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(54) ORGANIC ELECTROLUMINESCENT MATERIALS AND DEVICES

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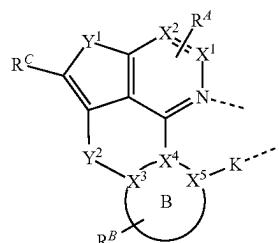
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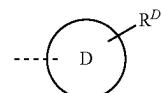
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ABSTRACT

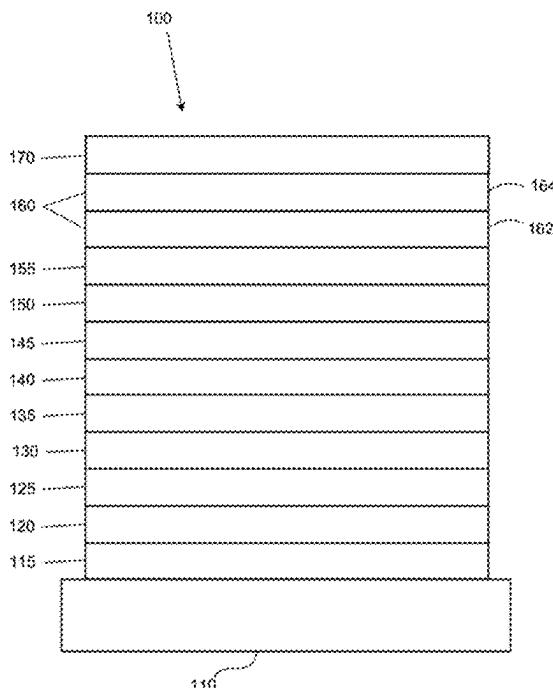
A compound having a first ligand L_A comprising a structure of Formula I,



is provided. In Formula I, at least one of the following statements is true: (1) R^C comprises at least one silyl or germyl group; or (2) R^C is Formula II



with the proviso that Y^2 and R^B are not joined to form a ring; and if moiety D is phenyl, then at least one R^D comprises one chemical group selected from the group consisting of: deuterium, halogen, alkyl having five or more carbon atoms, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, boryl, selenyl, and combinations thereof. Formulations, OLEDs, and consumer products containing the compound are also provided.



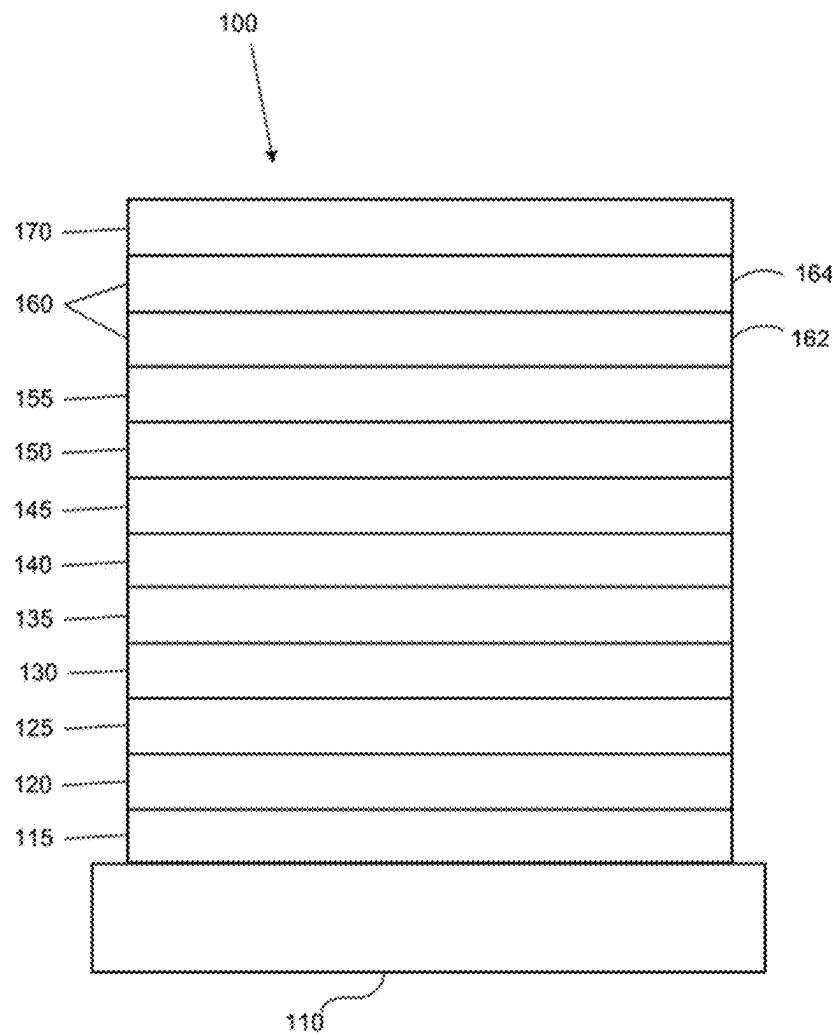


FIG. 1

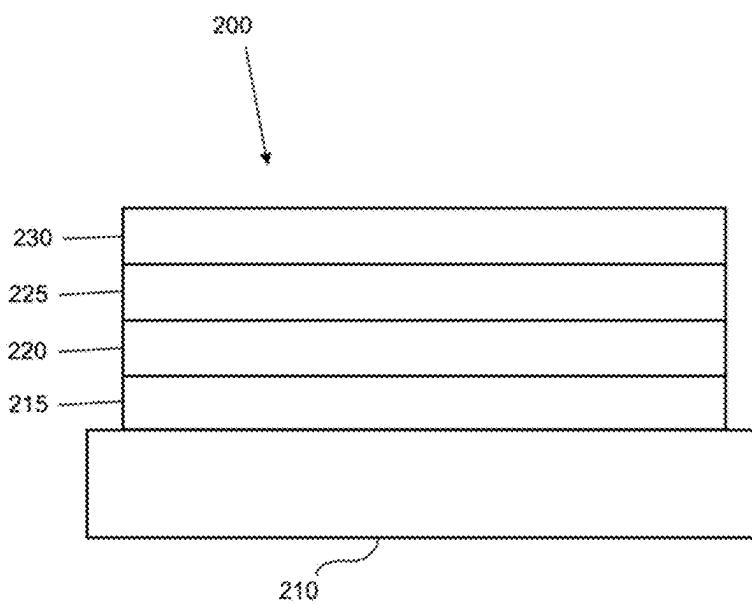


FIG. 2

ORGANIC ELECTROLUMINESCENT MATERIALS AND DEVICES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority under 35 U.S.C. § 119 (e) to U.S. Provisional Application No. 63/556,224, filed on Feb. 21, 2024, the entire contents of which are incorporated herein by reference.

FIELD

[0002] The present disclosure generally relates to organic or metal coordination compounds and formulations and their various uses including as emitters, sensitizers, charge transporters, or exciton transporters in devices such as organic light emitting diodes and related electronic devices and consumer products.

BACKGROUND

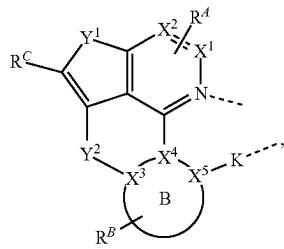
[0003] Opto-electronic devices that make use of organic materials are becoming increasingly desirable for various reasons. Many of the materials used to make such devices are relatively inexpensive, so organic opto-electronic devices have the potential for cost advantages over inorganic devices. In addition, the inherent properties of organic materials, such as their flexibility, may make them well suited for particular applications such as fabrication on a flexible substrate. Examples of organic opto-electronic devices include organic light emitting diodes/devices (OLEDs), organic phototransistors, organic photovoltaic cells, organic scintillators, and organic photodetectors. For OLEDs, the organic materials may have performance advantages over conventional materials.

[0004] OLEDs make use of thin organic films that emit light when voltage is applied across the device. OLEDs are becoming an increasingly interesting technology for use in applications such as displays, illumination, and backlighting.

[0005] One application for emissive molecules is a full color display. Industry standards for such a display call for pixels adapted to emit particular colors, referred to as “saturated” colors. In particular, these standards call for saturated red, green, and blue pixels. Alternatively, the OLED can be designed to emit white light. In conventional liquid crystal displays emission from a white backlight is filtered using absorption filters to produce red, green and blue emission. The same technique can also be used with OLEDs. The white OLED can be either a single emissive layer (EML) device or a stack structure. Color may be measured using CIE coordinates, which are well known to the art.

SUMMARY

[0006] In one aspect, the present disclosure provides a compound having a first ligand L_A comprising a structure of Formula I:

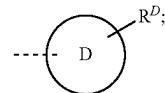


wherein:

[0007] at least one of the following statements is true:

[0008] (1) R^C comprises at least one silyl or germinal group;

[0009] (2) R^C is Formula II:



[0010] each of moiety B and moiety D is independently a monocyclic ring or a polycyclic fused ring system, wherein the monocyclic ring or each ring of the polycyclic fused ring system is independently a 5-membered to 10-membered carbocyclic or heterocyclic ring;

[0011] each of X^1 to X^5 is independently C or N;

[0012] Y^1 and Y^2 are each independently selected from the group consisting of BR, BRR', NR, PR, P(O)R, O, S, Se, C=O, C=S, C=Se, C=NR', C=CRR', S=O, SO₂, CR, CRR', SiRR', and GeRR';

[0013] K is selected from the group consisting of a direct bond, O, S, N(R^a), P(R^a), B(R), C(R^a)(R^b), and Si(R^a)(R^b);

[0014] each of R^A , R^B , and R^D each independently represents mono to the maximum allowable substitution, or no substitution;

[0015] each R, R', R^a, R^b, R^A, R^B, and R^D is independently hydrogen or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, boryl, arylalkyl, alkoxy, aryloxy, amino, silyl, germinal, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, and combinations thereof;

[0016] R^C is a substituent selected from the group consisting of alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, boryl, arylalkyl, alkoxy, aryloxy, amino, silyl, germinal, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, partially or fully deuterated variants thereof, partially or fully halogenated variants thereof, and combinations thereof;

[0017] L_A is coordinated to a metal M through the indicated dashed lines;

[0018] M has an atomic mass of at least 40;

[0019] M can be coordinated to other ligands;

[0020] L_A can be joined with other ligands to comprise a tridentate, tetradeятate, pentadentate, or hexadentate ligand; and any two substituents may be joined or fused to form a ring.

[0021] In another aspect, the present disclosure provides a formulation comprising a compound having a first ligand L_A comprising a structure of Formula I as described herein.

[0022] In yet another aspect, the present disclosure provides an OLED having an organic layer comprising a compound having a first ligand L_A comprising a structure of Formula I as described herein.

[0023] In yet another aspect, the present disclosure provides a consumer product comprising an OLED with an organic layer comprising a compound having a first ligand L_A comprising a structure of Formula I as described herein.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. 1 shows an organic light emitting device.

[0025] FIG. 2 shows an inverted organic light emitting device that does not have a separate electron transport layer.

DETAILED DESCRIPTION

A. Terminology

[0026] Unless otherwise specified, the below terms used herein are defined as follows:

[0027] As used herein, “top” means furthest away from the substrate, while “bottom” means closest to the substrate. Where a first layer is described as “disposed over” a second layer, the first layer is disposed further away from substrate. There may be other layers between the first and second layer, unless it is specified that the first layer is “in contact with” the second layer. For example, a cathode may be described as “disposed over” an anode, even though there are various organic layers in between.

[0028] As used herein, “solution processable” means capable of being dissolved, dispersed, or transported in and/or deposited from a liquid medium, either in solution or suspension form.

[0029] As used herein, and as would be generally understood by one skilled in the art, a first “Highest Occupied Molecular Orbital” (HOMO) or “Lowest Unoccupied Molecular Orbital” (LUMO) energy level is “greater than” or “higher than” a second HOMO or LUMO energy level if the first energy level is closer to the vacuum energy level. Since ionization potentials (IP) are measured as a negative energy relative to a vacuum level, a higher HOMO energy level corresponds to an IP having a smaller absolute value (an IP that is less negative). Similarly, a higher LUMO energy level corresponds to an electron affinity (EA) having a smaller absolute value (an EA that is less negative). On a conventional energy level diagram, with the vacuum level at the top, the LUMO energy level of a material is higher than the HOMO energy level of the same material. A “higher” HOMO or LUMO energy level appears closer to the top of such a diagram than a “lower” HOMO or LUMO energy level.

[0030] As used herein, and as would be generally understood by one skilled in the art, a first work function is “greater than” or “higher than” a second work function if the first work function has a higher absolute value. Because work functions are generally measured as negative numbers relative to vacuum level, this means that a “higher” work

function is more negative. On a conventional energy level diagram, with the vacuum level at the top, a “higher” work function is illustrated as further away from the vacuum level in the downward direction. Thus, the definitions of HOMO and LUMO energy levels follow a different convention than work functions.

[0031] Layers, materials, regions, and devices may be described herein in reference to the color of light they emit. In general, as used herein, an emissive region that is described as producing a specific color of light may include one or more emissive layers disposed over each other in a stack.

[0032] As used herein, a “NIR”, “red”, “green”, “blue”, “yellow” layer, material, region, or device refers to a layer, a material, a region, or a device that emits light in the wavelength range of about 700-1500 nm, 580-700 nm, 500-600 nm, 400-500 nm, 540-600 nm, respectively, or a layer, a material, a region, or a device that has a highest peak in its emission spectrum in the respective wavelength region. In some arrangements, separate regions, layers, materials, or devices may provide separate “deep blue” and “light blue” emissions. As used herein, the “deep blue” emission component refers to an emission having a peak emission wavelength that is at least about 4 nm less than the peak emission wavelength of the “light blue” emission component. Typically, a “light blue” emission component has a peak emission wavelength in the range of about 465-500 nm, and a “deep blue” emission component has a peak emission wavelength in the range of about 400-470 nm, though these ranges may vary for some configurations.

[0033] In some arrangements, a color altering layer that converts, modifies, or shifts the color of the light emitted by another layer to an emission having a different wavelength is provided. Such a color altering layer can be formulated to shift wavelength of the light emitted by the other layer by a defined amount, as measured by the difference in the wavelength of the emitted light and the wavelength of the resulting light. In general, there are two classes of color altering layers: color filters that modify a spectrum by removing light of unwanted wavelengths, and color changing layers that convert photons of higher energy to lower energy. For example, a “red” color filter can be present in order to filter an input light to remove light having a wavelength outside the range of about 580-700 nm. A component “of a color” refers to a component that, when activated or used, produces or otherwise emits light having a particular color as previously described. For example, a “first emissive region of a first color” and a “second emissive region of a second color different than the first color” describes two emissive regions that, when activated within a device, emit two different colors as previously described.

[0034] As used herein, emissive materials, layers, and regions may be distinguished from one another and from other structures based upon light initially generated by the material, layer or region, as opposed to light eventually emitted by the same or a different structure. The initial light generation typically is the result of an energy level change resulting in emission of a photon. For example, an organic emissive material may initially generate blue light, which may be converted by a color filter, quantum dot or other structure to red or green light, such that a complete emissive stack or sub-pixel emits the red or green light. In this case

the initial emissive material, region, or layer may be referred to as a “blue” component, even though the sub-pixel is a “red” or “green” component.

[0035] In some cases, it may be preferable to describe the color of a component such as an emissive region, sub-pixel, color altering layer, or the like, in terms of 1931 CIE coordinates. For example, a yellow emissive material may have multiple peak emission wavelengths, one in or near an edge of the “green” region, and one within or near an edge of the “red” region as previously described. Accordingly, as used herein, each color term also corresponds to a shape in the 1931 CIE coordinate color space. The shape in 1931 CIE color space is constructed by following the locus between two color points and any additional interior points. For example, interior shape parameters for red, green, blue, and yellow may be defined as shown below:

Color	CIE Shape Parameters
Central Red	Locus: [0.6270, 0.3725]; [0.7347, 0.2653]; Interior: [0.5086, 0.2657]
Central Green	Locus: [0.0326, 0.3530]; [0.3731, 0.6245]; Interior: [0.2268, 0.3321]
Central Blue	Locus: [0.1746, 0.0052]; [0.0326, 0.3530]; Interior: [0.2268, 0.3321]
Central Yellow	Locus: [0.3731, 0.6245]; [0.6270, 0.3725]; Interior: [0.3700, 0.4087]; [0.2886, 0.4572]

[0036] The terms “halo,” “halogen,” and “halide” are used interchangeably and refer to fluorine, chlorine, bromine, and iodine.

[0037] The term “acyl” refers to a substituted carbonyl group ($-\text{C}(\text{O})-\text{R}_s$).

[0038] The term “ester” refers to a substituted oxycarbonyl ($-\text{O}-\text{C}(\text{O})-\text{R}_s$ or $-\text{C}(\text{O})-\text{O}-\text{R}_s$) group.

[0039] The term “ether” refers to an $-\text{OR}_s$ group.

[0040] The terms “sulfanyl” or “thio-ether” are used interchangeably and refer to a $-\text{SR}_s$ group.

[0041] The term “selenyl” refers to a $-\text{SeR}_s$ group.

[0042] The term “sulfinyl” refers to a $-\text{S}(\text{O})-\text{R}_s$ group.

[0043] The term “sulfonyl” refers to a $-\text{SO}_2-\text{R}_s$ group.

[0044] The term “phosphino” refers to a group containing at least one phosphorus atom bonded to the relevant structure. Common examples of phosphino groups include, but are not limited to, groups such as a $-\text{P}(\text{R}_s)_2$ group or a $-\text{PO}(\text{R}_s)_2$ group, wherein each R_s can be same or different.

[0045] The term “silyl” refers to a group containing at least one silicon atom bonded to the relevant structure. Common examples of silyl groups include, but are not limited to, groups such as a $-\text{Si}(\text{R}_s)_3$ group, wherein each R_s can be same or different. The term “germyl” refers to a group containing at least one germanium atom bonded to the relevant structure. Common examples of germyl groups include, but are not limited to, groups such as a $-\text{Ge}(\text{R}_s)_3$ group, wherein each R_s can be same or different.

[0046] The term “boryl” refers to a group containing at least one boron atom bonded to the relevant structure. Common examples of boryl groups include, but are not limited to, groups such as a $-\text{B}(\text{R}_s)_2$ group or its Lewis adduct $-\text{B}(\text{R}_s)_3$ group, wherein R_s can be same or different.

[0047] In each of the above, R_s can be hydrogen or a substituent selected from the group consisting of the general substituents as defined in this application. Preferred R_s is selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl,

alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, and combination thereof. More preferably R_s is selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combination thereof.

[0048] The term “alkyl” refers to and includes both straight and branched chain alkyl groups having an alkyl carbon atom bonded to the relevant structure. Preferred alkyl groups are those containing from one to fifteen carbon atoms, preferably one to nine carbon atoms, and the preferred alkyl groups include methyl, ethyl, n-propyl, isopropyl, n-butyl, sec-butyl, iso-butyl, tert-butyl, n-pentyl, 2-methylbutyl, 3-methylbutyl, 2,2-dimethylpropyl, 1,3-dimethylpropyl, 1,1-dimethylpropyl, 2-ethylpropyl, 1,2-dimethylpropyl, n-hexyl, 2-methylpentyl, 3-methylpentyl, 2,2-dimethylbutyl, 2,3-dimethylbutyl, n-heptyl, 2-methylhexyl, 3-methylhexyl, 2,2-dimethylpentyl, 2,3-dimethylpentyl, 2,4-dimethylpentyl, 3,3-dimethylpentyl, 3-ethylpentyl, 2,2,3-trimethylbutyl, and the like. Additionally, the alkyl group can be further substituted.

[0049] The term “cycloalkyl” refers to and includes monocyclic, polycyclic, and spiro alkyl groups having a ring alkyl carbon atom bonded to the relevant structure. Preferred cycloalkyl groups are those containing 3 to 12 ring carbon atoms and includes cyclopropyl, cyclopentyl, cyclohexyl, bicyclo[3.1.1]heptyl, spiro[4.5]decyl, spiro[5.5]undecyl, adamantyl, and the like. Additionally, the cycloalkyl group can be further substituted.

[0050] The terms “heteroalkyl” or “heterocycloalkyl” refer to an alkyl or a cycloalkyl group, respectively, having at least one carbon atom replaced by a heteroatom. Optionally the at least one heteroatom is selected from O, S, N, P, B, Si, Ge and Se, preferably, O, S or N. Additionally, the heteroalkyl or heterocycloalkyl group can be further substituted.

[0051] The term “alkenyl” refers to and includes both straight and branched chain alkene groups. Alkenyl groups are essentially alkyl groups that include at least one carbon-carbon double bond in the alkyl chain with one carbon atom from the carbon-carbon double bond that is bonded to the relevant structure. Cycloalkenyl groups are essentially cycloalkyl groups that include at least one carbon-carbon double bond in the cycloalkyl ring. The term “heteroalkenyl” as used herein refers to an alkenyl group having at least one carbon atom replaced by a heteroatom. Optionally the at least one heteroatom is selected from O, S, N, P, B, Si, Ge, and Se, preferably, O, S, or N. Preferred alkenyl, cycloalkenyl, or heteroalkenyl groups are those containing two to fifteen carbon atoms. Additionally, the alkenyl, cycloalkenyl, or heteroalkenyl group can be further substituted.

[0052] The term “alkynyl” refers to and includes both straight and branched chain alkyne groups. Alkynyl groups are essentially alkyl groups that include at least one carbon-carbon triple bond in the alkyl chain with one carbon atom from the carbon-carbon triple bond that is bonded to the relevant structure. Preferred alkynyl groups are those containing two to fifteen carbon atoms. Additionally, the alkynyl group can be further substituted.

[0053] The terms “aralkyl” or “arylalkyl” are used interchangeably and refer to an aryl-substituted alkyl group having an alkyl carbon atom bonded to the relevant structure. Additionally, the aralkyl group can be further substituted.

[0054] The term “heterocyclic group” refers to and includes aromatic and non-aromatic cyclic groups containing at least one heteroatom. Optionally the at least one heteroatom is selected from O, S, Se, N, P, B, Si, Ge, and Se, preferably, O, S, N, or B. Hetero-aromatic cyclic groups may be used interchangeably with heteroaryl. Preferred hetero-non-aromatic cyclic groups are those containing 3 to 10 ring atoms, preferably those containing 3 to 7 ring atoms, which includes at least one hetero atom, and includes cyclic amines such as morpholino, piperidino, pyrrolidino, and the like, and cyclic ethers/thio-ethers, such as tetrahydrofuran, tetrahydropyran, tetrahydrothiophene, and the like. Additionally, the heterocyclic group can be further substituted or fused.

[0055] The term “aryl” refers to and includes both single-ring and polycyclic aromatic hydrocarbyl groups. The polycyclic rings may have two or more rings in which two carbons are common to two adjoining rings (the rings are “fused”). Preferred aryl groups are those containing six to thirty carbon atoms, preferably six to twenty-four carbon atoms, six to eighteen carbon atoms, and more preferably six to twelve carbon atoms. Especially preferred is an aryl group having six carbons, ten carbons, twelve carbons, fourteen carbons, or eighteen carbons. Suitable aryl groups include phenyl, biphenyl, triphenyl, triphenylene, tetraphenylene, naphthalene, anthracene, phenalene, phenanthrene, pyrene, chrysene, perylene, and azulene, preferably phenyl, biphenyl, triphenyl, triphenylene, and naphthalene. Additionally, the aryl group can be further substituted or fused, such as, without limitation, fluorene.

[0056] The term “heteroaryl” refers to and includes both single-ring aromatic groups and polycyclic aromatic ring systems that include at least one heteroatom. The heteroatoms include, but are not limited to O, S, Se, N, P, B, Si, Ge, and Se. In many instances, O, S, N, or B are the preferred heteroatoms. Hetero-single ring aromatic systems are preferably single rings with 5 or 6 ring atoms, and the ring can have from one to six heteroatoms. The hetero-polycyclic ring systems can have two or more aromatic rings in which two atoms are common to two adjoining rings (the rings are “fused”) wherein at least one of the rings is a heteroaryl. The hetero-polycyclic aromatic ring systems can have from one to six heteroatoms per ring of the polycyclic aromatic ring system. Preferred heteroaryl groups are those containing three to thirty carbon atoms, preferably three to twenty-four carbon atoms, three to eighteen carbon atoms, and more preferably three to twelve carbon atoms. Suitable heteroaryl groups include dibenzothiophene, dibenzofuran, dibenzoselenophene, furan, thiophene, benzofuran, benzothiophene, benzoselenophene, carbazole, indolocarbazole, pyridindole, pyrrolodipyridine, pyrazole, imidazole, triazole, oxazole, thiazole, oxadiazole, oxatriazole, dioxazole, thiadiazole, pyridine, pyridazine, pyrimidine, pyrazine, triazine, oxazine, oxathiazine, oxadiazine, indole, benzimidazole, indazole, indoxazine, benzoxazole, benzisoxazole, benzothiazole, quinoline, isoquinoline, cinnoline, quinazoline, quinoxaline, naphthyridine, phthalazine, pteridine, xanthene, acridine, phenazine, phenothiazine, phenoxazine, benzofuropyridine, furodipyridine, benzothienopyridine, thienodipyridine, benzoselenophenopyridine, selenopheno-dipyridine, azaborine, borazine, 522,9% 2-diaza-13b-boranaphtho[2,3,4-de]anthracene, 5% 2-benzo[d]benzo[4,5]imidazo[3,2-a]imidazole, and 5,9-dioxa-13b-boranaphtho[3,2,1-de]anthracene; preferably dibenzothiophene, dibenzofuran, dibenzoselenophene, carbazole, indolocarba-

zole, imidazole, pyridine, triazine, benzimidazole, 522,9% 2-diaza-13b-boranaphtho[2,3,4-de]anthracene, 522-benzo[d]benzo[4,5]imidazo[3,2-a]imidazole, and 5,9-dioxa-13b-boranaphtho[3,2,1-de]anthracene. Additionally, the heteroaryl group can be further substituted or fused.

[0057] Of the aryl and heteroaryl groups listed above, the groups of triphenylene, naphthalene, anthracene, dibenzothiophene, dibenzofuran, dibenzoselenophene, carbazole, indolocarbazole, imidazole, pyridine, pyrazine, pyrimidine, triazine, benzimidazole, 522,922-diaza-13b-boranaphtho[2,3,4-de]anthracene, 522-benzo[d]benzo[4,5]imidazo[3,2-a]imidazole, 5,9-dioxa-13b-boranaphtho[3,2,1-de]anthracene, and the respective aza-analogs of each thereof are of particular interest.

[0058] In many instances, the General Substituents are selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, selenyl, sulfinyl, sulfonyl, phosphino, and combinations thereof.

[0059] In some instances, the Preferred General Substituents are selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, and combinations thereof.

[0060] In some instances, the More Preferred General Substituents are selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, aryl, heteroaryl, nitrile, sulfanyl, and combinations thereof.

[0061] In some instances, the Even More Preferred General Substituents are selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, silyl, aryl, heteroaryl, nitrile, and combinations thereof.

[0062] In yet other instances, the Most Preferred General Substituents are selected from the group consisting of deuterium, alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof.

[0063] The terms “substituted” and “substitution” refer to a substituent other than H that is bonded to the relevant position, e.g., a carbon or nitrogen. For example, when R¹ represents mono-substitution, then one R¹ must be other than H (i.e., a substitution). Similarly, when R¹ represents di-substitution, then two of R¹ must be other than H. Similarly, when R¹ represents zero or no substitution, R¹, for example, can be a hydrogen for all available valencies of ring atoms, as in carbon atoms for benzene and the nitrogen atom in pyrrole, or simply represents nothing for ring atoms with fully filled valencies, e.g., the nitrogen atom in pyridine. The maximum number of substitutions possible in a ring structure will depend on the total number of available valencies in the ring atoms.

[0064] As used herein, “combinations thereof” indicates that one or more members of the applicable list are combined to form a known or chemically stable arrangement that one of ordinary skill in the art can envision from the applicable list. For example, an alkyl and deuterium can be combined to form a partial or fully deuterated alkyl group; a halogen and alkyl can be combined to form a halogenated alkyl substituent; and a halogen, alkyl, and aryl can be combined to form a halogenated arylalkyl. In one instance, the term substitution includes a combination of two to four

of the listed groups. In another instance, the term substitution includes a combination of two to three groups. In yet another instance, the term substitution includes a combination of two groups. Preferred combinations of substituent groups are those that contain up to fifty atoms that are not hydrogen or deuterium, or those which include up to forty atoms that are not hydrogen or deuterium, or those that include up to thirty atoms that are not hydrogen or deuterium. In many instances, a preferred combination of substituent groups will include up to twenty atoms that are not hydrogen or deuterium.

[0065] The “aza” designation in the fragments described herein, i.e. aza-dibenzofuran, aza-dibenzothiophene, etc. means that one or more of the C—H groups in the respective aromatic ring can be replaced by a nitrogen atom, for example, and without any limitation, azatriphenylene encompasses both dibenzo[f,h]quinoxaline and dibenzo[f,h] quinoline. One of ordinary skill in the art can readily envision other nitrogen analogs of the aza-derivatives described above, and all such analogs are intended to be encompassed by the terms as set forth herein.

[0066] As used herein, “deuterium” refers to an isotope of hydrogen. Deuterated compounds can be readily prepared using methods known in the art. For example, U.S. Pat. No. 8,557,400, Patent Pub. No. WO 2006/095951, and U.S. Pat. Application Pub. No. US 2011/0037057, which are hereby incorporated by reference in their entireties, describe the making of deuterium-substituted organometallic complexes. Further reference is made to Ming Yan, et al., *Tetrahedron* 2015, 71, 1425-30 and Atzrodt et al., *Angew. Chem. Int. Ed. (Reviews)* 2007, 46, 7744-65, which are incorporated by reference in their entireties, describe the deuteration of the methylene hydrogens in benzyl amines and efficient pathways to replace aromatic ring hydrogens with deuterium, respectively.

[0067] As used herein, any specifically listed substituent, such as, without limitation, methyl, phenyl, pyridyl, etc. includes undeuterated, partially deuterated, and fully deuterated versions thereof. Similarly, classes of substituents such as, without limitation, alkyl, aryl, cycloalkyl, heteroaryl, etc. also include undeuterated, partially deuterated, and fully deuterated versions thereof. Unless otherwise specified, atoms in chemical structures without valences fully filled by H or D should be considered to include undeuterated, partially deuterated, and fully deuterated versions thereof. For example, the chemical structure of



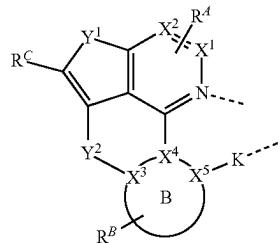
implies to include C_6H_6 , C_6D_6 , $C_6H_5D_3$, and any other partially deuterated variants thereof. Some common basic partially or fully deuterated group include, without limitation, CD_3 , $CD_2C(CH_3)_3$, $C(CD_3)_3$, and C_6D_5 .

[0068] It is to be understood that when a molecular fragment is described as being a substituent or otherwise attached to another moiety, its name may be written as if it were a fragment (e.g. phenyl, phenylene, naphthyl, dibenzofuryl) or as if it were the whole molecule (e.g. benzene, naphthalene, dibenzofuran). As used herein, these different ways of designating a substituent or attached fragment are considered to be equivalent.

[0069] In some instances, a pair of substituents in the molecule can be optionally joined or fused into a ring. The preferred ring is a five to nine-membered carbocyclic or heterocyclic ring, includes both instances where the portion of the ring formed by the pair of substituents is saturated and where the portion of the ring formed by the pair of substituents is unsaturated. In yet other instances, a pair of adjacent substituents can be optionally joined or fused into a ring. As used herein, “adjacent” means that the two substituents involved can be on the same ring next to each other, or on two neighboring rings having the two closest available substitutable positions, such as 2,2' positions in a biphenyl, or 1,8 position in a naphthalene.

B. The Compounds of the Present Disclosure

[0070] In one aspect, the present disclosure provides a compound having a first ligand L_A comprising a structure of Formula I:

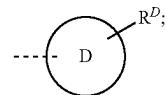


[0071] wherein:

[0072] at least one of the following statements is true:

[0073] (1) R^C comprises at least one silyl or germyl group;

[0074] (2) R^C is Formula II:



[0075] each of moiety B and moiety D is independently a monocyclic ring or a polycyclic fused ring system, wherein the monocyclic ring or each ring of the polycyclic fused ring system is independently a 5-membered to 10-membered carbocyclic or heterocyclic ring;

[0076] each of X^1 to X^5 is independently C or N;

[0077] Y^1 and Y^2 are each independently selected from the group consisting of BR, BRR', NR, PR, P(O)R, O, S, Se, C=O, C=S, C=Se, C=NR', C=CRR', S=O, SO₂, CR, CRR', SiRR', and GeRR';

[0078] K is selected from the group consisting of a direct bond, O, S, N(R^a), P(R^a), B(R^a), C(R^a) (R^b), and Si(R^a) (R^b);

[0079] each of R^A , R^B , and R^D each independently represents mono to the maximum allowable substitution, or no substitution;

[0080] each R, R', R^a, R^b, R^A, R^B, and R^D is independently hydrogen or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, boryl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, alkenyl,

cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, and combinations thereof;

[0081] R^C is a substituent selected from the group consisting of alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, boryl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, partially or fully deuterated variants thereof, partially or fully halogenated variants thereof, and combinations thereof;

[0082] L_A is coordinated to a metal M through the indicated dashed lines;

[0083] M has an atomic mass of at least 40;

[0084] M can be coordinated to other ligands;

[0085] L_A can be joined with other ligands to comprise a tridentate, tetradeятate, pentadentate, or hexadentate ligand; and any two substituents may be joined or fused to form a ring.

[0086] In some embodiments, Y^2 and R^B are not joined to form a ring.

[0087] In some embodiments, if moiety D is phenyl, then at least one R^D comprises one chemical group selected from the group consisting of: deuterium, halogen, alkyl having five or more carbon atoms, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, boryl, selenyl, and combinations thereof. In some such embodiments, moiety D is phenyl.

[0088] In some embodiments, L_A consists essentially of Formula I. In some embodiments, L_A has a structure of Formula I.

[0089] In some embodiments of Formula I, at least one R^A , R^B , and R^C is partially or fully deuterated. In some embodiments, at least one R^A is partially or fully deuterated. In some embodiments, at least one R^B is partially or fully deuterated. In some embodiments, at least one R^D is partially or fully deuterated.

[0090] In some embodiments, each R, R' , R^α , R^B , R^A , R^B , and R^D is independently hydrogen or a substituent selected from the General Preferred Substituents defined herein. In some embodiments, each R, R' , R^α , R^B , R^A , R^B , and R^D is independently hydrogen or a substituent selected from the More Preferred Substituents defined herein. In some embodiments, each R, R' , R^α , R^B , R^A , R^B , and R^D is independently hydrogen or a substituent selected from the Even More Preferred Substituents defined herein. In some embodiments, each R, R' , R^α , R^B , R^A , R^B , and R^D is independently hydrogen or a substituent selected from the Most Preferred Substituents defined herein.

[0091] In some embodiments, at least one R^A , R^B , R^C or R^D is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^A is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^B is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^C is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^D is selected from the group consisting of the General

Substituents defined herein. In some embodiments, at least one R^A , R^B , R^C or R^D is selected from the group consisting of the Preferred General Substituents defined herein.

[0092] In some embodiments, R^C is a substituent selected from the group consisting of alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, partially or fully deuterated variants thereof, partially or fully fluorinated variants thereof, and combinations thereof.

[0093] In some embodiments, the metal M is selected from the group consisting of Ir, Rh, Re, Ru, Os, Pt, Pd, Ag, Au, and Cu. In some embodiments, the metal M is Ir. In some embodiments, the metal M is Pt.

[0094] In some embodiments, moiety B is selected from the group consisting of the following Cyclic Moiety List: benzene, pyridine, pyrimidine, pyridazine, pyrazine, triazine, imidazole, pyrazole, pyrrole, oxazole, furan, thiophene, thiazole, triazole, naphthalene, quinoline, isoquinoline, quinaline, quinoxaline, benzofuran, aza-benzofuran, benzoxazole, aza-benzoxazole, benzothiophene, aza-benzothiophene, benzothiazole, aza-benzothiazole, benzoselenophene, aza-benzoselenophene, indene, aza-indene, indole, aza-indole, benzimidazole, aza-benzimidazole, carbazole, aza-carbazole, dibenzofuran, aza-dibenzofuran, dibenzothiophene, aza-dibenzothiophene, phthalazine, phenanthrene, aza-phenanthrene, anthracene, aza-anthracene, phenanthridine, fluorene, and aza-fluorene.

[0095] In some embodiments, the aza variant includes one N on a benzo ring. In some embodiments, the aza variant includes one N on a benzo ring and the N is bonded to the metal M.

[0096] In some embodiments, moiety B is a monocyclic ring. In some embodiments, moiety B is selected from the group consisting of benzene, pyridine, pyrimidine, pyridazine, pyrazine, triazine, imidazole, pyrazole, pyrrole, oxazole, furan, thiophene, thiazole, and triazole. In some embodiments, moiety B is benzene.

[0097] In some embodiments, moiety B is a polycyclic fused ring system. In some embodiments, moiety B is selected from the group consisting of naphthalene, quinoline, isoquinoline, quinazoline, quinoxaline, benzofuran, aza-benzofuran, benzoxazole, aza-benzoxazole, benzothiophene, aza-benzothiophene, benzoselenophene, aza-benzoselenophene, indene, aza-indene, indole, aza-indole, benzimidazole, aza-benzimidazole, benzobenzimidazole, aza-benzobenzimidazole, carbazole, aza-carbazole, dibenzofuran, aza-dibenzofuran, phenanthro[3,2-b]benzofuran, dibenzothiophene, aza-dibenzothiophene, phthalazine, phenanthrene, aza-phenanthrene, anthracene, aza-anthracene, phenanthridine, fluorene, and aza-fluorene. In some embodiments, moiety B is naphthalene or benzothiophene.

[0098] In some embodiments, X^1 and X^2 are both C.

[0099] In some embodiments, one of X^1 and X^2 is C and the other of X^1 and X^2 is N. In some embodiments, X^1 is C and X^2 is N. In some embodiments, X^1 is N and X^2 is C.

[0100] In some embodiments, each of X^3 to X^5 is C. In some embodiments, at least one of X^3 to X^5 is N. In some embodiments, X^5 is N.

[0101] In some embodiments, Y^1 is selected from the group consisting of O, S, and Se. In some embodiments, Y^1 is S.

[0102] In some embodiments, Y^1 is selected from the group consisting of BR, NR, and PR.

[0103] In some embodiments, Y^1 is selected from the group consisting of BRR', CRR', SiRR', and GeRR'.

[0104] In some embodiments, Y^1 is selected from the group consisting of P(O)R, C=O, C=S, C=Se, C=NR, C=CRR', S=O, and SO₂.

[0105] In some embodiments, Y^1 is CR.

[0106] In some embodiments, Y^2 is selected from the group consisting of O, S, and Se. In some embodiments, Y^1 is S.

[0107] In some embodiments, Y^2 is selected from the group consisting of BR, NR, and PR.

[0108] In some embodiments, Y^2 is selected from the group consisting of BRR', CRR', SiRR', and GeRR'. In some embodiments, Y^2 is selected from the group consisting of CRR', SiRR', and GeRR'.

[0109] In some embodiments, Y^2 is CRR'. In some embodiments, each of R and R' is independently an alkyl group.

[0110] In some embodiments, Y^2 is selected from the group consisting of P(O)R, C=O, C=S, C=Se, C=NR, C=CRR', S=O, and SO₂.

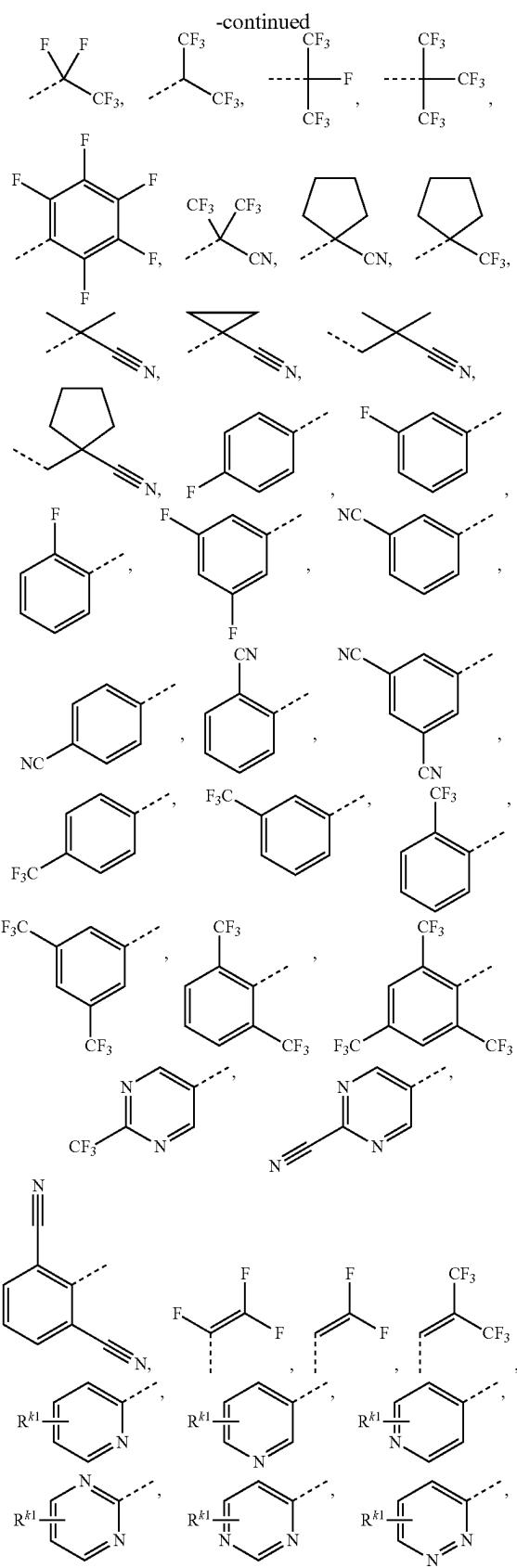
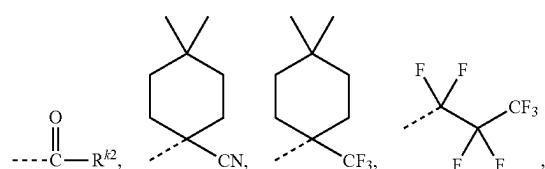
[0111] In some embodiments, Y^2 is CR.

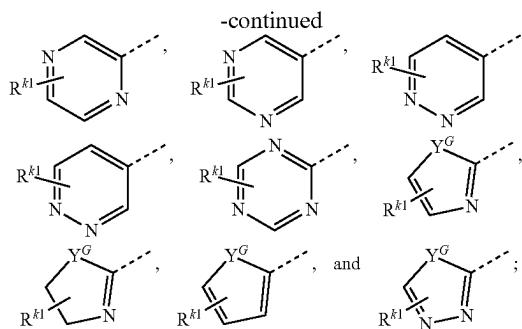
[0112] In some embodiments, K is selected from the group consisting of a direct bond, O, and S. In some embodiments, K is O or S. In some embodiments, K is a direct bond.

[0113] In some embodiments, K is selected from the group consisting of N(R^a), P(R^a), and B(R^a).

[0114] In some embodiments, K is selected from the group consisting of C(R^a) (R^b), and Si(R^a) (R^b).

[0115] In some embodiments, the first ligand L₄ comprises an electron-withdrawing group selected from the group consisting of the structures in the following EWG1 LIST: F, CF₃, CN, COCH₃, CHO, COCF₃, COOMe, COOCF₃, NO₂, SF₃, SiF₃, PF₄, SF₅, OCF₃, SCF₃, SeCF₃, SOCF₃, SeOCF₃, SO₂F, SO₂CF₃, SeO₂CF₃, OSeO₂CF₃, OCN, SCN, SeCN, NC, +N(R^{k2})₃, (R^{k2})₂CCN, (R^{k2})₂CCF₃, CNC(CF₃)₂, BR^{k3}R^{k2}, substituted or unsubstituted dibenzoborole, 1-substituted carbazole, 1,9-substituted carbazole, substituted or unsubstituted carbazole, substituted or unsubstituted pyridine, substituted or unsubstituted pyrazine, substituted or unsubstituted pyrimidine, substituted or unsubstituted pyridoxine, substituted or unsubstituted triazine, substituted or unsubstituted oxazole, substituted or unsubstituted benzoxazole, substituted or unsubstituted thiazole, substituted or unsubstituted benzothiazole, substituted or unsubstituted imidazole, substituted or unsubstituted benzimidazole, ketone, carboxylic acid, ester, nitrile, isonitrile, sulfinyl, sulfonyl, partially and fully fluorinated alkyl, partially and fully fluorinated aryl, partially and fully fluorinated heteroaryl, cyano-containing alkyl, cyano-containing aryl, cyano-containing heteroaryl, isocyanate,



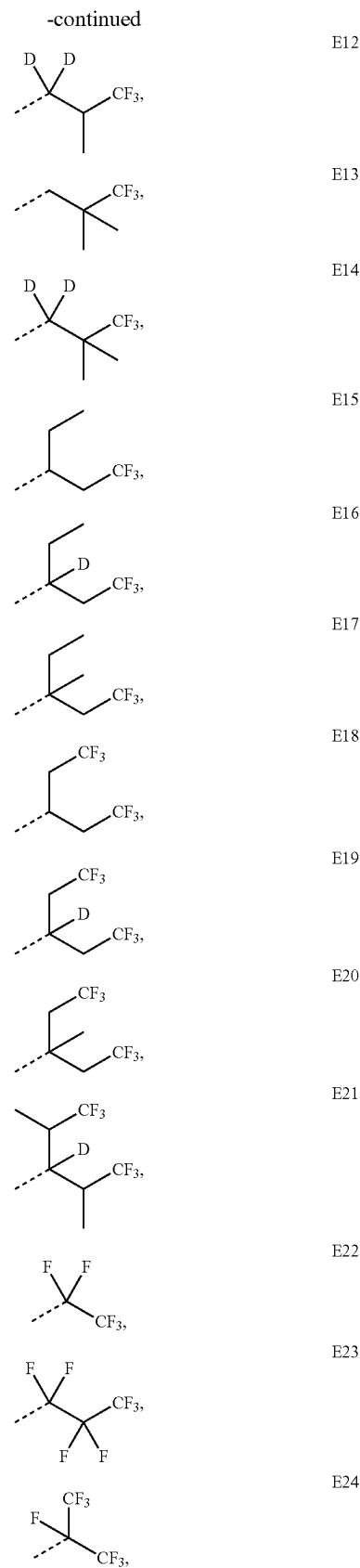


[0116] wherein each R^{k1} represents mono to the maximum allowable substitution, or no substitutions;

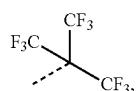
[0117] wherein Y^G is selected from the group consisting of BR_e, NR_e, PR_e, O, S, Se, C=O, S=O, SO₂, CR_eR_f, SiR_eR_f and GeR_eR_f; and

[0118] wherein each of R^{k1}, R^{k2}, R^{k3}, R_e, and R_f is independently a hydrogen, or a substituent selected from the group consisting of the General Substituents defined herein.

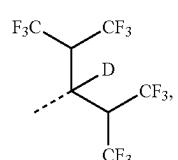
[0119] In some embodiments, the first ligand L_A comprises an electron-withdrawing group selected from the group consisting of the structures of the following EWG2 List:



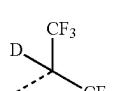
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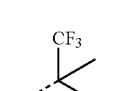
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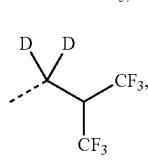
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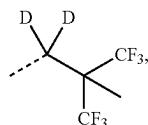
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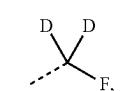
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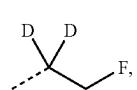
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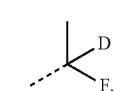
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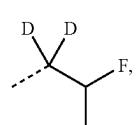
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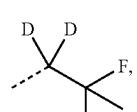
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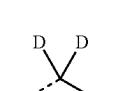
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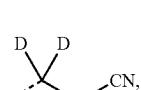
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E35



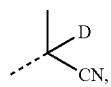
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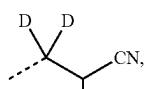
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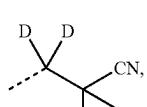
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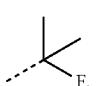
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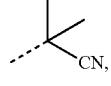
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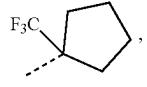
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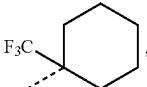
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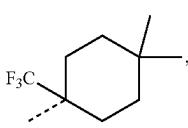
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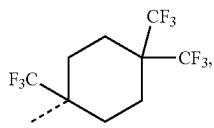
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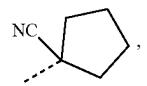
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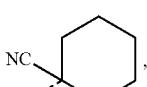
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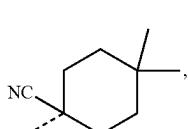
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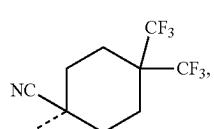
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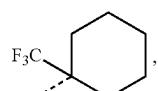
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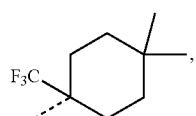
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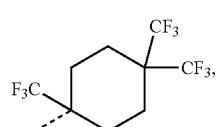
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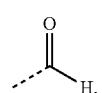
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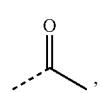
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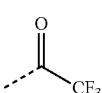
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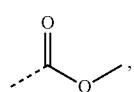
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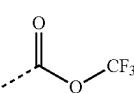
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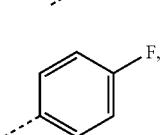


E58

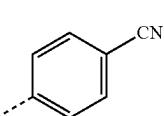
 NO_2 , SF_3 , SiF_3 , PF_4 , SF_5 , $\text{O}-\text{CF}_3$, $\text{S}-\text{CF}_3$, $\text{Se}-\text{CF}_3$, OCN , SCN , SeCN ,

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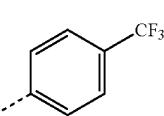
E70

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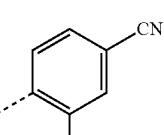
E71



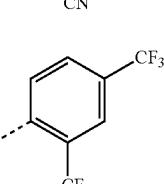
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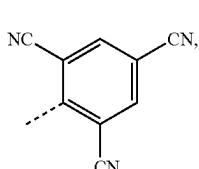
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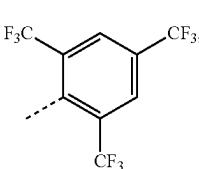
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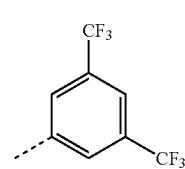
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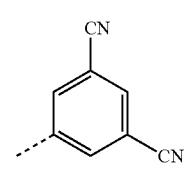
E76



E77



E78



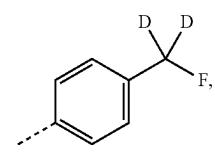
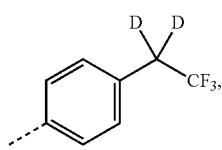
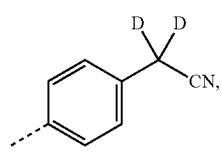
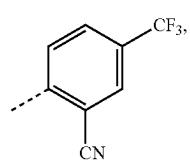
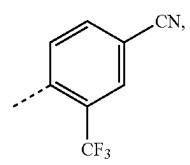
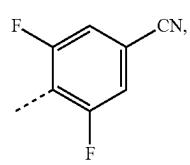
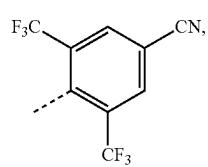
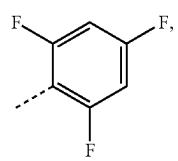
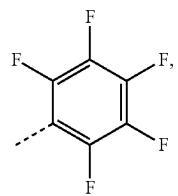
E79

E67

E68

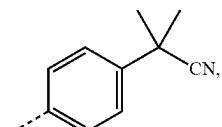
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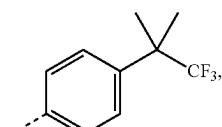


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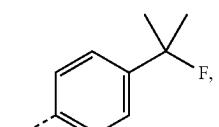
E89



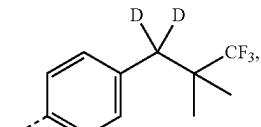
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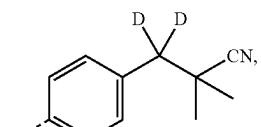
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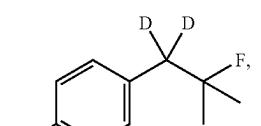
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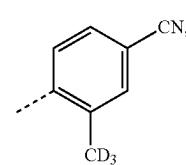
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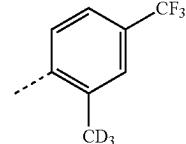
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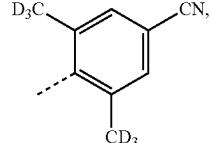
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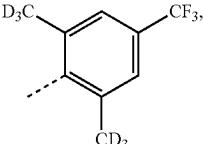
E96



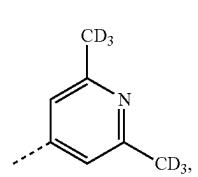
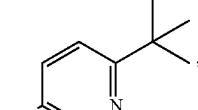
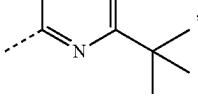
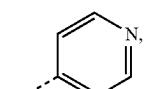
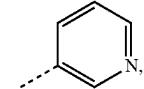
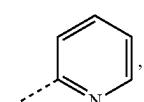
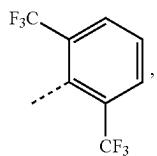
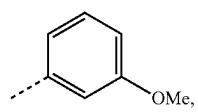
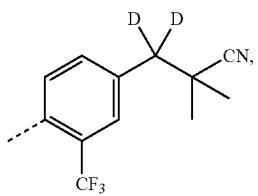
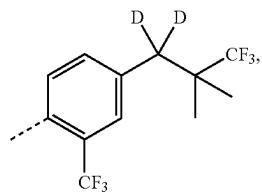
E97



E98

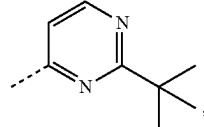


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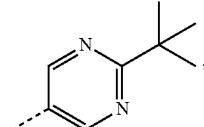


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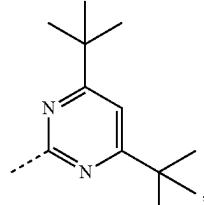
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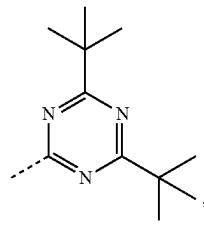
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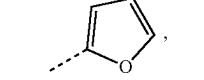
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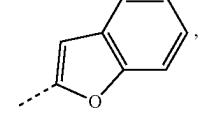
E112



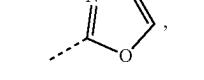
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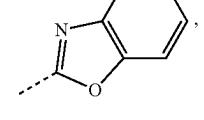
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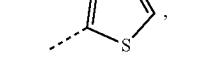
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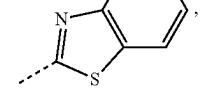
E116



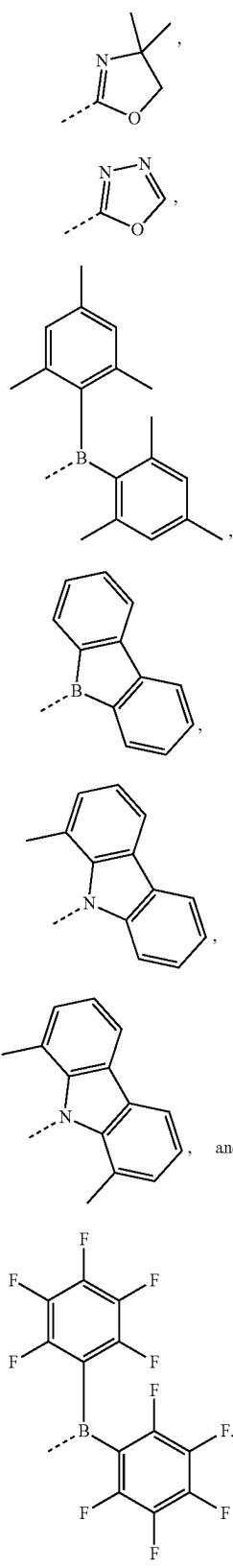
E117



E118



-continued



E119

E120

E121

E122

E123

E124

E125

[0120] In some embodiments, the first ligand L_A comprises an electron-withdrawing group selected from the group consisting of the structures of the following EWG3 LIST:



E1



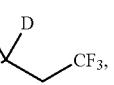
E2



E3



E5



E7



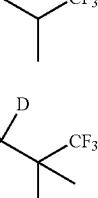
E9



E10



E12



E14



E22



E23



E24

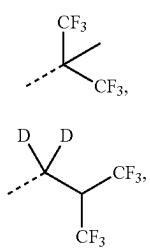


E25

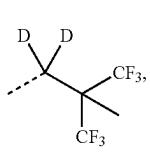


E27

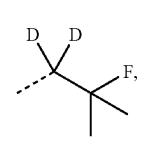
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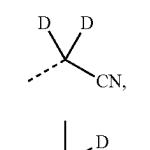
E28



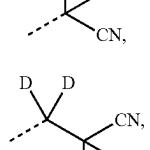
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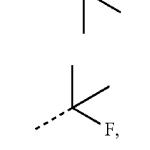
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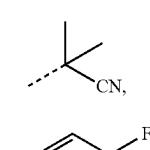
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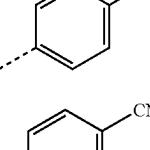
E36



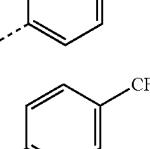
E38



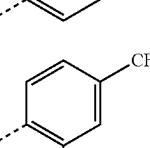
E40



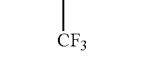
E41



E42



E71



E72

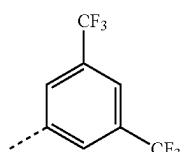


E73

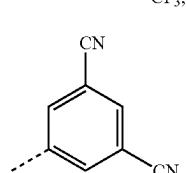


E75

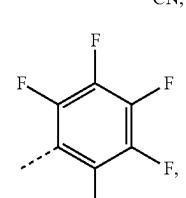
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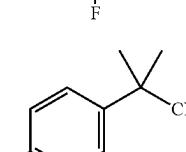
E78



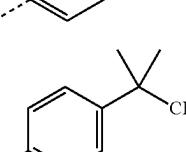
E79



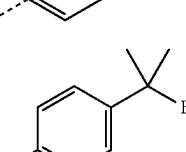
E80



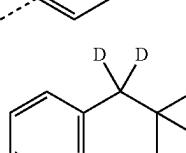
E89



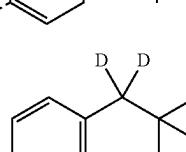
E90



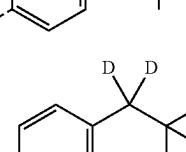
E91



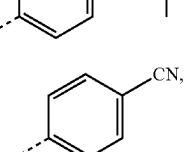
E92



E93

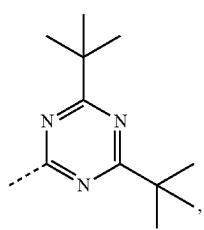
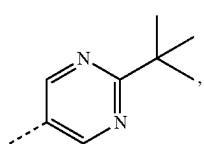
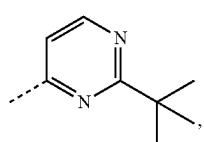
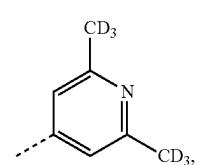
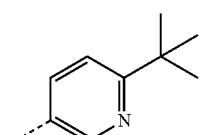
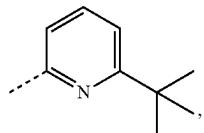
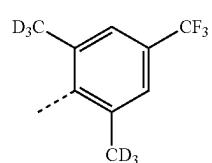
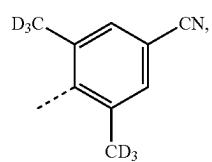
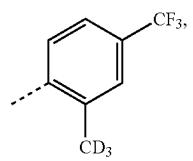


E94

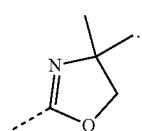
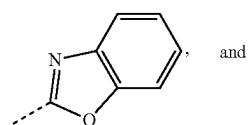
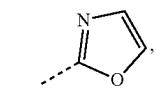
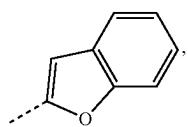


E95

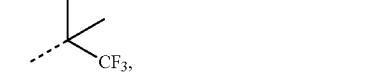
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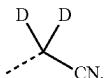
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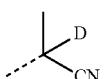
[0121] In some embodiments, the first ligand L_A comprises an electron-withdrawing group selected from the group consisting of the structures of the following EWG4 LIST:



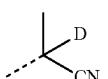
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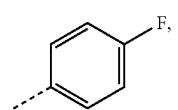
E36



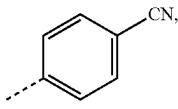
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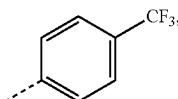
E42



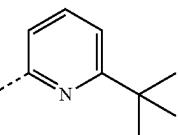
E71



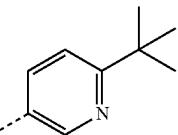
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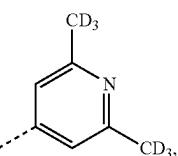
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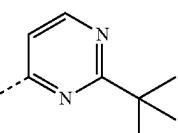
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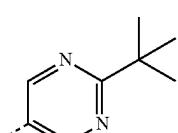
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E108



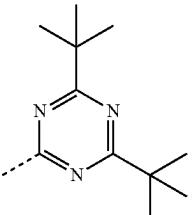
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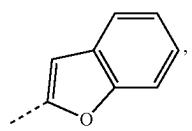
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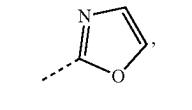
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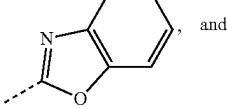
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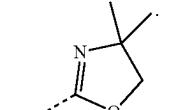
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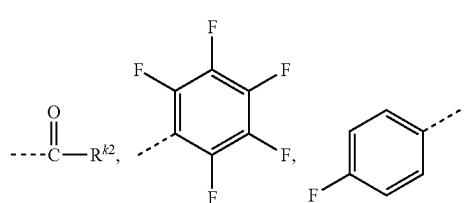
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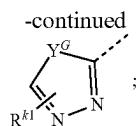
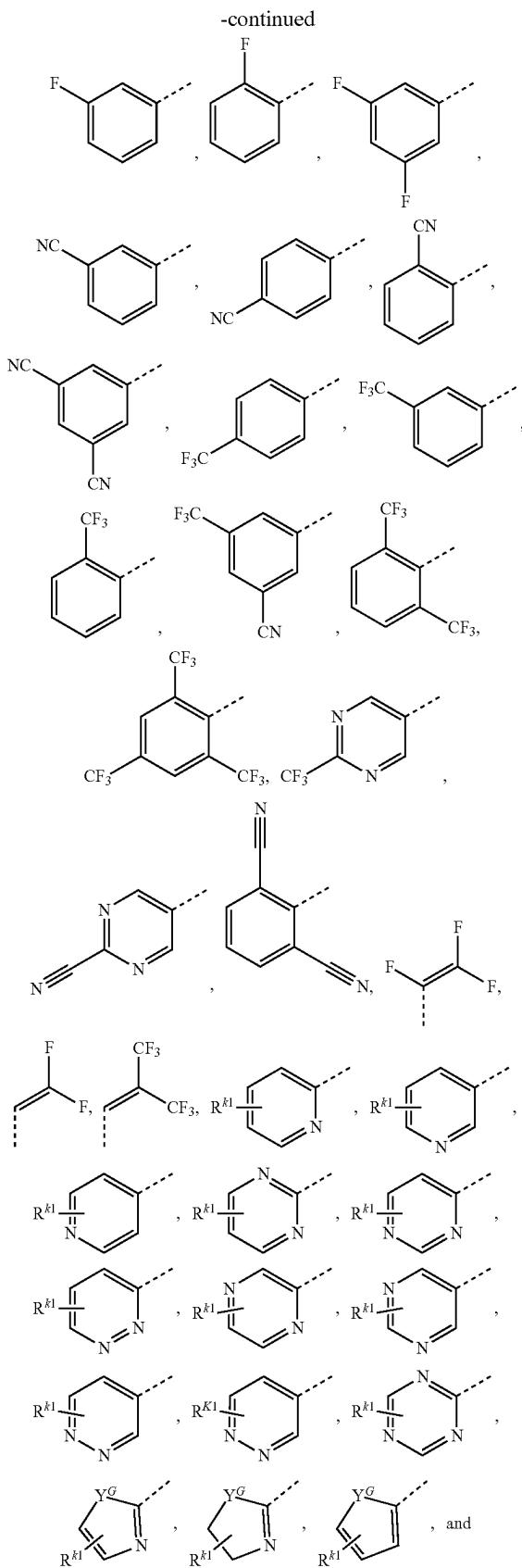


E119



[0122] In some embodiments, the first ligand L_A comprises a T-electron deficient electron-withdrawing group selected from the group consisting of the structures of the following Pi-EWG LIST: CN, COCH₃, CHO, COCF₃, COOME, COOCF₃, NO₂, SF₃, SiF₃, PF₅, OCF₃, SCF₃, SeCF₃, SOCF₃, SeOCF₃, SO₂F, SO₂CF₃, SeO₂CF₃, OSeO₂CF₃, OCN, SCN, SeCN, NC, ⁺N(R^{k2})₃, BR^{k2}R^{k3}, substituted or unsubstituted dibenzoborole, 1-substituted carbazole, 1,9-substituted carbazole, substituted or unsubstituted carbazole, substituted or unsubstituted pyridine, substituted or unsubstituted pyrimidine, substituted or unsubstituted pyrazine, substituted or unsubstituted triazine, substituted or unsubstituted oxazole, substituted or unsubstituted benzoxazole, substituted or unsubstituted thiazole, substituted or unsubstituted benzothiazole, substituted or unsubstituted imidazole, substituted or unsubstituted benzimidazole, ketone, carboxylic acid, ester, nitrile, isonitrile, sulfinyl, sulfonyl, partially and fully fluorinated aryl, partially and fully fluorinated heteroaryl, cyano-containing aryl, cyano-containing heteroaryl, isocyanate,





wherein the variables are the same as previously defined.

[0123] In some embodiments, at least one R⁴ is not hydrogen. In some embodiments, at least one R⁴ comprises at least one C atom. In some embodiments, at least one R⁴ comprises a substituent selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof.

[0124] In some embodiments, two R⁴ are joined or fused to form a Moiety A1. In some embodiments, Moiety A1 is selected from the group consisting of Cyclic Moiety List defined herein. In some embodiments, Moiety A1 is benzene.

[0125] In some embodiments, at least one R^4 is or comprises an electron-withdrawing group. In some embodiments, at least one R^4 is or comprises an electron-withdrawing group from the EWG1 LIST defined herein. In some embodiments, at least one R^4 is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R^4 is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one R^4 is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R^4 is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0126] In some embodiments, at least one R^B is not hydrogen. In some embodiments, at least one R^B comprises at least one C atom. In some embodiments, at least one R^B comprises a substituent selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof. In some embodiments, two R^B are joined or fused to form a ring.

[0127] In some embodiments, at least one R^B is or comprises an electron-withdrawing group. In some embodiments, at least one R^B is or comprises an electron-withdrawing group from the EWG1 LIST defined herein. In some embodiments, at least one R^B is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R^B is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one R^B is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R^B is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0128] In some embodiments, at least one R^D is not hydrogen. In some embodiments, at least one R^D comprises at least one C atom. In some embodiments, at least one R^D comprises a substituent selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof. In some embodiments, two R^D are joined or fused to form a ring.

[0129] In some embodiments, at least one R^D is or comprises an electron-withdrawing group. In some embodiments, at least one R^D is or comprises an electron-withdrawing group from the EWG1 LIST defined herein. In some embodiments, at least one R^D is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R^D is or comprises an electron-withdrawing group from the EWG3 LIST as

defined herein. In some embodiments, at least one R^D is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R^D is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0130] In some embodiments, at least one R or R' is not hydrogen. In some embodiments, at least one R or R' comprises at least one C atom. In some embodiments, at least one R or R' comprises a substituent selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof. In some embodiments, R and R' are joined or fused to form a ring.

[0131] In some embodiments, at least one R or R' is or comprises an electron-withdrawing group. In some embodiments, at least one R or R' is or comprises an electron-withdrawing group from the EWG1 LIST defined herein. In some embodiments, at least one R or R' is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R or R' is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one R or R' is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R or R' is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0132] In some embodiments, at least one R^α or R^β is not hydrogen. In some embodiments, at least one R^α or R^β comprises at least one C atom. In some embodiments, at least one R^α or R^β comprises a substituent selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof. In some embodiments, R^α and R^β are joined or fused to form a ring.

[0133] In some embodiments, at least one R^α or R^β is or comprises an electron-withdrawing group. In some embodiments, at least one R^α or R^β is or comprises an electron-withdrawing group from the EWG1 LIST defined herein. In some embodiments, at least one R^α or R^β is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R^α or R^β is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one R^α or R^β is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R^α or R^β is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0134] In some embodiments, R^C comprises at least one silyl or germyl group. In some embodiments, R^C comprises at least one silyl. In some embodiments, R^C comprises at least one germyl.

[0135] In some embodiments, R^C is or comprises -L-Q(R^{1A})(R^{1B})(R^{1C}), wherein L is an organic linker or a direct bond, Q is Si or Ge, and wherein RIA, R^{1B} , and R^{1C} are each independently hydrogen or a substituent selected from the group consisting of the General Substituents defined herein.

[0136] In some embodiments, at least one of RIA, R^{1B} , or R^{1C} comprises at least one C atom. In some embodiments, at least two of R^{1A} , R^{1B} , or R^{1C} comprises at least one C atom. In some embodiments, each of RIA, R^{1B} , or R^{1C} comprises at least one C atom.

[0137] In some embodiments, at least one of RIA, R^{1B} , or R^{1C} is selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, partially or fully deuterated variants

thereof, partially or fully fluorinated variants thereof, and combinations thereof. In some embodiments, at least two of RIA, R^{1B} , or R^{1C} are independently selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, partially or fully deuterated variants thereof, partially or fully fluorinated variants thereof, and combinations thereof. In some embodiments, each of R^{1A} , R^{1B} , or R^{1C} is independently selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, partially or fully deuterated variants thereof, partially or fully fluorinated variants thereof, and combinations thereof.

[0138] In some embodiments, at least one of R^{1A} , R^{1B} , or R^{1C} is or comprises an electron-withdrawing group. In some embodiments, at least one of RIA, R^{1B} , or R^{1C} is or comprises an electron-withdrawing group from the EWG1 LIST defined herein. In some embodiments, at least one of R^{1A} , R^{1B} , or R^{1C} is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one of RIA, R^{1B} , or R^{1C} is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one of R^{1A} , R^{1B} , or R^{1C} is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one of RIA, R^{1B} , or R^{1C} is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0139] In some embodiments, L is a direct bond.

[0140] In some embodiments, L is an organic linker selected from the group consisting of BR, BRR', NR, PR, P(O)R, O, S, Se, C—O, C=S, C=Se, C=NR, C=CRR', S=O, SO₂, CR, CRR', SiRR', GeRR', alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof.

[0141] In some embodiments, L is an organic linker selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof.

[0142] In some embodiments, L comprises alkyl. In some embodiments, L is alkyl.

[0143] In some embodiments, L comprises cycloalkyl. In some embodiments, L is cycloalkyl.

[0144] In some embodiments, L comprises aryl. In some embodiments, L is aryl.

[0145] In some embodiments, L comprises heteroaryl. In some embodiments, L is heteroaryl.

[0146] In some embodiments, Q is Si. In some embodiments, Q is Si.

[0147] In some embodiments, R^{1A} is not hydrogen. In some embodiments, R^{1A} is alkyl or aryl. In some embodiments, R^{1A} is alkyl. In some embodiments, R^{1A} is aryl.

[0148] In some embodiments, R^{1B} is not hydrogen. In some embodiments, R^{1B} is alkyl or aryl. In some embodiments, R^{1B} is alkyl. In some embodiments, R^{1B} is aryl.

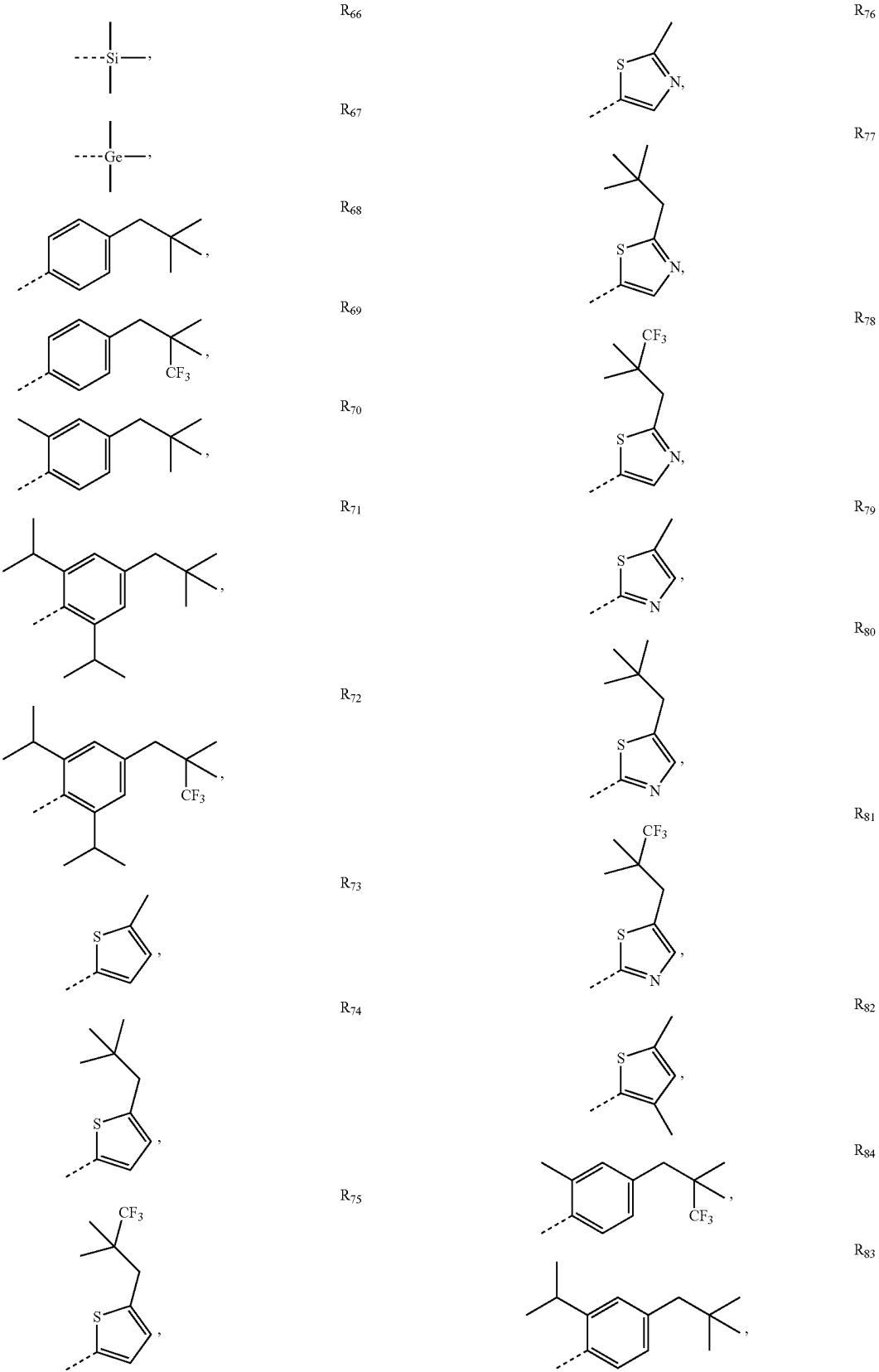
[0149] In some embodiments, R^{1C} is not hydrogen. In some embodiments, R^{1C} is alkyl or aryl. In some embodiments, R^{1C} is alkyl. In some embodiments, R^{1C} is aryl.

[0150] In some embodiments, at least one of RIA, R^{1B} , and R^{1C} is alkyl. In some embodiments, each of RIA, R^{1B} , and R^{1C} is independently alkyl. In some embodiments, each of R^{1A} , R^{1B} , and R^{1C} is methyl.

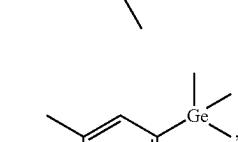
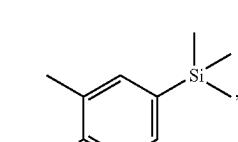
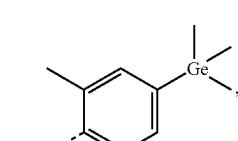
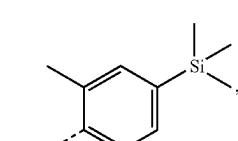
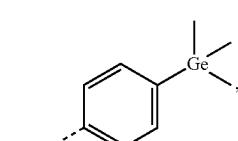
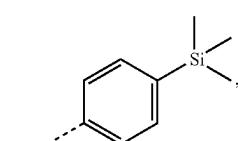
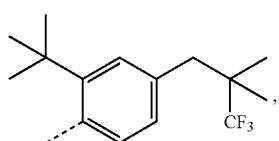
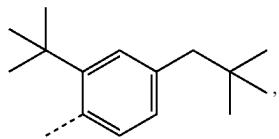
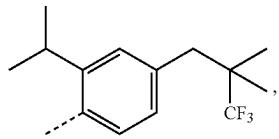
[0151] In some embodiments, at least one of R^{1A} , R^{1B} , and R^{1C} is aryl. In some embodiments, each of R^{1A} , RIB, and R^{1C} is independently aryl.

[0152] In some embodiments, R^C may be selected from the group consisting of the structures of the following LIST 1:

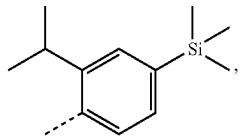
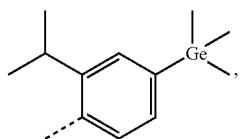
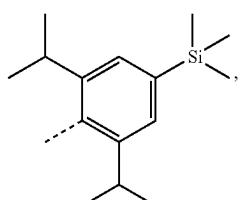
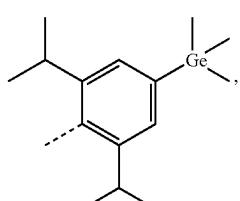
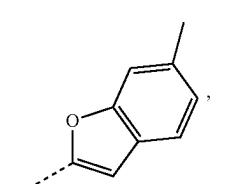
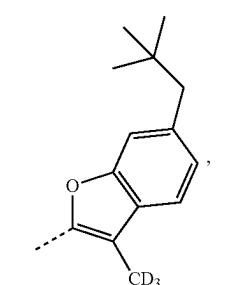
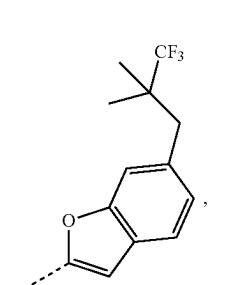
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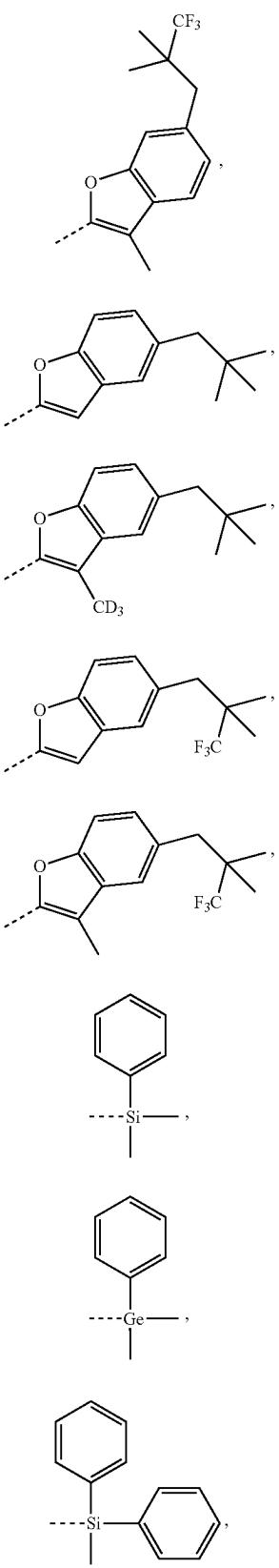
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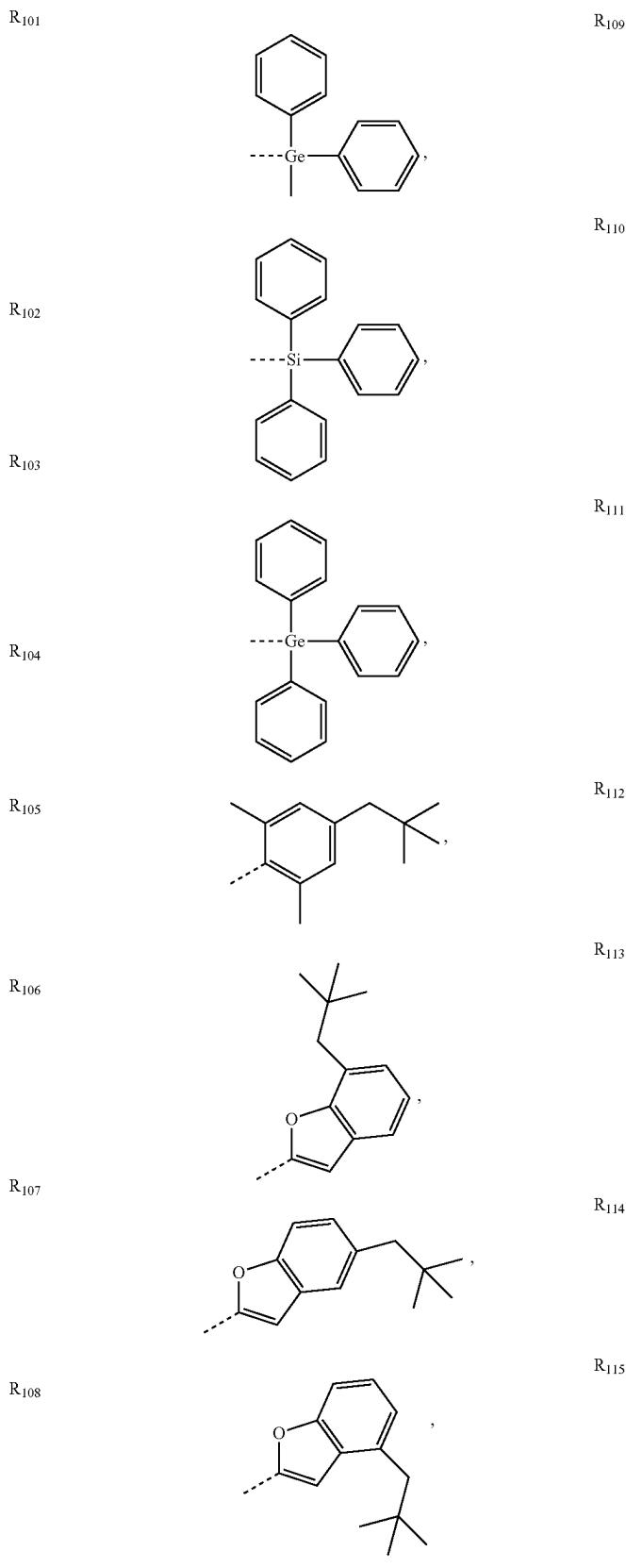
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R₈₅R₈₆R₈₇R₈₈R₈₉R₉₀R₉₁R₉₂

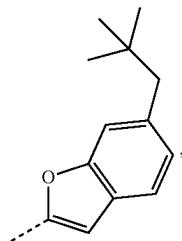
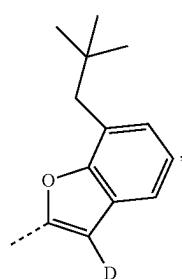
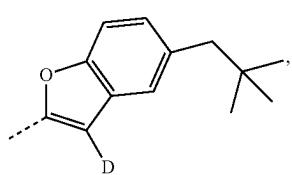
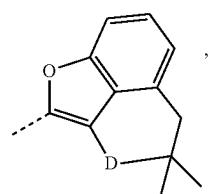
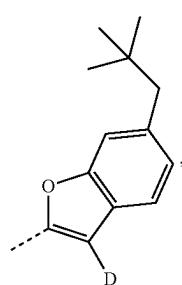
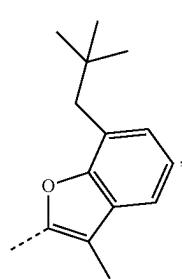
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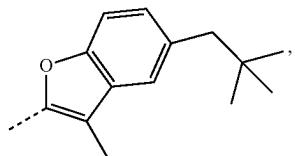
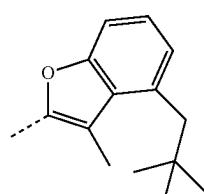
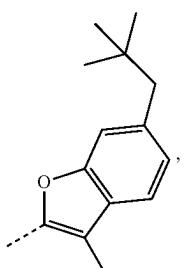
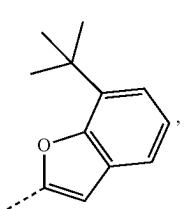
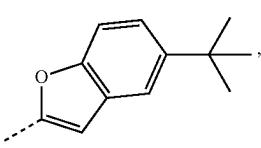
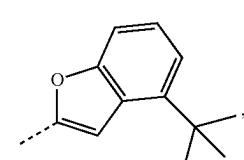
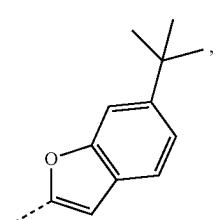
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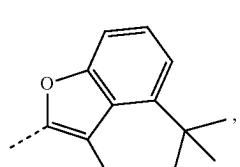
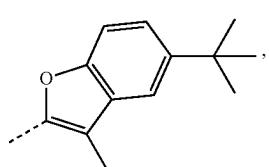
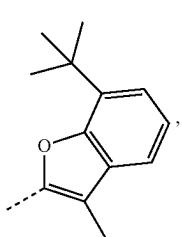
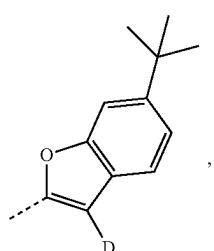
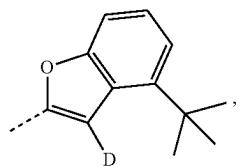
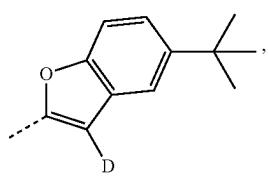
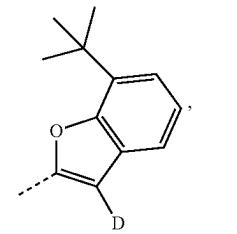
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R₁₁₆R₁₁₇R₁₁₈R₁₁₉R₁₂₀R₁₂₁

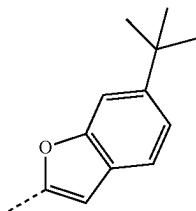
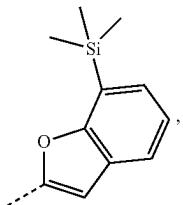
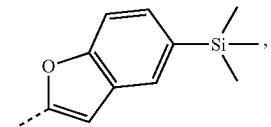
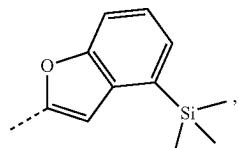
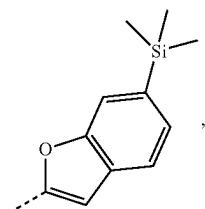
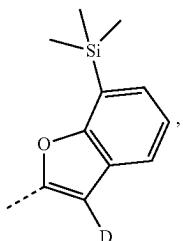
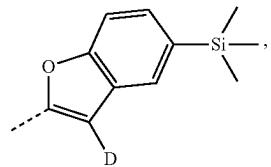
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R₁₂₂R₁₂₃R₁₂₄R₁₂₅R₁₂₆R₁₂₇R₁₂₈

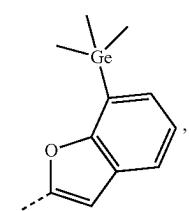
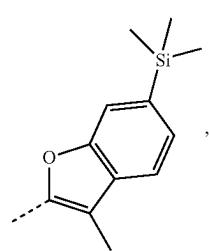
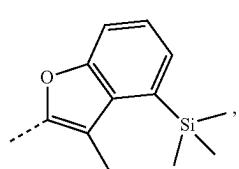
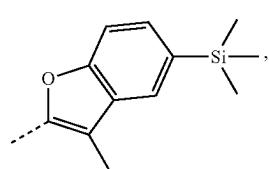
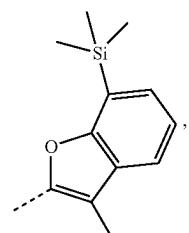
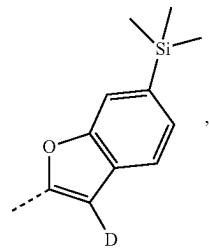
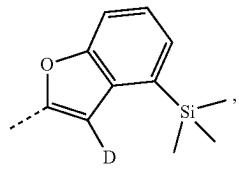
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 R_{129} 

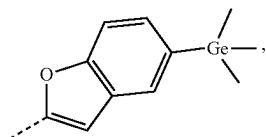
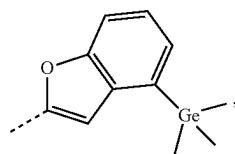
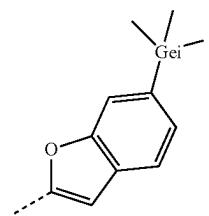
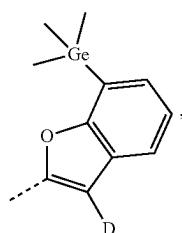
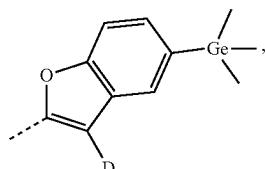
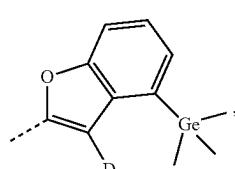
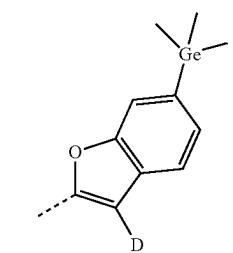
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 R_{136}  R_{137}  R_{138}  R_{139}  R_{140}  R_{141}  R_{142} 

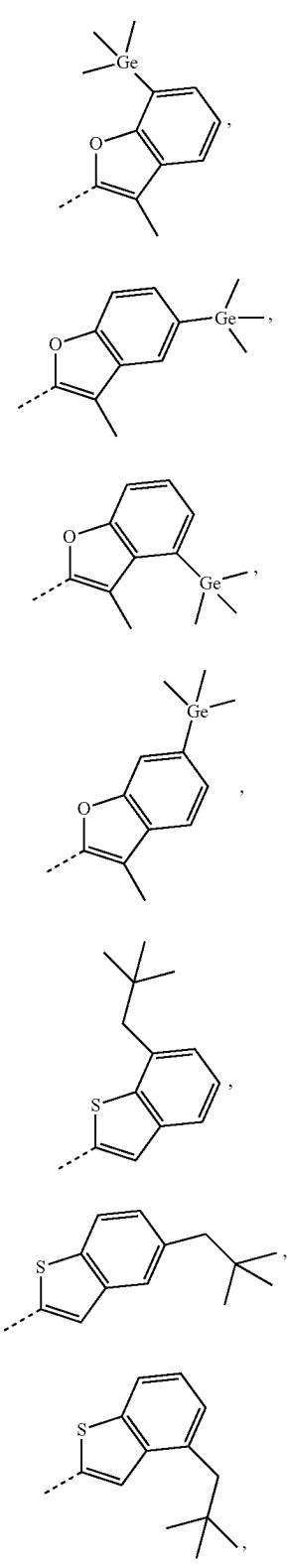
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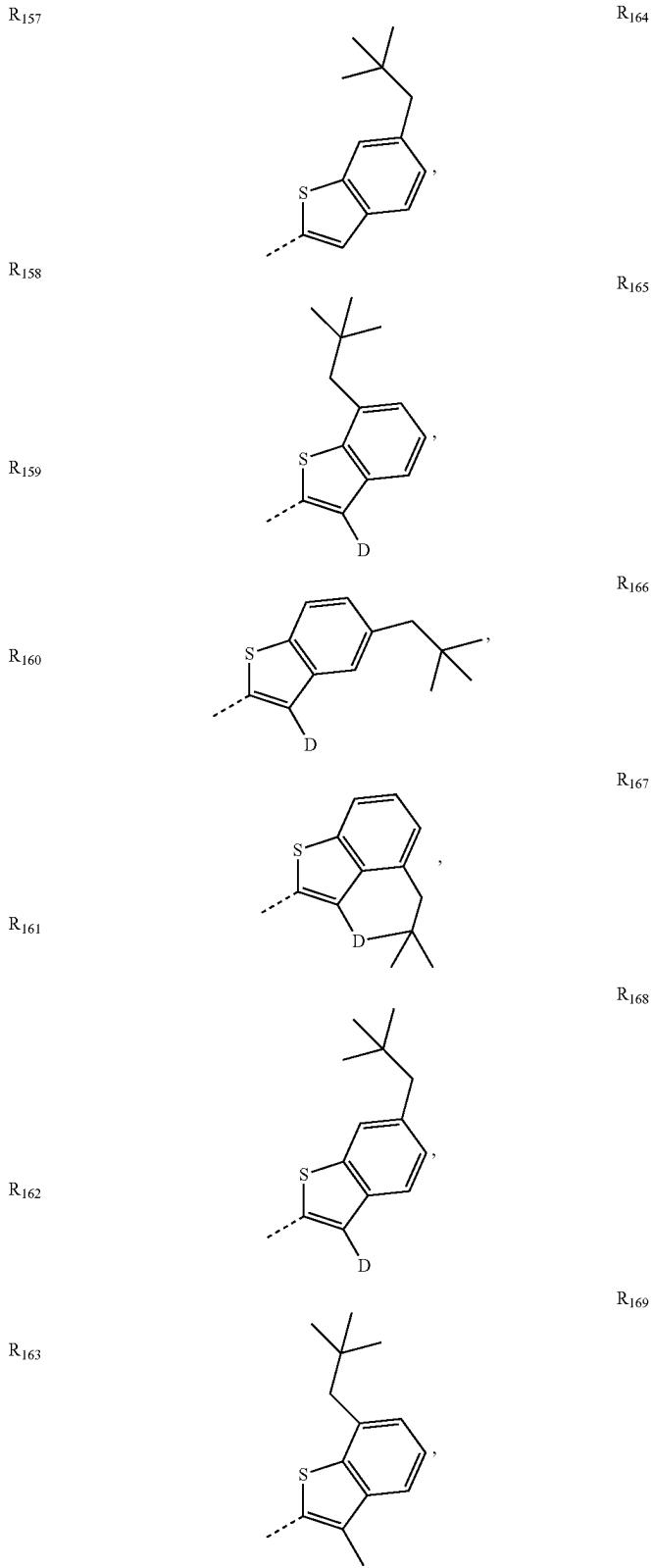
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R₁₄₃R₁₄₄R₁₄₅R₁₄₆R₁₄₇R₁₄₈R₁₄₉

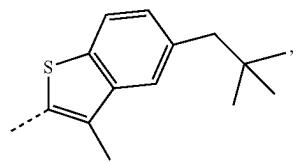
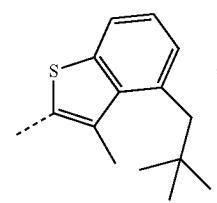
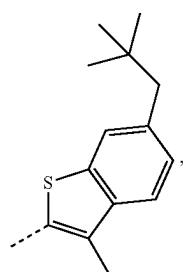
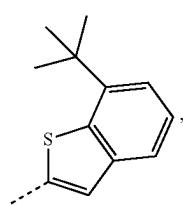
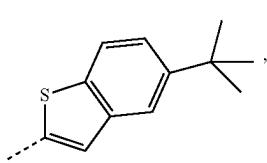
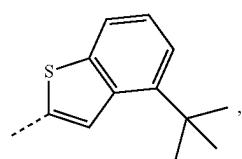
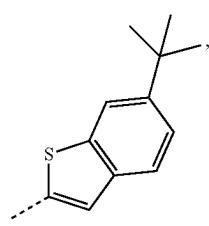
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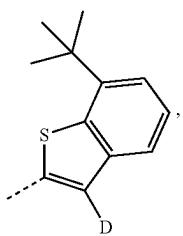
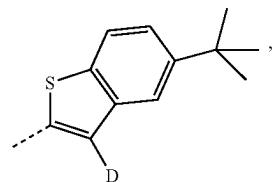
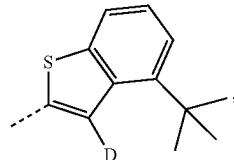
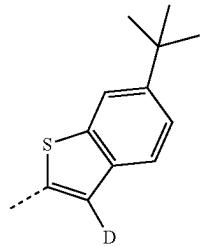
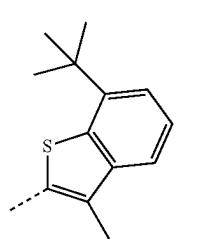
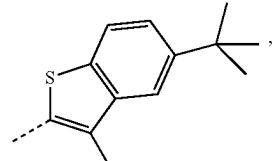
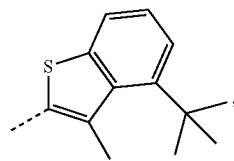
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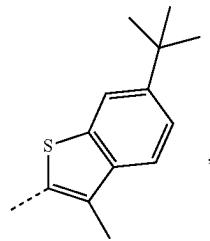
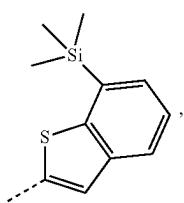
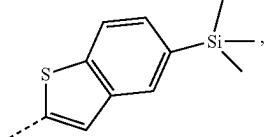
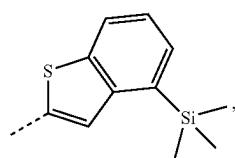
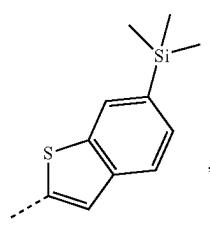
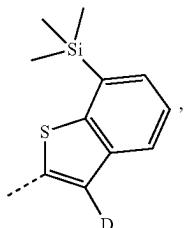
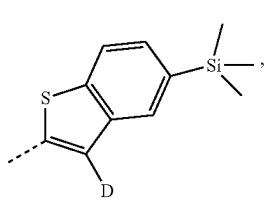
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R₁₇₀R₁₇₁R₁₇₂R₁₇₃R₁₇₄R₁₇₅R₁₇₆

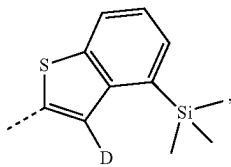
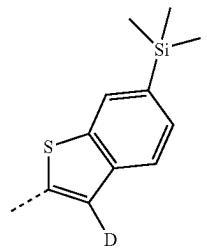
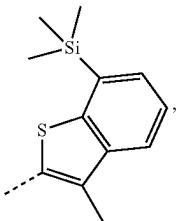
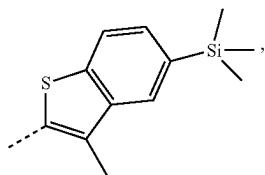
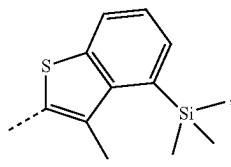
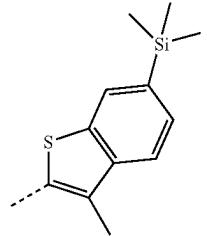
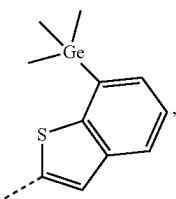
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R₁₇₇R₁₇₈R₁₇₉R₁₈₀R₁₈₁R₁₈₂R₁₈₃

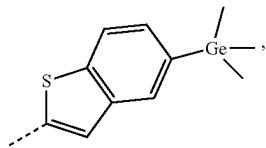
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R₁₈₄R₁₈₅R₁₈₆R₁₈₇R₁₈₈R₁₈₉R₁₉₀

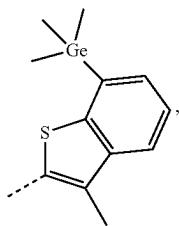
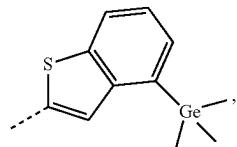
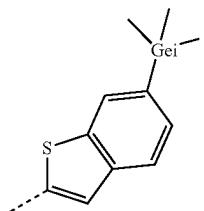
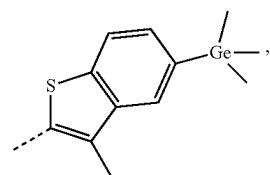
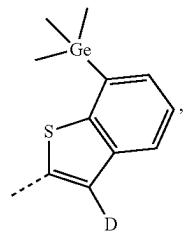
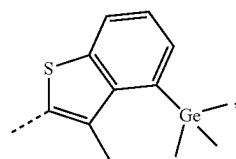
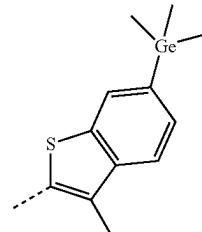
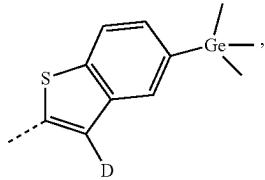
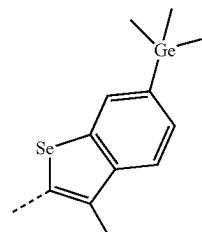
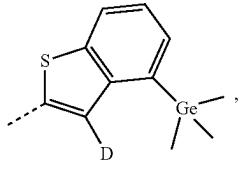
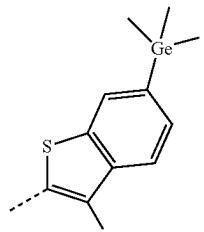
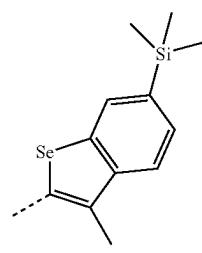
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R₁₉₁R₁₉₂R₁₉₃R₁₉₄R₁₉₅R₁₉₆R₁₉₇

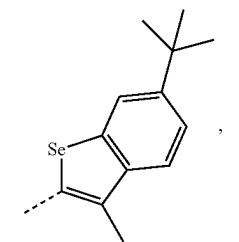
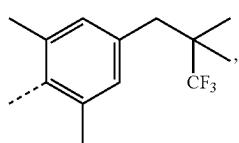
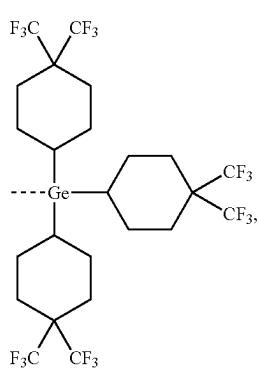
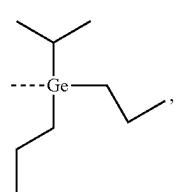
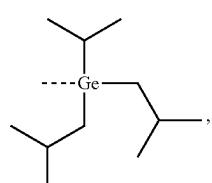
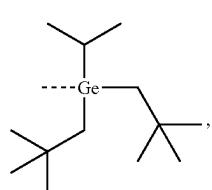
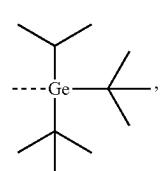
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R₁₉₈

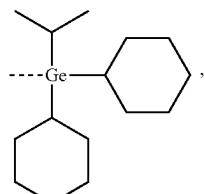
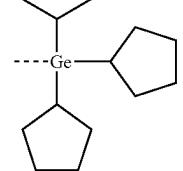
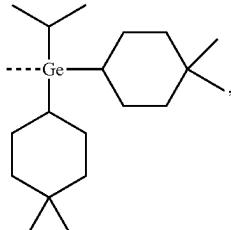
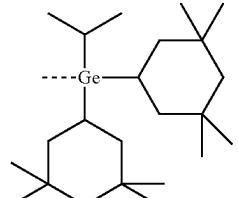
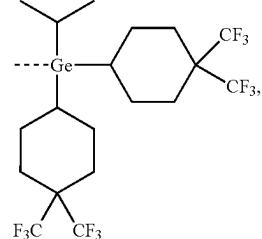
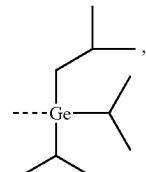
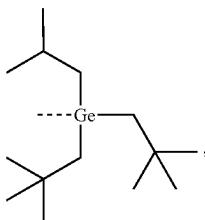
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R₂₀₅R₁₉₉R₂₀₀R₂₀₆R₂₀₁R₂₀₇R₂₀₈R₂₀₂R₂₀₉R₁₂₀₃R₂₀₄R₂₁₀

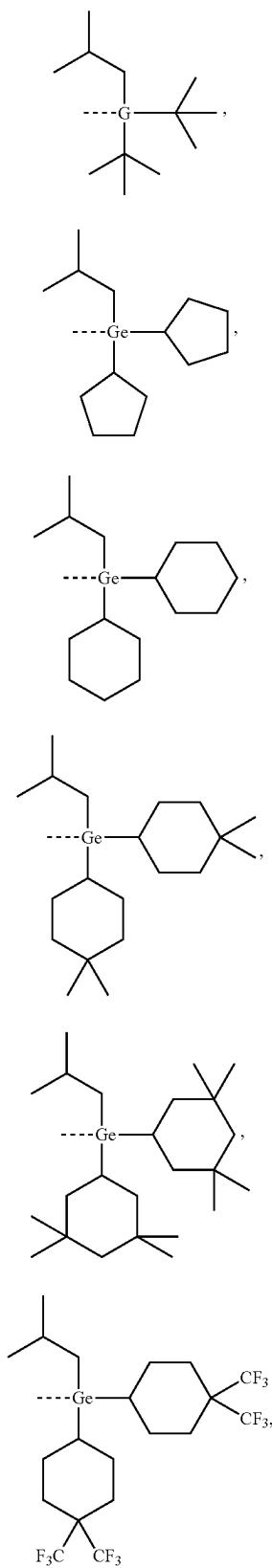
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 R_{211}  R_{212}  R_{213}  R_{214}  R_{215}  R_{216}  R_{217}

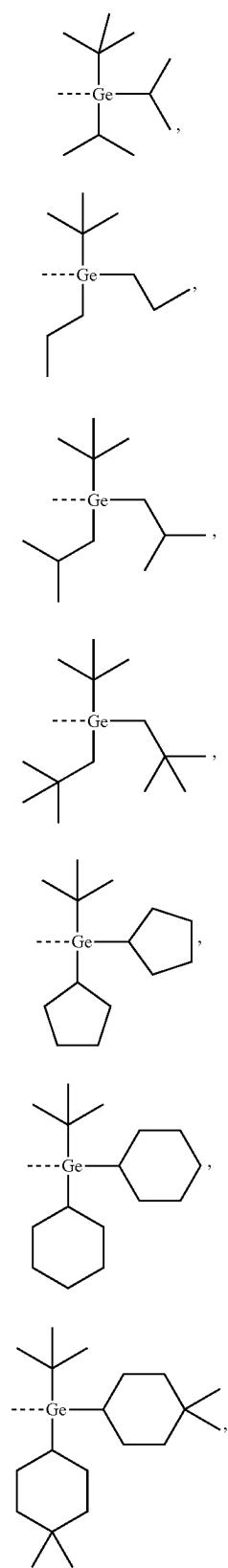
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 R_{218}  R_{219}  R_{220}  R_{221}  R_{222}  R_{223}  R_{224} 

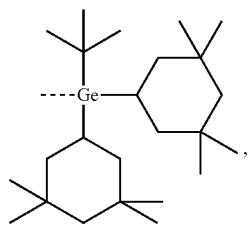
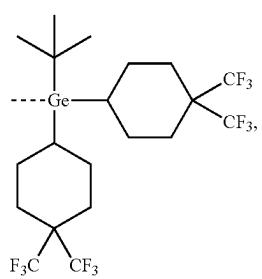
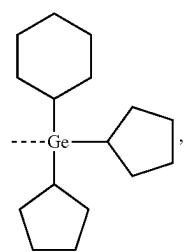
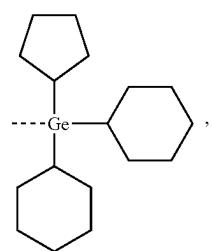
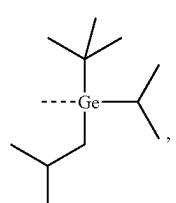
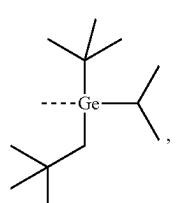
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R₂₂₅R₂₂₆R₂₂₇R₂₂₈R₂₂₉R₂₃₀

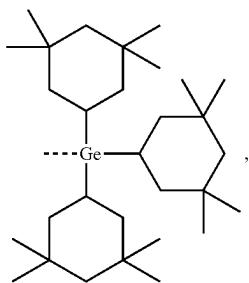
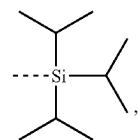
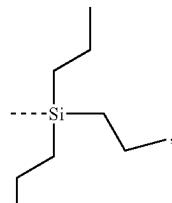
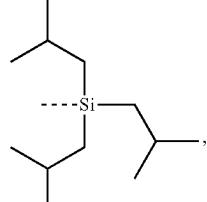
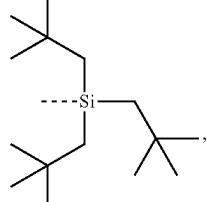
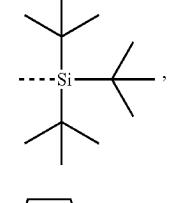
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R₂₃₁R₂₃₂R₂₃₃R₂₃₄R₂₃₅R₂₃₆R₂₃₇

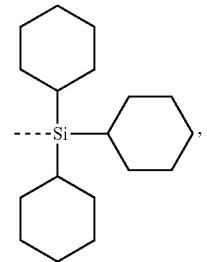
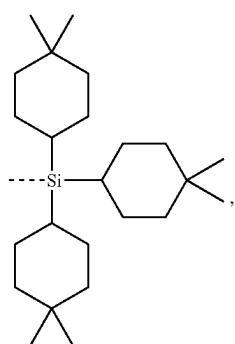
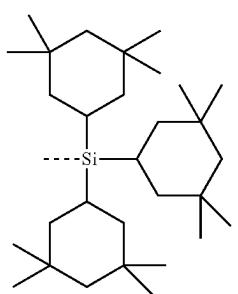
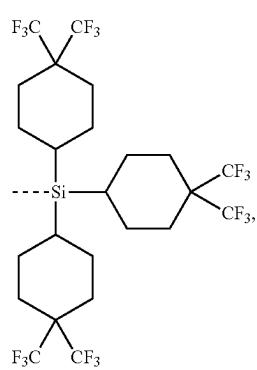
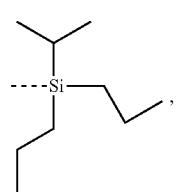
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R₂₃₈R₂₃₉R₂₄₀R₂₄₁R₂₄₂R₂₄₃

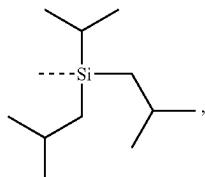
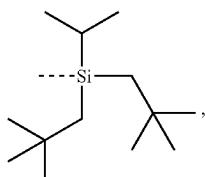
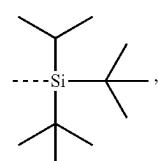
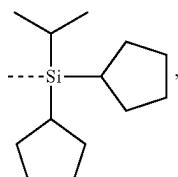
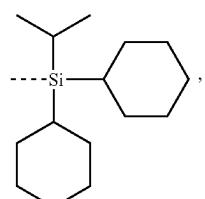
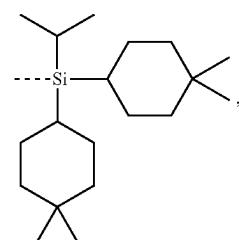
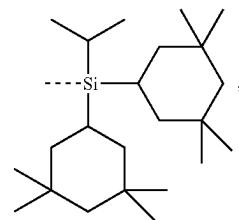
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R₂₄₄R₂₄₅R₂₄₆R₂₄₇R₂₄₈R₂₄₉R₂₅₀

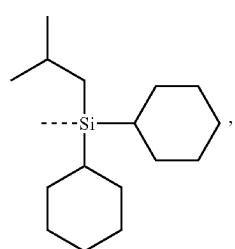
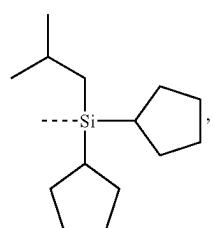
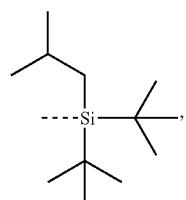
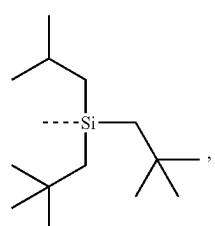
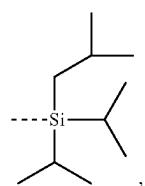
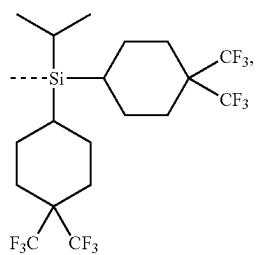
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R₂₅₁R₂₅₂R₂₅₃R₂₅₄R₂₅₅

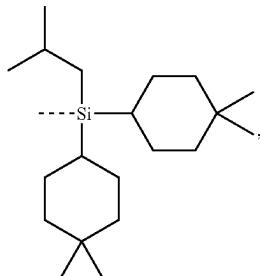
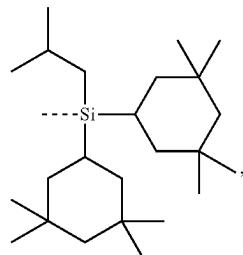
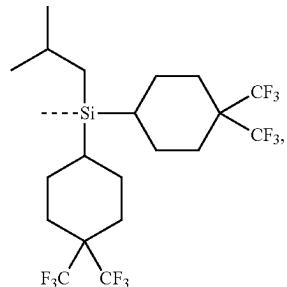
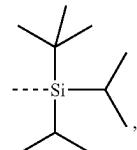
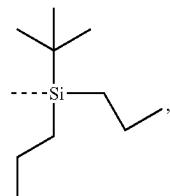
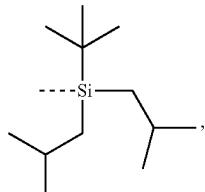
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R₂₅₆R₂₅₇R₂₅₈R₂₅₉R₂₆₀R₂₆₁R₂₆₂

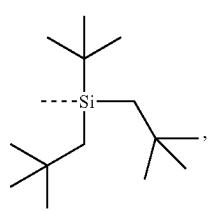
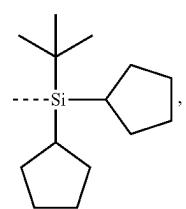
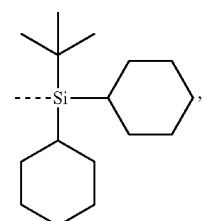
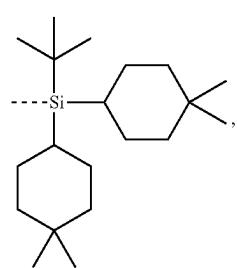
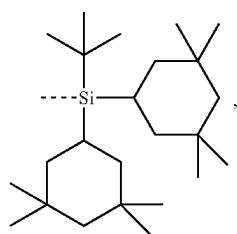
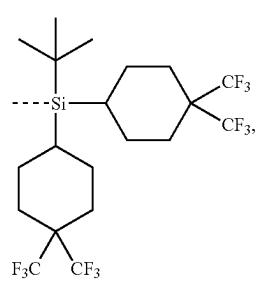
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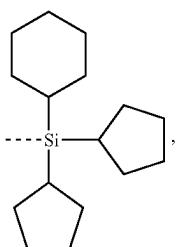
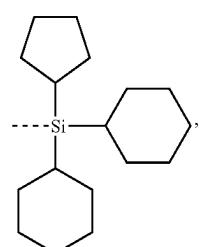
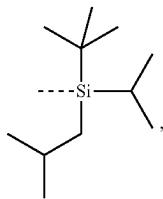
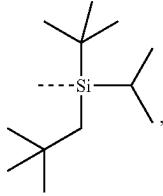
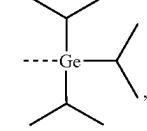
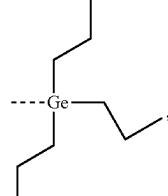
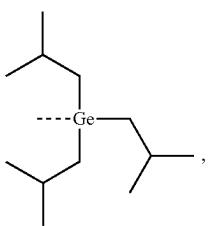
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R₂₆₉R₂₇₀R₂₇₁R₂₇₂R₂₇₃R₂₇₄

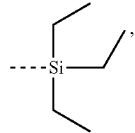
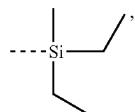
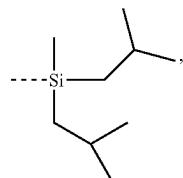
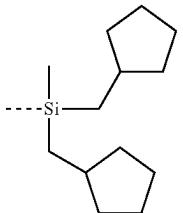
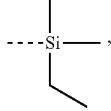
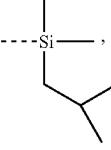
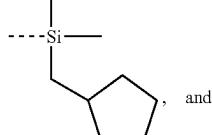
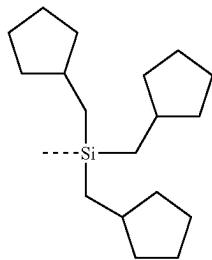
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R₂₇₅R₂₇₆R₂₇₇R₂₇₈R₂₇₉R₂₈₀

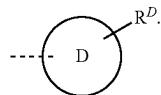
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R₂₈₁R₂₈₂R₂₈₃R₂₈₄R₂₈₅R₂₈₆R₂₈₇

-continued

 R_{288}  R_{289}  R_{290}  R_{291}  R_{292}  R_{293}  R_{294}  R_{295} 

[0153] In some embodiments, R^C has the structure of Formula II:

 R_{296}

[0154] In some embodiments, moiety D is selected from the group consisting of Cyclic Moiety List defined herein.

[0155] In some embodiments, moiety D is an aza variant. In some such embodiments, the aza variant includes one N on a benzo ring.

[0156] In some embodiments, moiety D is a monocyclic ring. In some embodiments, moiety D is selected from the group consisting of benzene, pyridine, pyrimidine, pyridazine, pyrazine, triazine, imidazole, pyrazole, pyrrole, oxazole, furan, thiophene, thiazole, and triazole. In some embodiments, moiety D is benzene.

 R_{297}

[0157] In some embodiments, moiety D is a polycyclic fused ring system. In some embodiments, moiety D is selected from the group consisting of naphthalene, quinoline, isoquinoline, quinazoline, quinoxaline, benzofuran, aza-benzofuran, benzoxazole, aza-benzoxazole, benzothiophene, aza-benzothiophene, benzothiazole, aza-benzothiazole, benzoselenophene, aza-benzoselenophene, indene, aza-indene, indole, aza-indole, benzimidazole, aza-benzimidazole, carbazole, aza-carbazole, dibenzofuran, aza-dibenzofuran, dibenzothiophene, aza-dibenzothiophene, phthalazine, phenanthrene, aza-phenanthrene, anthracene, aza-anthracene, phenanthridine, fluorene, and aza-fluorene. In some embodiments moiety D is naphthalene.

[0158] In some embodiments, two R^D are joined to form a ring, where the portion formed by the two R^D is saturated.

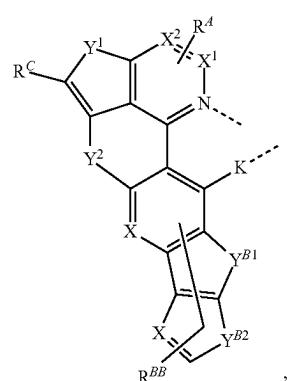
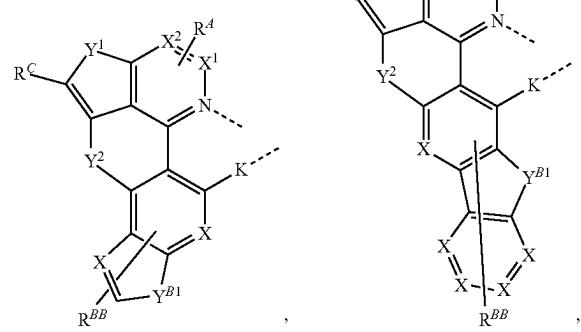
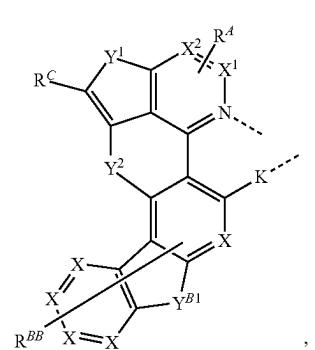
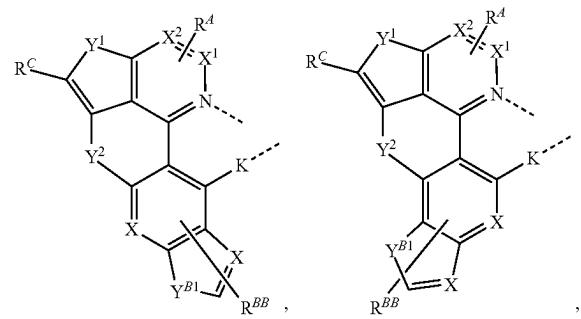
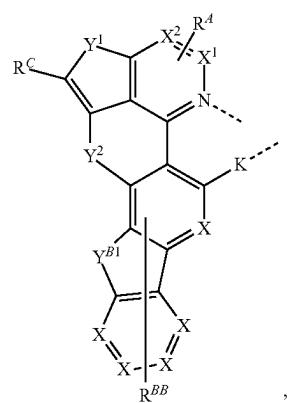
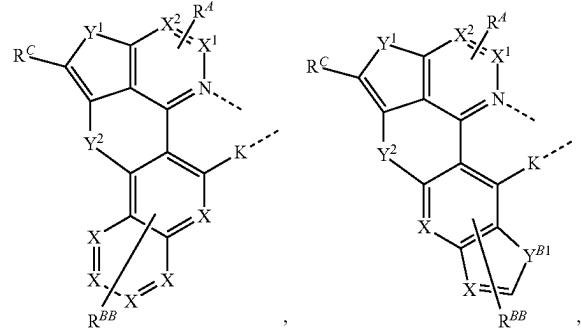
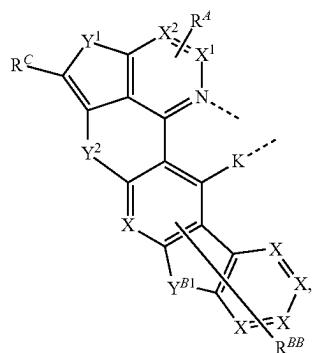
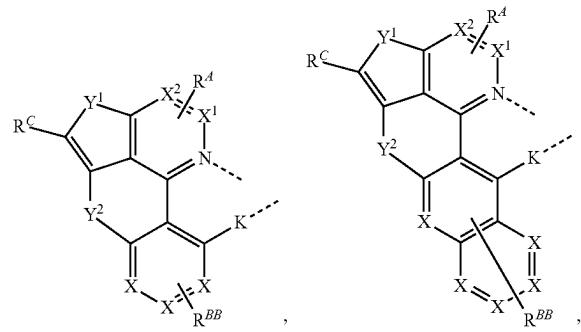
[0159] In some embodiments, two R^D are joined to form a substituted or unsubstituted 6-membered ring.

[0160] In some embodiments, moiety D is a 6-membered ring and R^D bonds at a para position relative to the bond to Formula I. In some embodiments, moiety D is benzene. In some embodiments, the para R^D is selected from the group consisting of alkyl, cycloalkyl, and aryl. In some embodiments, the para R^D is alkyl. In some embodiments, the para R^D is neopentyl. In some embodiments, the para R^D is cycloalkyl. In some embodiments, the para R^D is cyclohexane. In some embodiments, the para R^D is aryl. In some embodiments, the para R^D is 3,5-di-tert-butylbenzene.

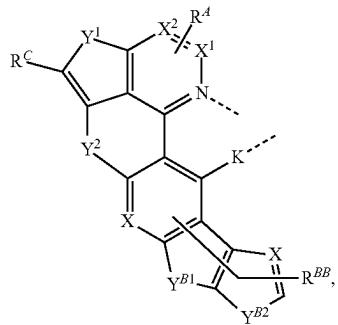
[0161] In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0162] In some embodiments, the ligand L_A is selected from the group consisting of the structures of the following LIST 2:

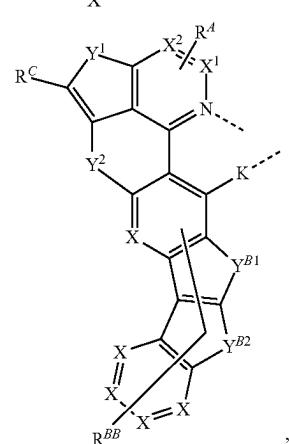
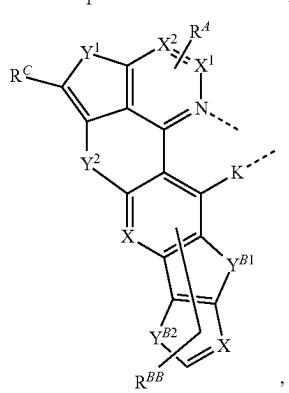
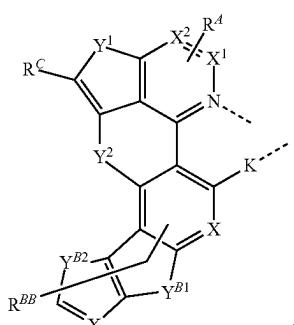
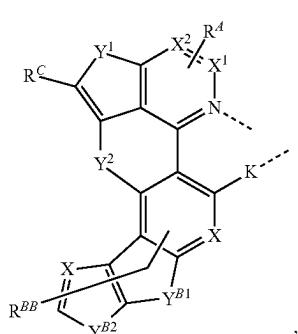
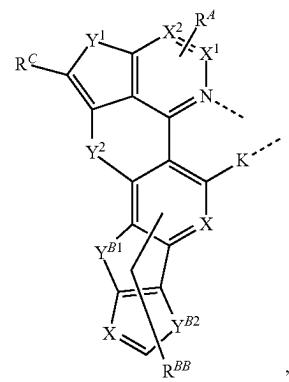
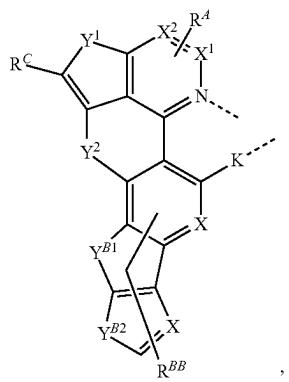
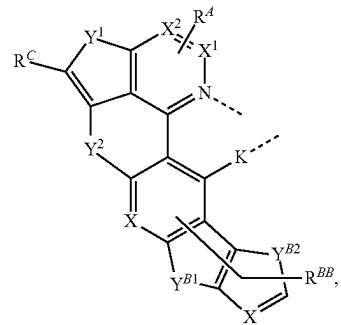
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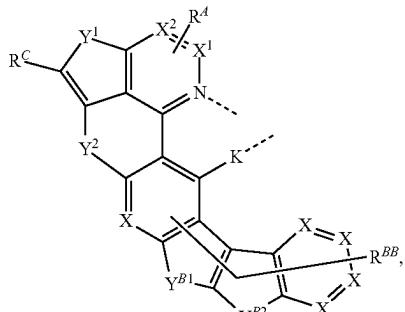
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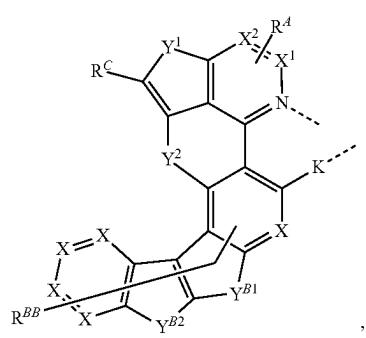
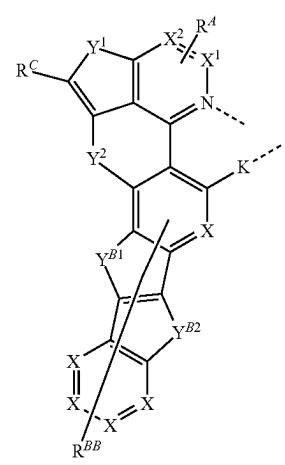
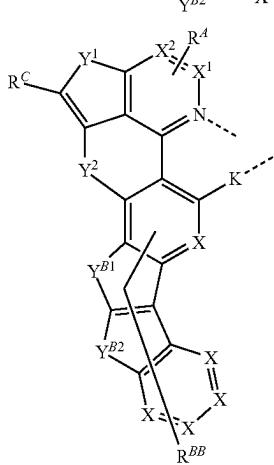
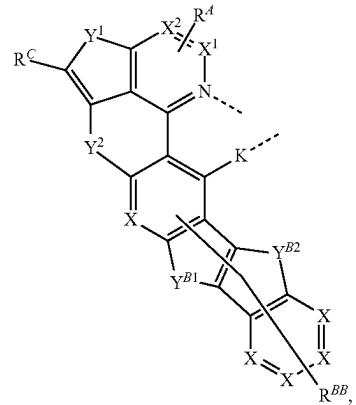
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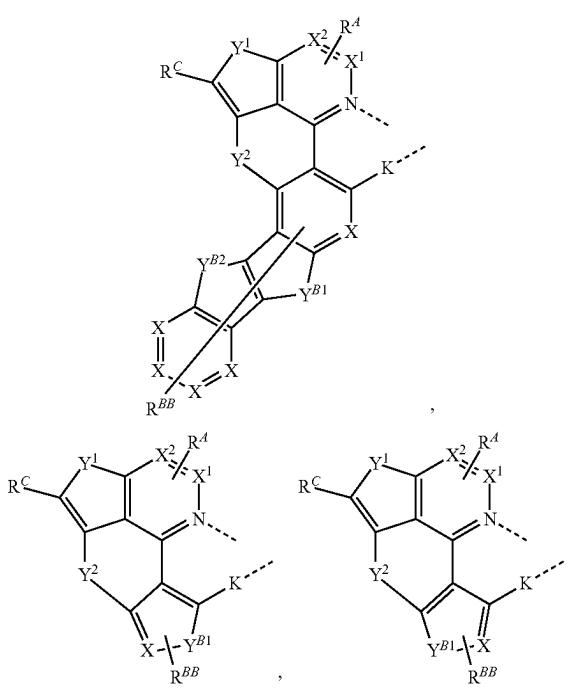
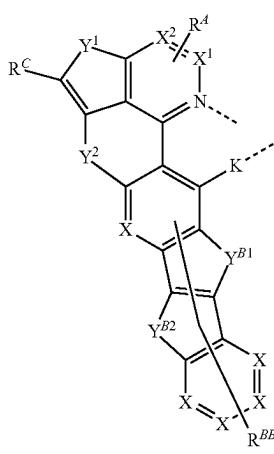
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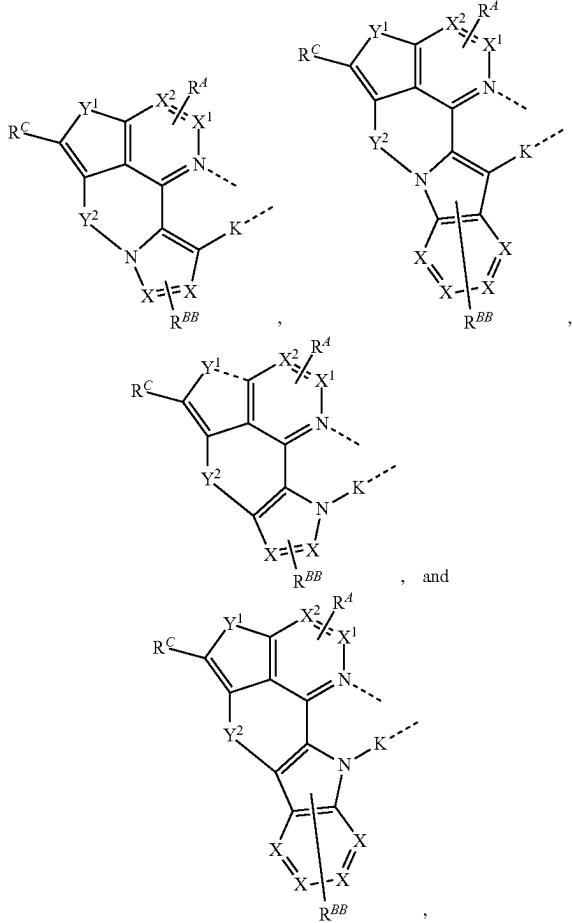
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[0163] wherein X, for each occurrence, is independently C or N;

[0164] Y^{B1} and Y^{B2} are each independently selected from the group consisting of a direct bond, BR, BR' , NR, PR, $P(O)R$, O, S, Se, $C=O$, $C=S$, $C=Se$, $C=NR$, $C=CRR'$, $S=O$, SO_2 , CR, CRR' , $SiRR'$, and $GeRR'$;

[0165] R^{BB} represents mono to the maximum allowable substitution, or no substitution;

[0166] each R^{BB} is independently hydrogen, or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, and combinations thereof;

[0167] the remaining variables are the same as previously defined; and

[0168] any two substituents can be joined or fused to form a ring.

[0169] In some embodiments where ligand L_A is selected from LIST 2, at least one R^A , R^{BB} , or R^C is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^A is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^{BB} is selected from the

group consisting of the General Substituents defined herein. In some embodiments, at least one R^C is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^A , R^{BB} , or R^C is selected from the group consisting of the Preferred General Substituents defined herein.

[0170] In some embodiments where ligand L_A is a structure selected from the group consisting of the structures in LIST 2, where R^C is selected from the group consisting of the structures in LIST 1.

[0171] In some embodiments, for the structures of LIST 2, at least one of R^A , R^{BB} or R^C is partially or fully deuterated. In some embodiments, at least one R^A is partially or fully deuterated. In some embodiments, at least one R^{BB} is partially or fully deuterated. In some embodiments, at least one R^C is partially or fully deuterated. In some embodiments, at least one R or R^t is partially or fully deuterated.

[0172] In some embodiments, for the structures of LIST 2, at least one R^A is not hydrogen. In some embodiments, at least one R^A comprises at least one C atom. In some embodiments, two R^A are joined or fused to form a ring.

[0173] In some embodiments, for the structures of LIST 2, at least one R^{BB} is not hydrogen. In some embodiments, at least one R^{BB} comprises at least one C atom. In some embodiments, two R^{BB} are joined or fused to form a ring.

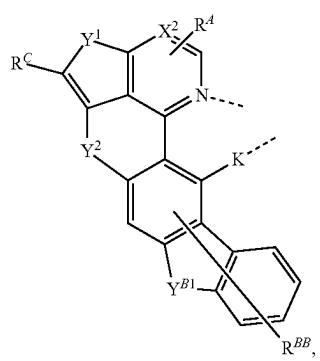
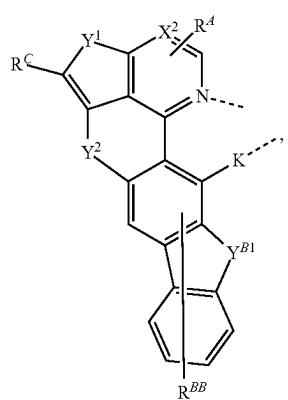
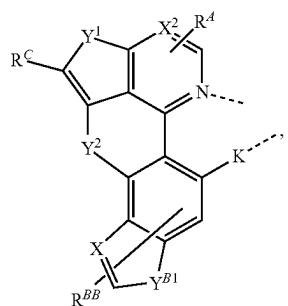
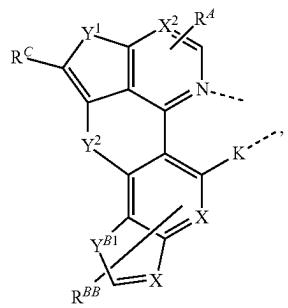
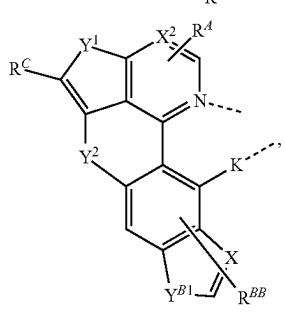
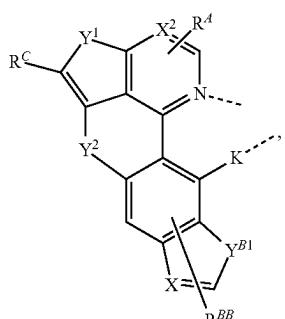
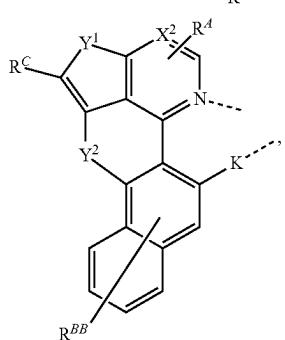
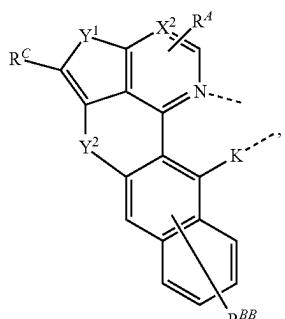
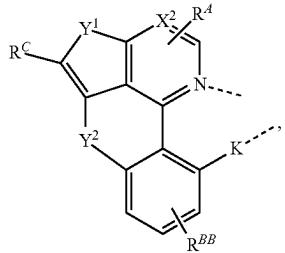
[0174] In some embodiments, for the structures of LIST 2, at least one R^A is or comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, at least one R^A is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R^A is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one R^A is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R^A is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0175] In some embodiments, for the structures of LIST 2, at least one R^{BB} is or comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, at least one R^{BB} is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R^{BB} is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one R^{BB} is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R^{BB} is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0176] In some embodiments, for the structures of LIST 2, R^C is or comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

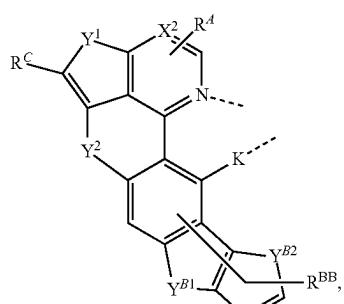
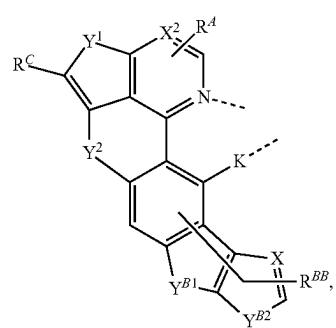
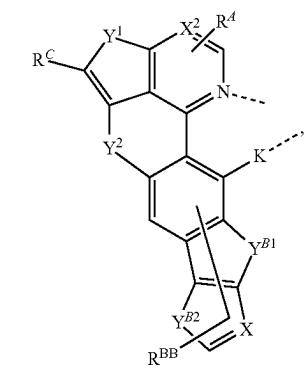
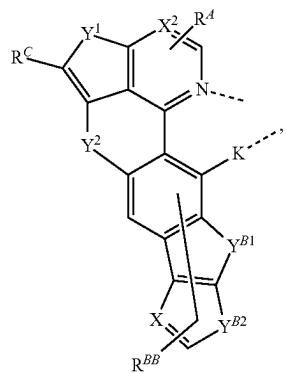
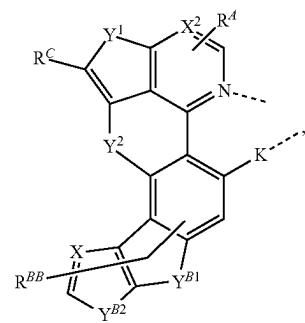
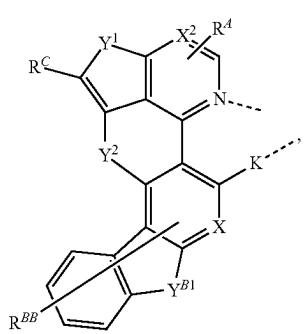
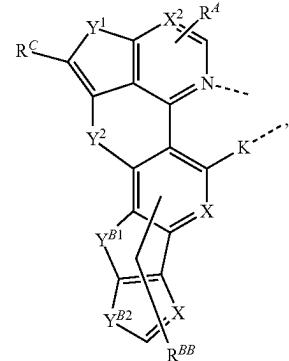
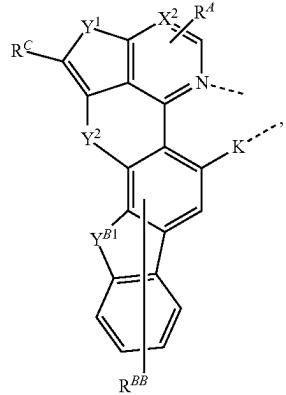
[0177] In some embodiments, the ligand L_A is selected from the group consisting of the structures of the following LIST 3:

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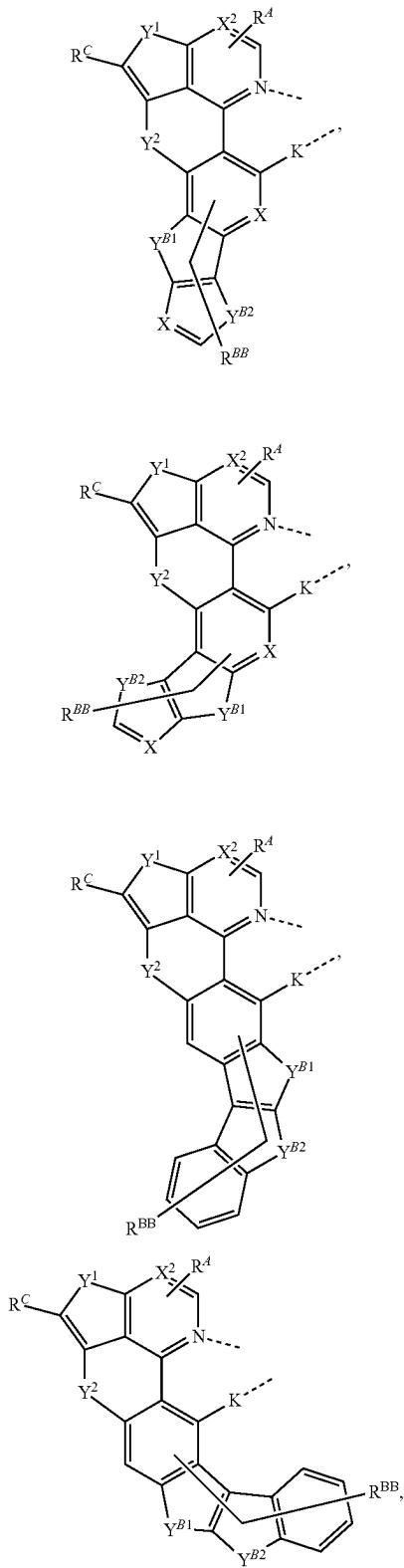


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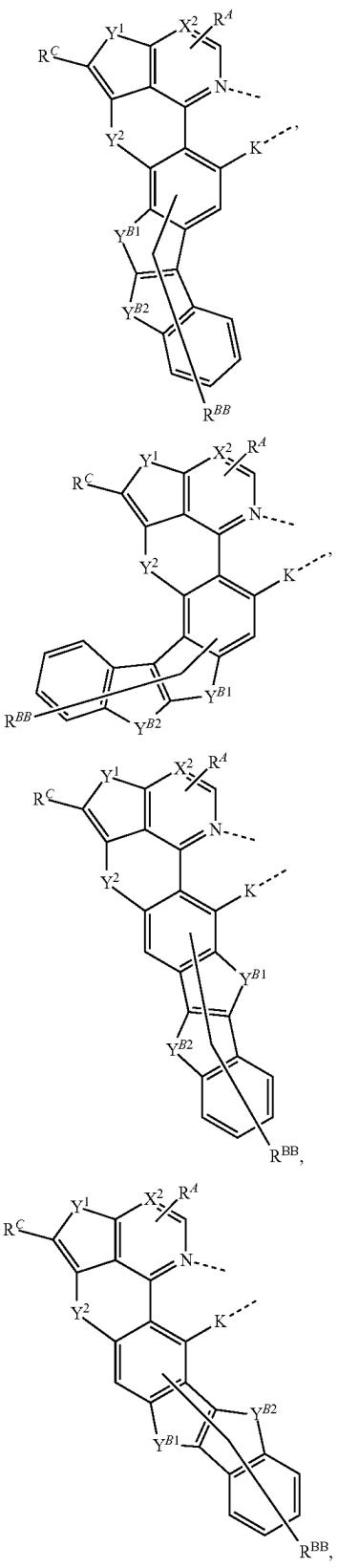
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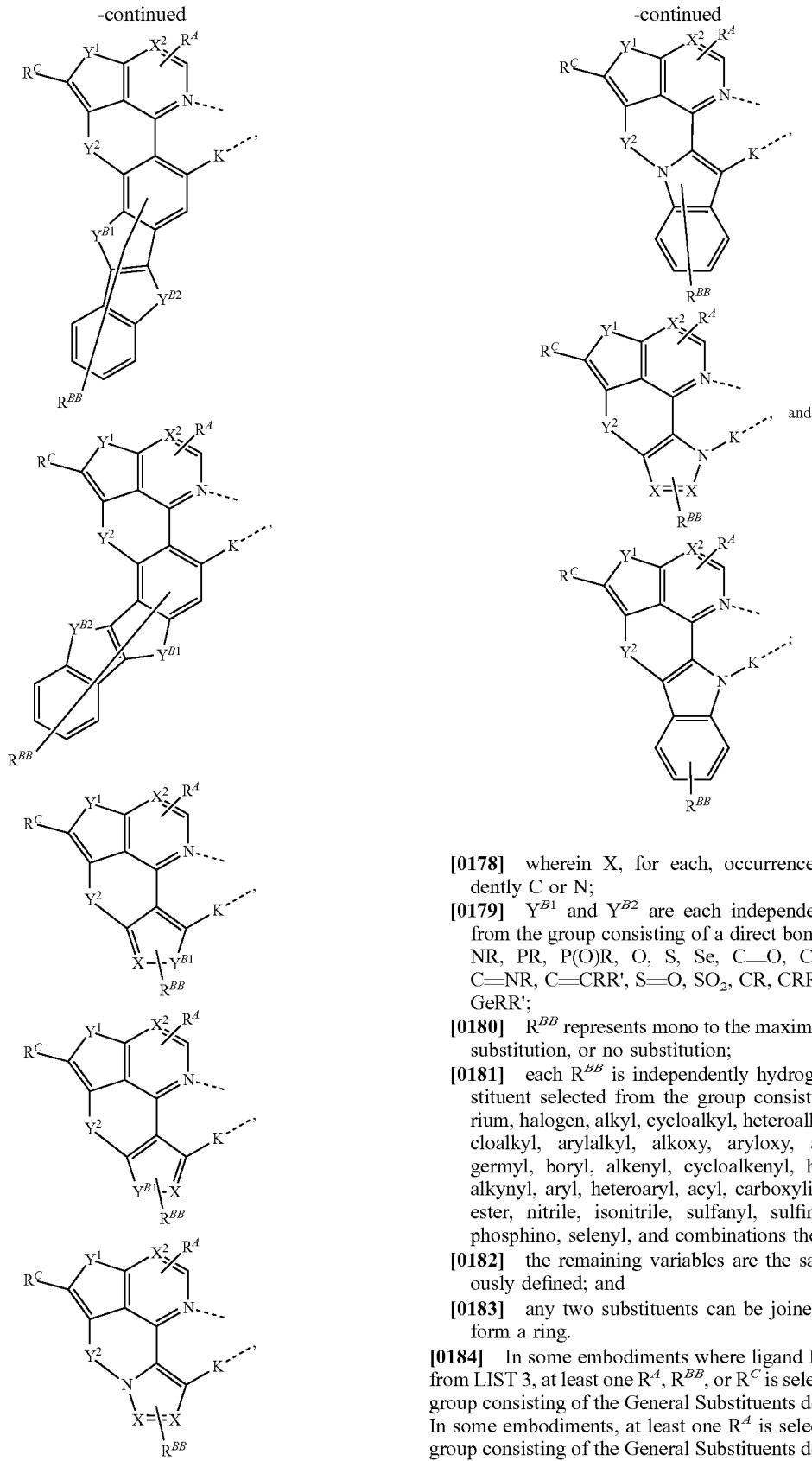


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[0178] wherein X, for each, occurrence is independently C or N;

[0179] Y^{B1} and Y^{B2} are each independently selected from the group consisting of a direct bond, BR, BRR', NR, PR, P(O)R, O, S, Se, C=O, C=S, C=Se, C=NR, C=CRR', S=O, SO₂, CR, CRR', SiRR', and GeRR';

[0180] R^{BB} represents mono to the maximum allowable substitution, or no substitution;

[0181] each R^{BB} is independently hydrogen, or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, and combinations thereof;

[0182] the remaining variables are the same as previously defined; and

[0183] any two substituents can be joined or fused to form a ring.

[0184] In some embodiments where ligand L_A is selected from LIST 3, at least one R^A, R^{BB}, or R^C is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^A is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^{BB} is selected from the

group consisting of the General Substituents defined herein. In some embodiments, at least one R^C is selected from the group consisting of the General Substituents defined herein. In some embodiments, at least one R^A , R^{BB} , or R^C is selected from the group consisting of the Preferred General Substituents defined herein.

[0185] In some embodiments where ligand L_A is a structure selected from LIST 3, R^C is selected from the group of LIST 1 as defined herein.

[0186] In some embodiments, for the structures of LIST 3, at least one of R^A , R^{BB} or R^C is partially or fully deuterated. In some embodiments, at least one R^A is partially or fully deuterated. In some embodiments, at least one R^{BB} is partially or fully deuterated. In some embodiments, at least one R^C is partially or fully deuterated. In some embodiments, at least one R or R' is partially or fully deuterated.

[0187] In some embodiments, for the structures of LIST 3, at least one R^A is or comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, at least one R^A is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R^A is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one R^A is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R^A is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0188] In some embodiments, for the structures of LIST 3, at least one R^{BB} is or comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, at least one R^{BB} is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, at least one R^{BB} is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, at least one R^{BB} is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, at least one R^{BB} is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0189] In some embodiments, for the structures of LIST 3, R^C is or comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, R^C is or comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0190] In some embodiments, the ligand L_A is selected from $L_{A1} (R^{EA}) (R^{EB}) (R^{EC}) (R^{ED}) (R^{EE})$; wherein i is an integer from 1 to 152, each of R^{EB} , R^{EC} , R^{ED} , and R^{EE} is independently selected from the group consisting of R_1 to R_{295} ; R^{EA} is selected from the group consisting of R_{66} to R_{295} , wherein each of $L_{A1} (R_{66}) (R_1) (R_1) (R_1) (R_1)$ to $L_{A152} (R_{295}) (R_{295}) (R_{295}) (R_{295}) (R_{295})$ is defined in the following LIST 4:

L_A	Structure of L_A
$L_{A1}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A1}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A1}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A2}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A2}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A2}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A3}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A3}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A3}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A4}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A4}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A4}(R_{395})(R_{295})(R_{295})(R_{295})$ have the structure	

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L_A	Structure of L_A	L_A	Structure of L_A
$L_{A5}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A5}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A5}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A9}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A9}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A9}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A6}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A6}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A6}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A10}(R^{EA})(R^{EE})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A10}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A10}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A7}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A7}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A7}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A11}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A11}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A11}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A8}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A8}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A8}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A12}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EB})$, wherein $L_{A12}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A12}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	

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L_A	Structure of L_A	L_A	Structure of L_A
$L_{A13}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A13}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A13}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{A17}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A17}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A17}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{A14}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A14}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A14}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{A18}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A18}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A18}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{A15}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A15}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A15}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{A19}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EB})$, wherein $L_{A19}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A19}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{A16}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A16}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A16}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{A20}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A20}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A20}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	

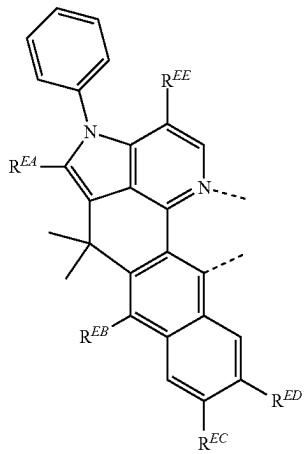
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L_A	Structure of L_A	L_A	Structure of L_A
$L_{A21}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A21}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A21}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{A25}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A25}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A25}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{A22}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A22}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A22}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{A26}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A26}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A26}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{A23}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, (R^{EE}), wherein $L_{A23}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A23}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{A27}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A27}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A27}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{A24}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A24}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A24}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{A28}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A28}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A28}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	

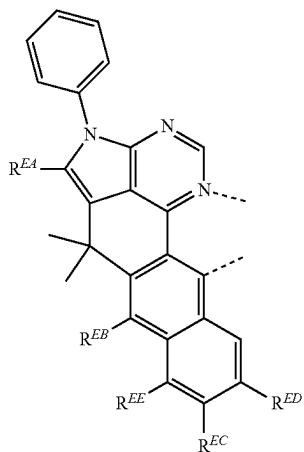
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 L_A Structure of L_A

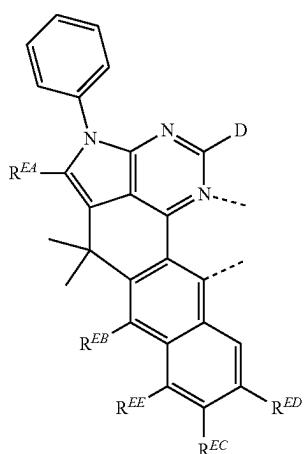
$L_{A29}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A29}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A29}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A30}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A30}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A30}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



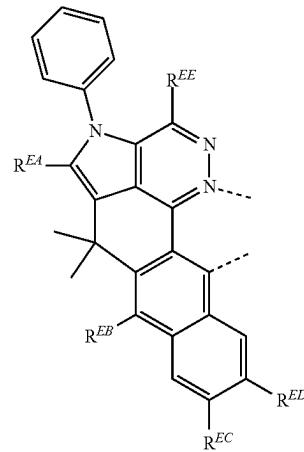
$L_{A31}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A31}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A31}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



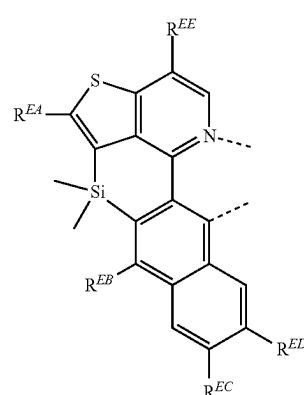
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 L_A Structure of L_A

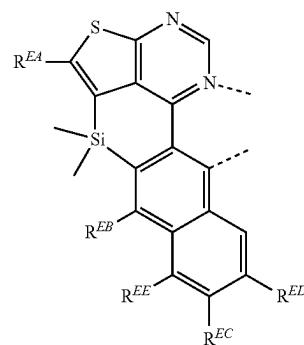
$L_{A32}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A32}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A32}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



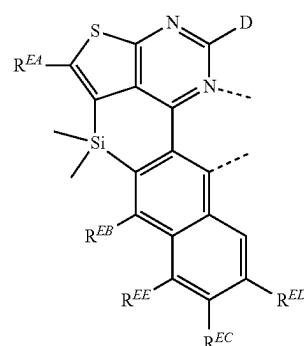
$L_{A33}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A33}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A33}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A34}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A34}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A34}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



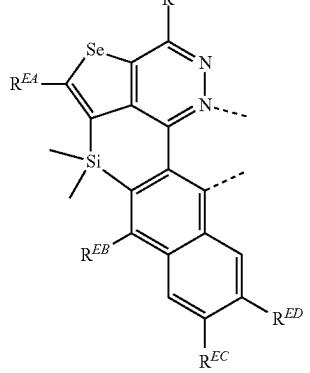
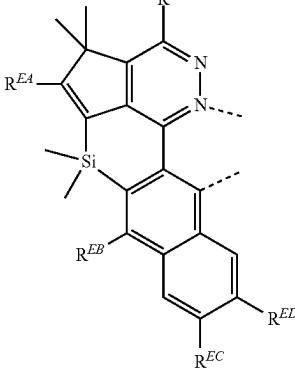
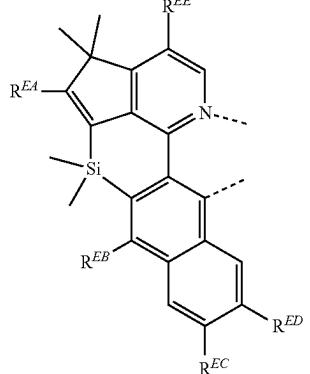
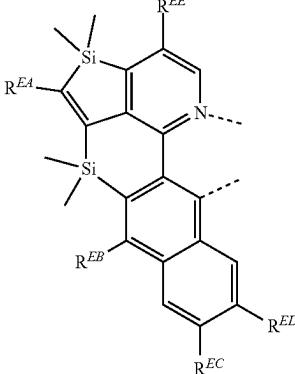
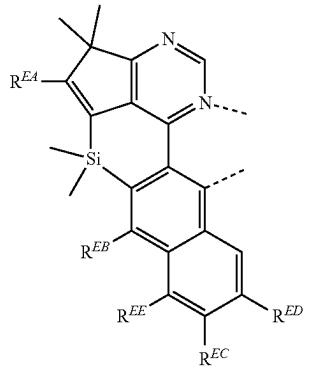
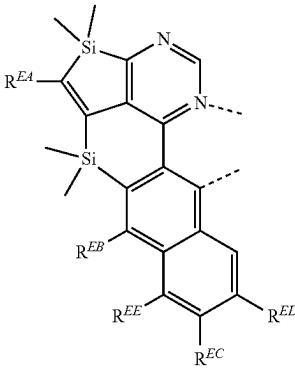
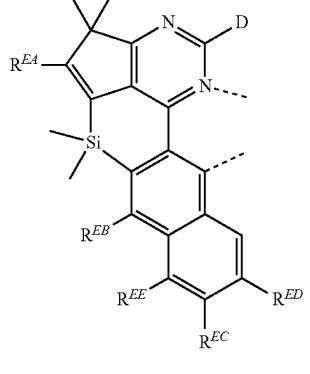
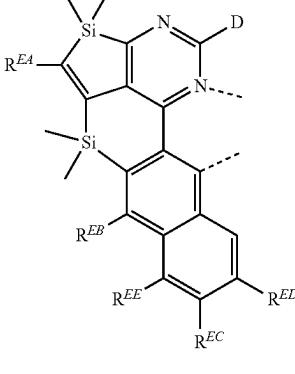
$L_{A35}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A35}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A35}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



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L_A	Structure of L_A	L_A	Structure of L_A
$L_{A36}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A36}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A36}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure 		$L_{A440}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A440}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A440}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure 	
$L_{A37}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A37}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A37}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure 		$L_{A441}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A441}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A441}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure 	
$L_{A38}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A38}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A38}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure 		$L_{A442}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A442}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A442}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure 	
$L_{A39}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A39}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A39}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure 		$L_{A443}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A443}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A443}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure 	

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L_A	Structure of L_A	L_A	Structure of L_A
$L_{444}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{444}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{444}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{448}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{448}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{448}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{445}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EB})$, wherein $L_{445}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{445}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{449}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EB})$, wherein $L_{449}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{449}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{446}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{446}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{446}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{450}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{450}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{450}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{447}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, herein $L_{447}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{447}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{451}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{451}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{451}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	

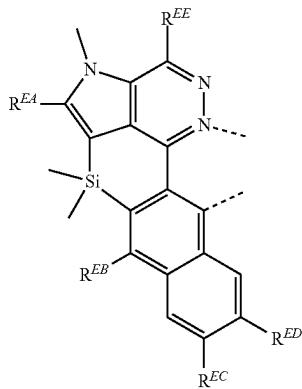
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L_A	Structure of L_A	L_A	Structure of L_A
$L_{452}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{452}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{452}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{456}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{456}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{456}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{453}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{453}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{453}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{457}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{457}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{457}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{454}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{454}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{454}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{458}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{458}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{458}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	
$L_{455}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{455}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{455}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})		$L_{459}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{459}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{459}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure (R_{295})	

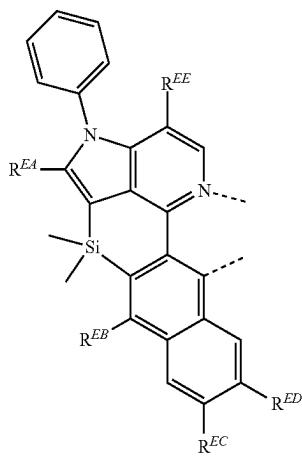
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 L_A Structure of L_A

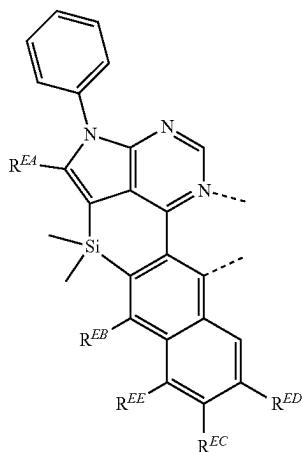
$L_{A60}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A60}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A60}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A61}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A61}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A61}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



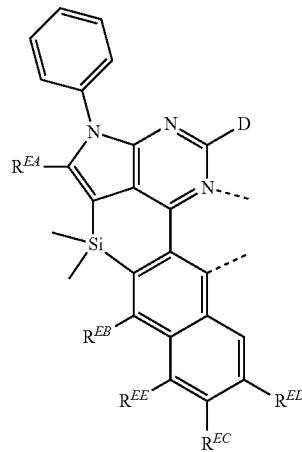
$L_{A62}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EF})$,
wherein
 $L_{A62}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A62}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



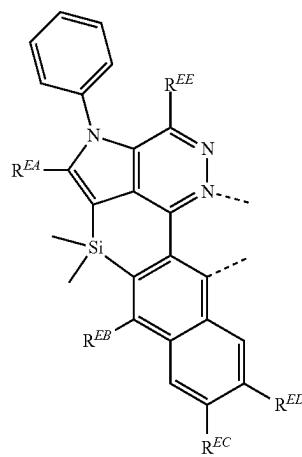
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 L_A Structure of L_A

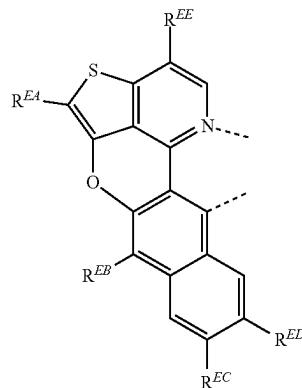
$L_{A63}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A63}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A63}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A64}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A64}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A64}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



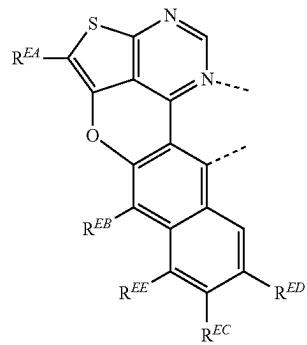
$L_{A65}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A65}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A65}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



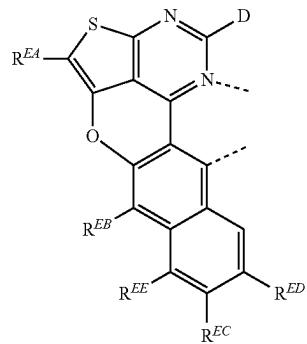
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 L_A Structure of L_A

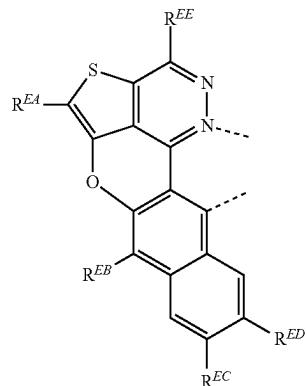
$L_{A66}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A66}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A66}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



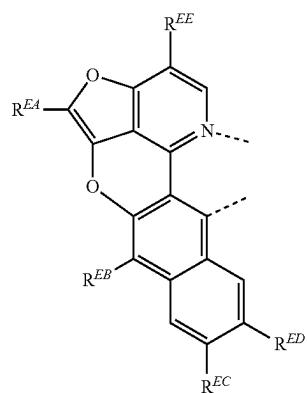
$L_{A67}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A67}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A67}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A68}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A68}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A68}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



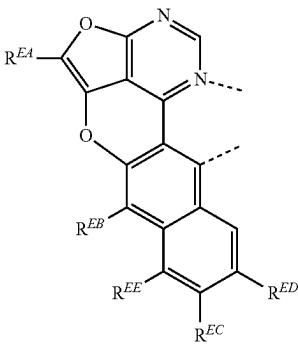
$L_{A69}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A69}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A69}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



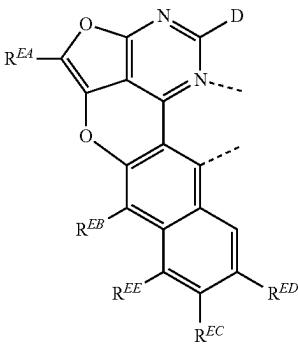
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 L_A Structure of L_A

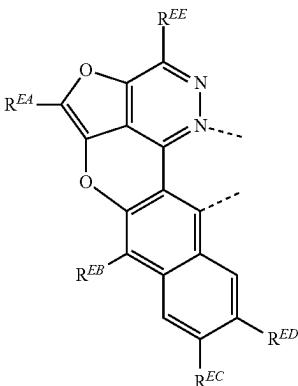
$L_{A70}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A70}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A70}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



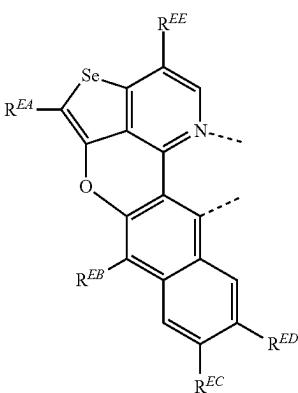
$L_{A71}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A71}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A71}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A72}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A72}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A72}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



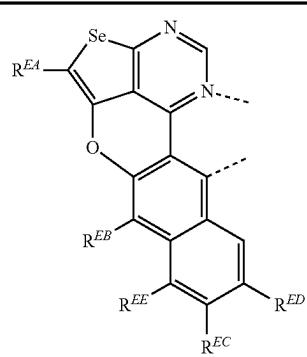
$L_{A73}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A73}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A73}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



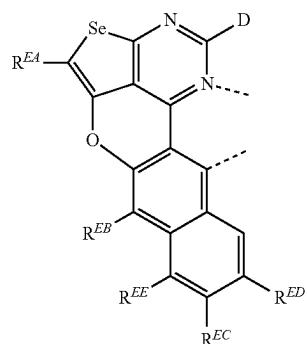
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 L_A Structure of L_A

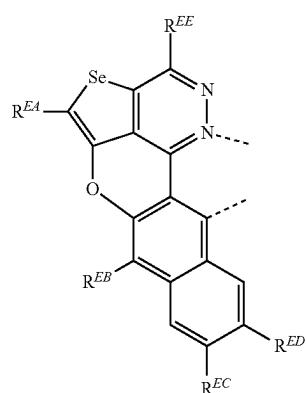
$L_{A74}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A74}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A74}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



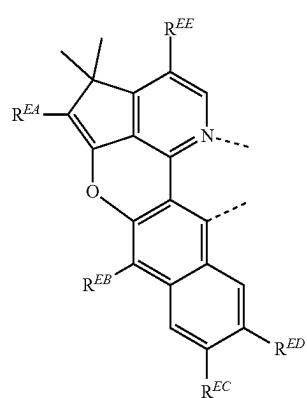
$L_{A75}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A75}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A75}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A76}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A76}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A76}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



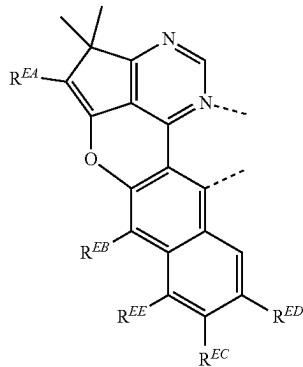
$L_{A77}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A77}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A77}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



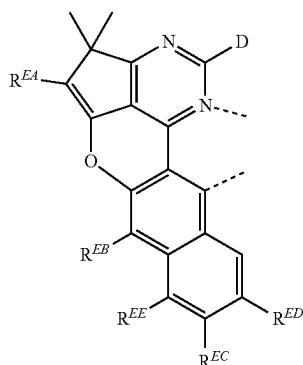
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 L_A Structure of L_A

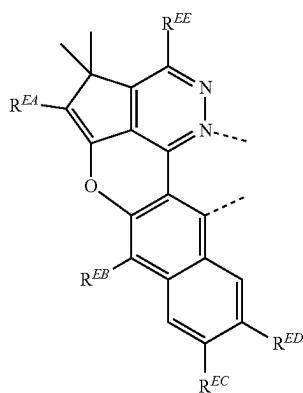
$L_{A78}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A78}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A78}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



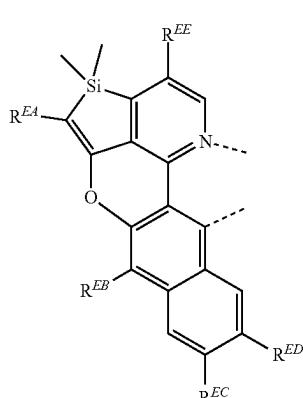
$L_{A79}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A79}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A79}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



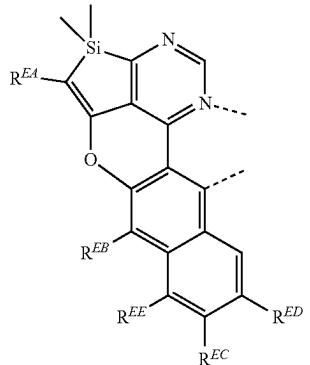
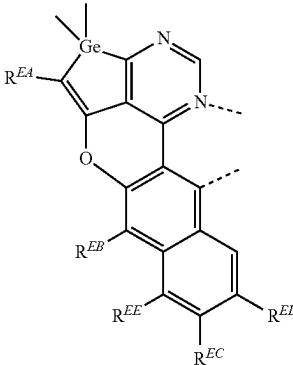
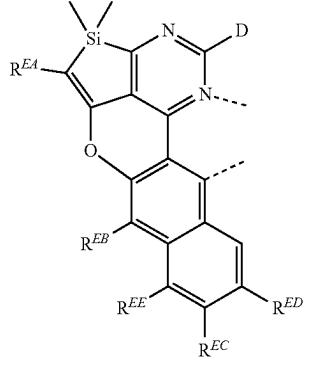
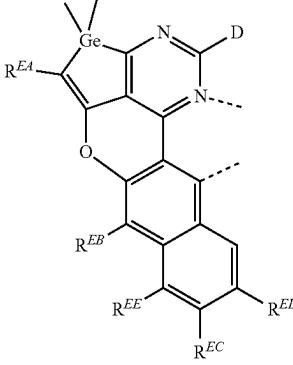
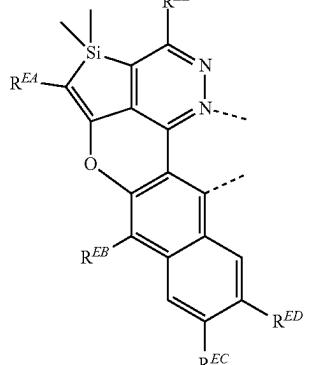
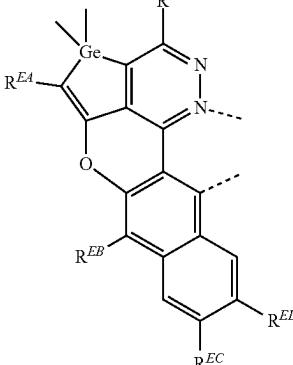
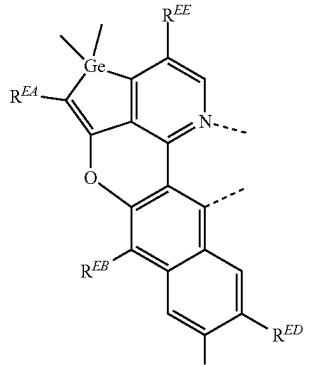
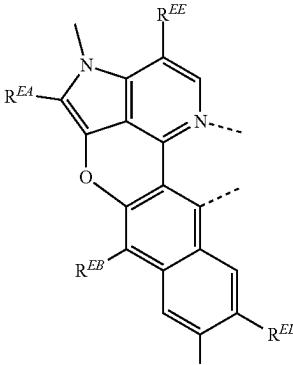
$L_{A80}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A80}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A80}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A81}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein
 $L_{A81}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A81}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



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L_A	Structure of L_A	L_A	Structure of L_A
$L_{482}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{482}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{482}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure		$L_{486}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{486}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{486}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{483}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{483}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{483}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure		$L_{487}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{487}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{487}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{484}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{484}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{484}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure		$L_{488}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{488}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{488}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{485}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{485}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{485}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure		$L_{489}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{489}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{489}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

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L_A	Structure of L_A	L_A	Structure of L_A
$L_{490}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{490}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{490}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{493}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{493}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{493}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{491}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{491}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{491}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{494}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{494}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{494}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{492}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{492}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{492}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{495}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{495}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{495}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	

-continued

L _A	Structure of L _A	-continued	Structure of L _A
L ₄₉₆ (R ^{E4})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L ₄₉₆ (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L ₄₉₆ (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) (R ₂₉₅) have the structure		L ₄₁₀₀ (R ^{E4})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L ₄₁₀₀ (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L ₄₁₀₀ (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) (R ₂₉₅) have the structure	
L ₄₉₇ (R ^{E4})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L ₄₉₇ (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L ₄₉₇ (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) (R ₂₉₅) have the structure		L ₄₁₀₁ (R ^{E4})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L ₄₁₀₁ (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L ₄₁₀₁ (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) (R ₂₉₅) have the structure	
L ₄₉₈ (R ^{E4})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L ₄₉₈ (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L ₄₉₈ (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) (R ₂₉₅) have the structure		L ₄₁₀₂ (R ^{E4})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L ₄₁₀₂ (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L ₄₁₀₂ (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) (R ₂₉₅) have the structure	
L ₄₉₉ (R ^{E4})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L ₄₉₉ (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L ₄₉₉ (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) (R ₂₉₅) have the structure		L ₄₁₀₃ (R ^{E4})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L ₄₁₀₃ (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L ₄₁₀₃ (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) (R ₂₉₅) have the structure	

-continued

L_A	Structure of L_A	L_A	Structure of L_A
$L_{A104}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A104}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A104}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A108}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A108}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A108}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A105}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A105}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A105}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A109}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A109}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A109}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A106}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A106}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A106}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A110}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A110}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A110}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A107}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A107}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A107}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A111}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A111}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A111}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	

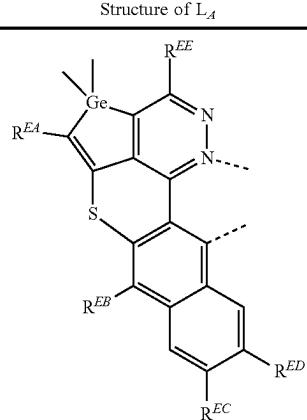
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L_A	Structure of L_A	L_A	Structure of L_A
$L_{A112}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A112}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A112}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A116}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A116}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A116}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A113}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A113}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A113}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A117}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A117}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A117}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A114}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A114}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A114}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A118}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A118}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A118}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A115}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A115}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A115}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure		$L_{A119}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein $L_{A119}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A119}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	

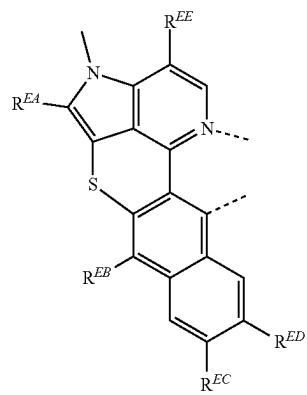
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L_A

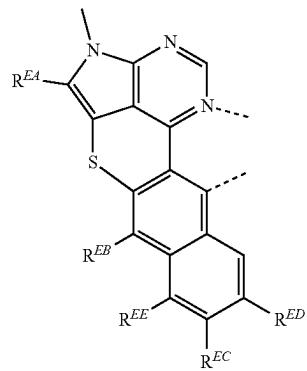
$L_{A120}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A120}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A120}(R_{295})(R_{295})(R_{295})(R_{295})$ (R^{EE}) have the structure



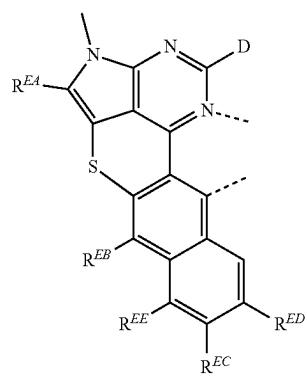
$L_{A121}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A121}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A121}(R_{295})(R_{295})(R_{295})(R_{295})$ (R^{EE}) have the structure



$L_{A122}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A122}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A122}(R_{295})(R_{295})(R_{295})(R_{295})$ (R^{EE}) have the structure



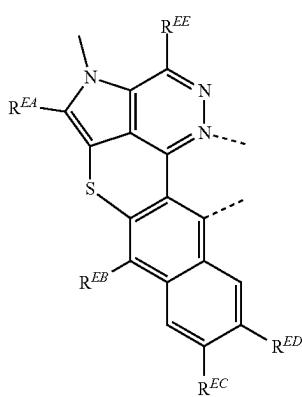
$L_{A123}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A123}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A123}(R_{295})(R_{295})(R_{295})(R_{295})$ (R^{EE}) have the structure



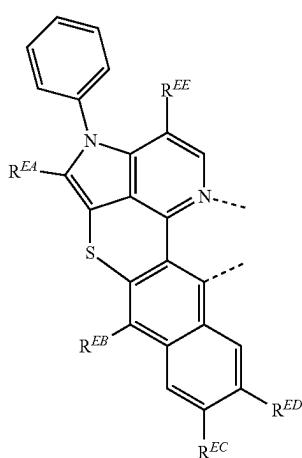
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L_A

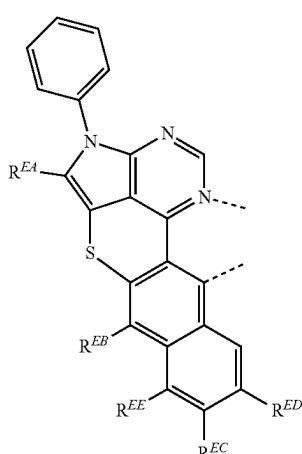
$L_{A124}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A124}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A124}(R_{295})(R_{295})(R_{295})(R_{295})$ (R^{EE}) have the structure



$L_{A125}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A125}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A125}(R_{295})(R_{295})(R_{295})(R_{295})$ (R^{EE}) have the structure



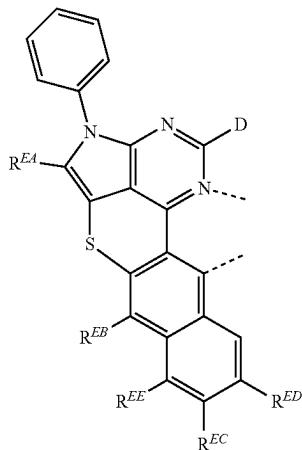
$L_{A126}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A126}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A126}(R_{295})(R_{295})(R_{295})(R_{295})$ (R^{EE}) have the structure



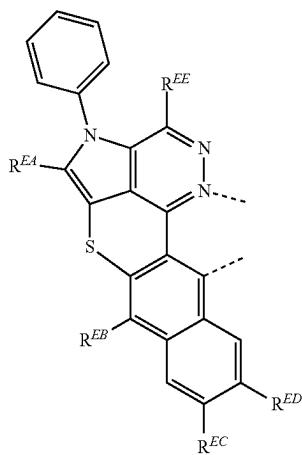
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 L_A Structure of L_A

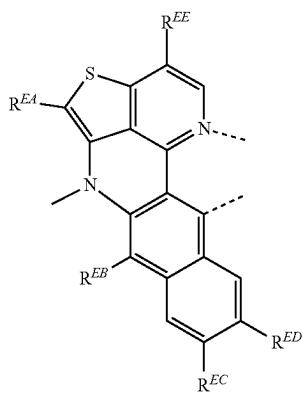
$L_{A127}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A127}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A127}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



$L_{A128}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A128}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A128}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



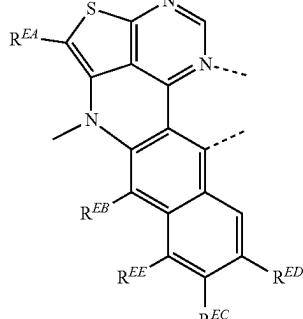
$L_{A129}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A129}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A129}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



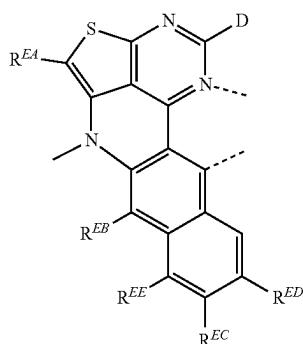
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 L_A Structure of L_A

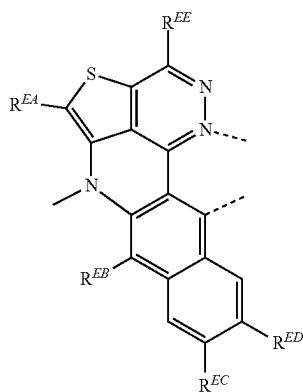
$L_{A130}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A130}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A130}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



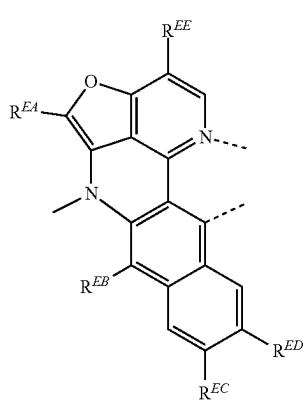
$L_{A131}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A131}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A131}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



$L_{A132}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A132}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A132}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



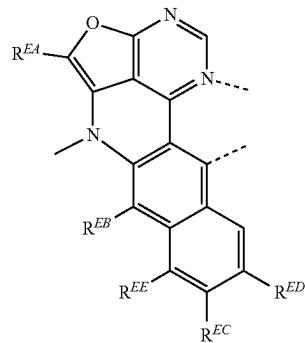
$L_{A133}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{33}), wherein
 $L_{A133}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A133}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



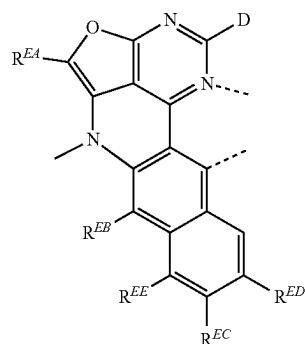
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 L_A Structure of L_A

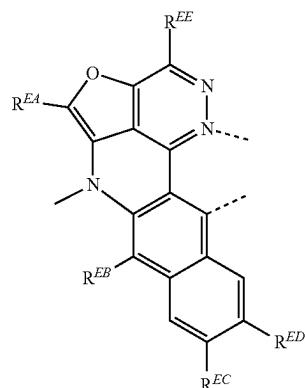
$L_{A134}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$
(R^{EE}), wherein
 $L_{A134}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A134}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



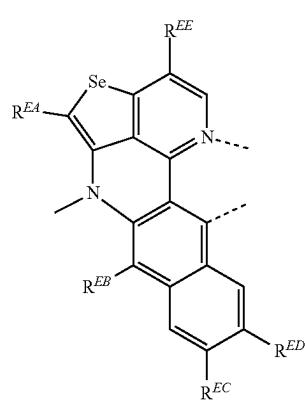
$L_{A135}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$
(R^{EE}), wherein
 $L_{A135}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A135}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A136}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$
(R^{EE}), wherein
 $L_{A136}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A136}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



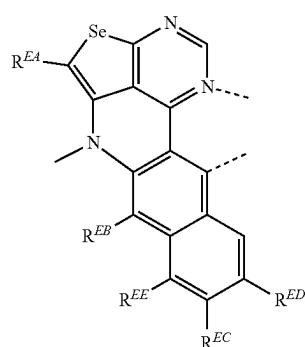
$L_{A137}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$
(R^{EE}), wherein
 $L_{A137}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A137}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



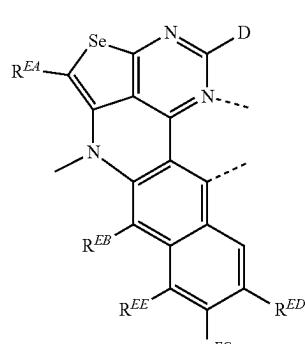
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 L_A Structure of L_A

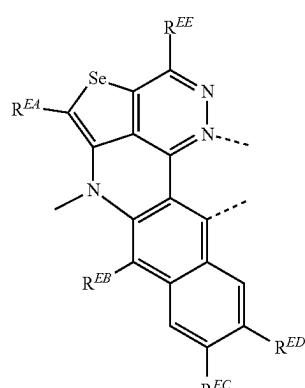
$L_{A138}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$
(R^{EE}), wherein
 $L_{A138}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A138}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



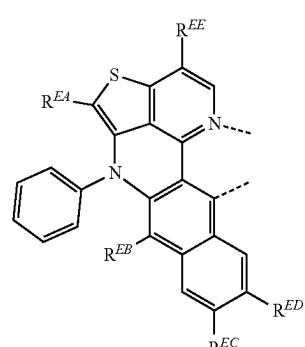
$L_{A139}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$
(R^{EE}), wherein
 $L_{A139}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A139}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



$L_{A140}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$
(R^{EE}), wherein
 $L_{A140}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A140}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



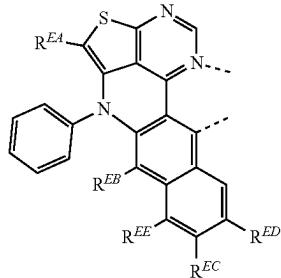
$L_{A141}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$
(R^{EE}), wherein
 $L_{A141}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A141}(R_{295})(R_{295})(R_{295})(R_{295})$
(R_{295}) have the structure



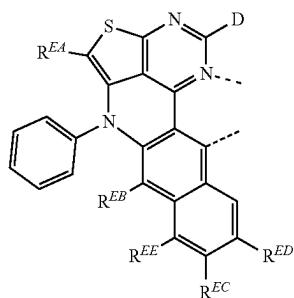
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 L_A Structure of L_A

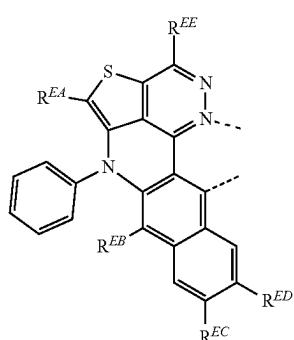
$L_{A142}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A142}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A142}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



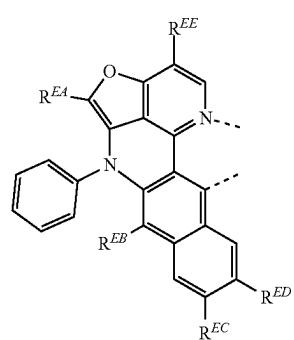
$L_{A143}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A143}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A143}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



$L_{A144}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A144}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A144}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



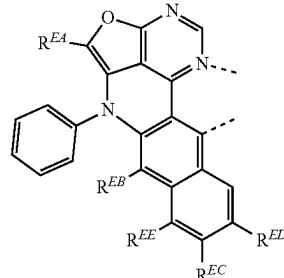
$L_{A145}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A145}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A145}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



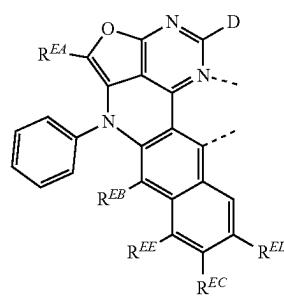
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 L_A Structure of L_A

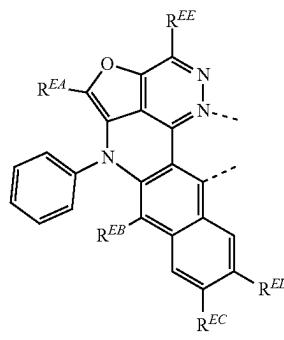
$L_{A146}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A146}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A146}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



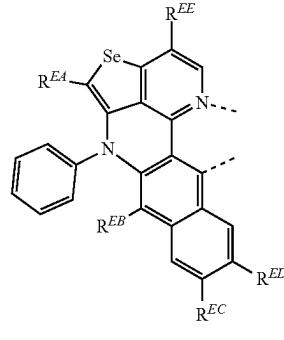
$L_{A147}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A147}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A147}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



$L_{A148}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A148}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A148}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



$L_{A149}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}), wherein
 $L_{A149}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to
 $L_{A149}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure



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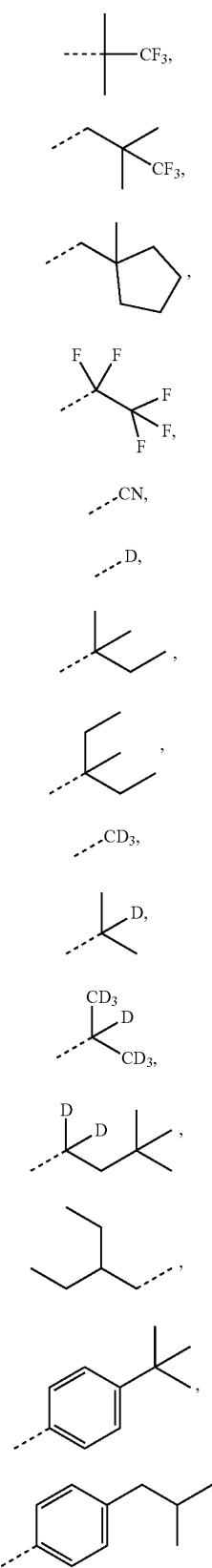
L_A	Structure of L_A
$L_{A150}^{(E)}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}) , wherein $L_{A150}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A150}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A151}^{(E)}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}) , wherein $L_{A151}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A151}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	
$L_{A152}^{(E)}(R^{EA})(R^{EB})(R^{EC})(R^{ED})$ (R^{EE}) , wherein $L_{A152}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A152}(R_{295})(R_{295})(R_{295})(R_{295})$ (R_{295}) have the structure	

[0191] wherein R₁ to R₂₉₅ have the structures in the following LIST 5:

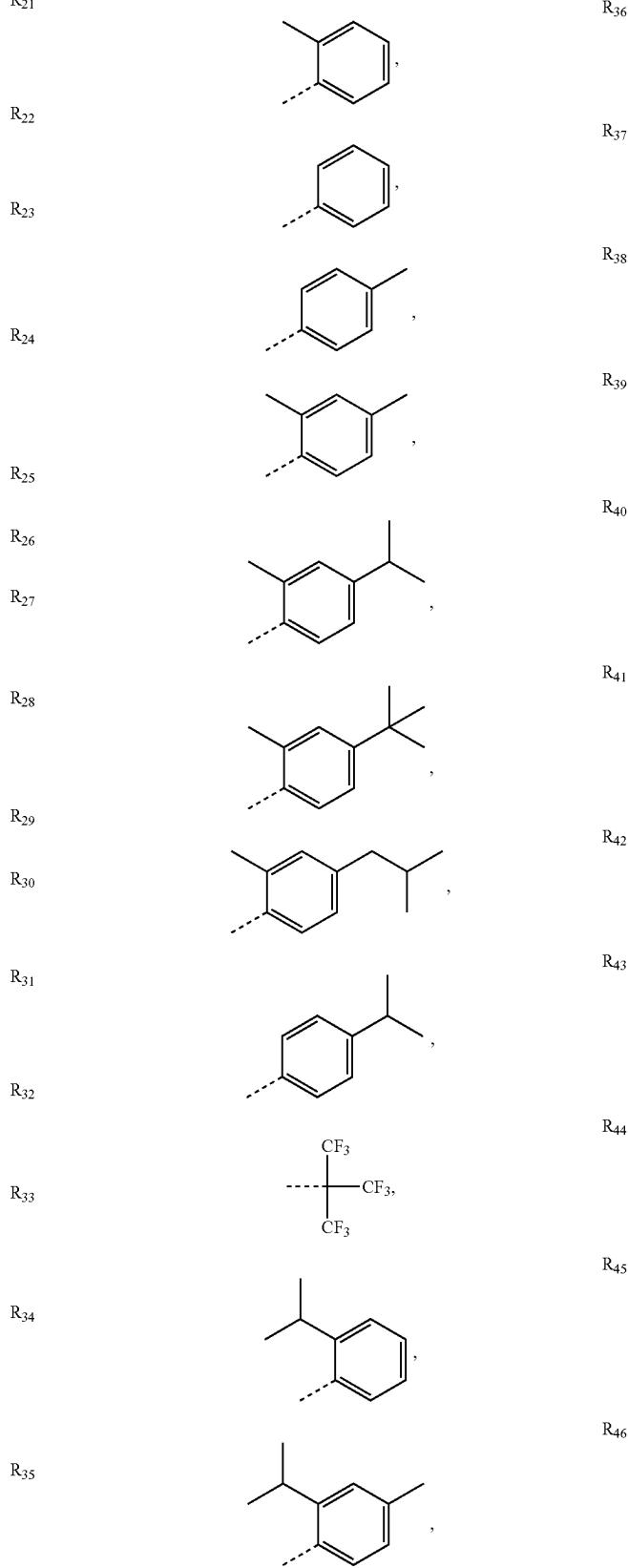
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 R₇
 R₈
 R₉
 R₁₀
 R₁₁
 R₁₂
 R₁₃
 R₁₄
 R₁₅
 R₁₆
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 R₁₈
 R₁₉
 R₂₀

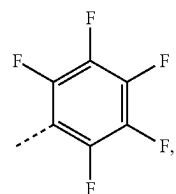
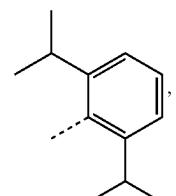
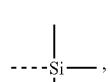
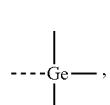
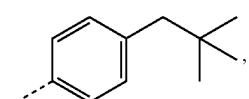
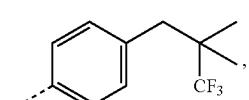
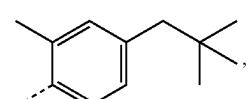
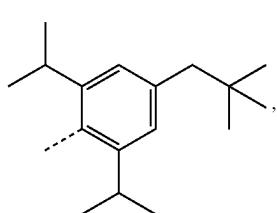
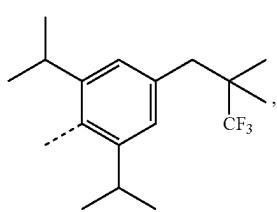
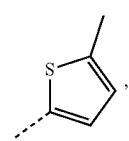
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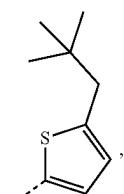
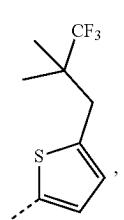
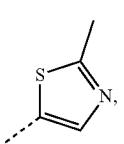
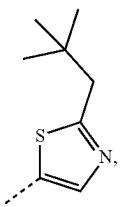
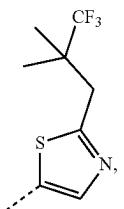
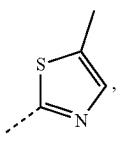
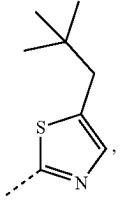
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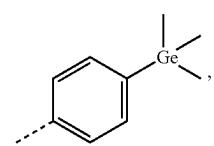
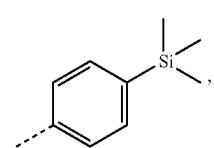
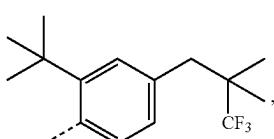
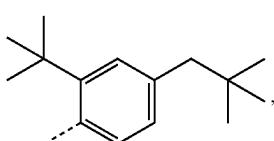
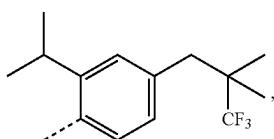
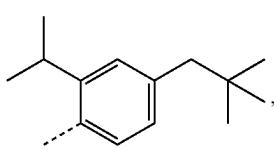
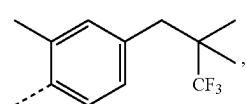
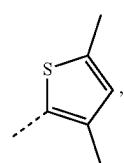
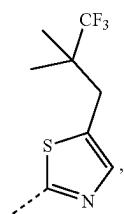
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R₆₄R₆₅R₆₆R₆₇R₆₈R₆₉R₇₀R₇₁R₇₂R₇₃

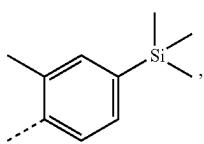
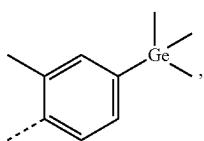
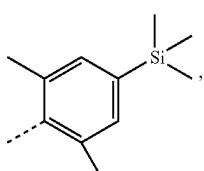
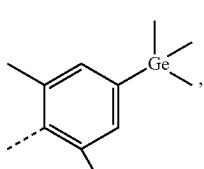
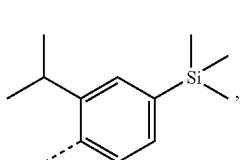
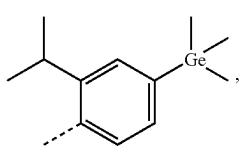
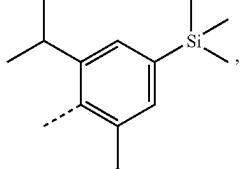
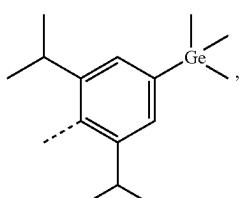
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R₇₄R₇₅R₇₆R₇₇R₇₈R₇₉R₈₀

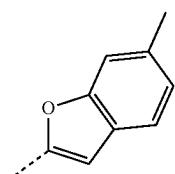
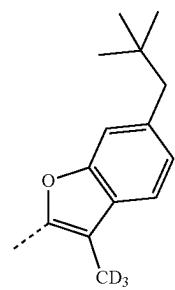
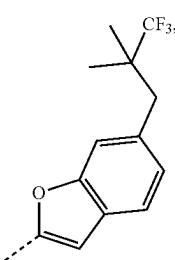
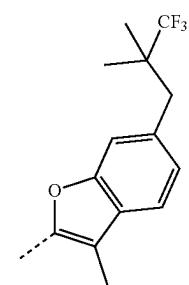
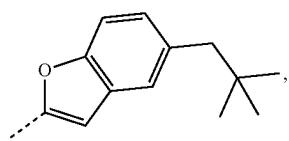
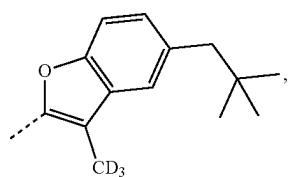
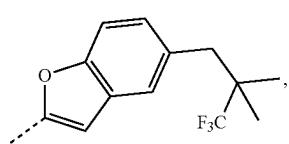
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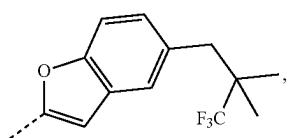
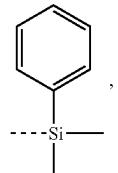
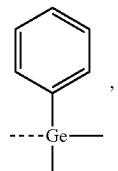
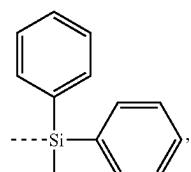
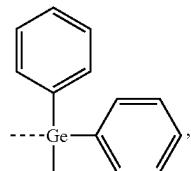
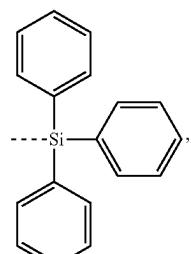
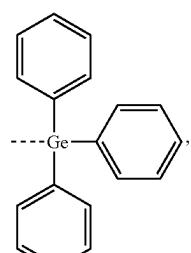
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R₈₁R₉₀R₉₁R₉₂R₉₃R₉₄R₉₅R₉₆R₉₇

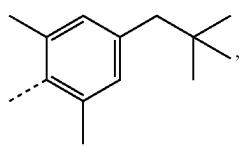
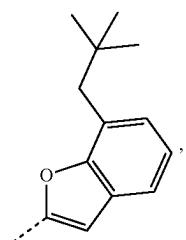
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R₉₈R₉₉R₁₀₀R₁₀₁R₁₀₂R₁₀₃R₁₀₄

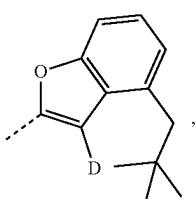
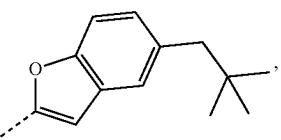
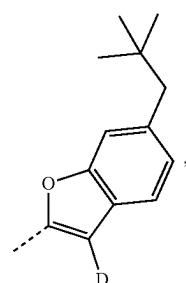
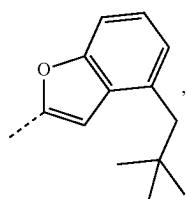
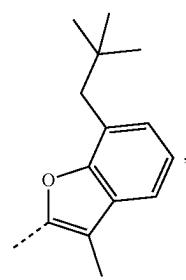
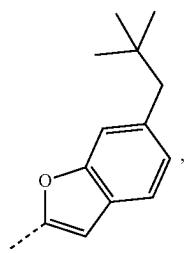
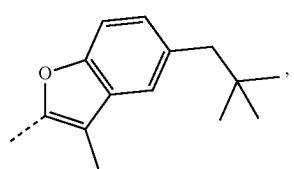
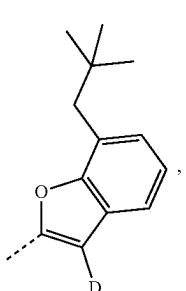
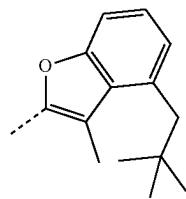
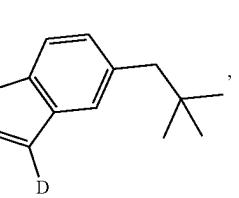
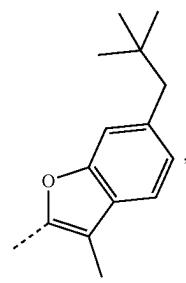
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R₁₀₅R₁₀₆R₁₀₇R₁₀₈R₁₀₉R₁₁₀R₁₁₁

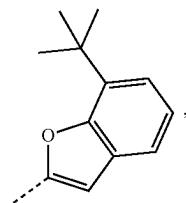
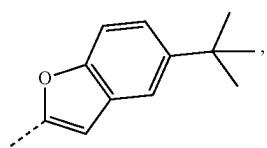
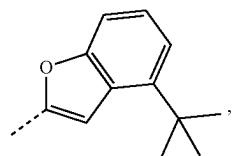
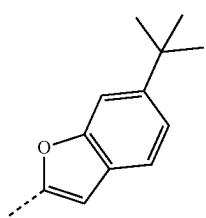
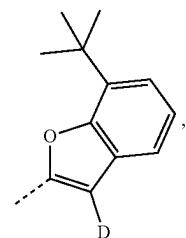
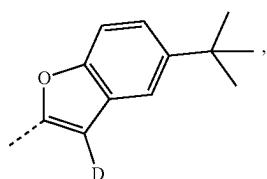
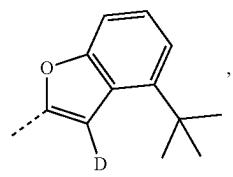
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R₁₁₂R₁₁₃

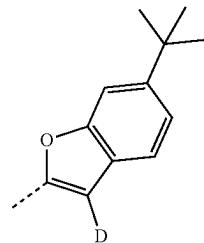
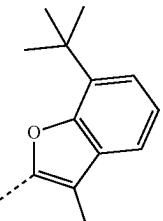
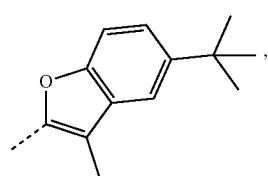
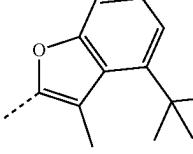
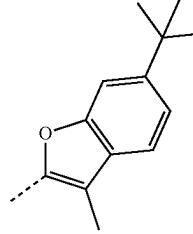
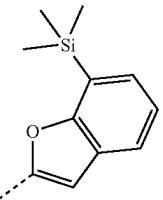
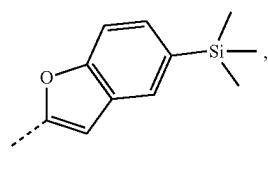
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R₁₁₉R₁₁₄R₁₂₀R₁₁₅R₁₂₁R₁₁₆R₁₂₂R₁₁₇R₁₂₃R₁₁₈R₁₂₄

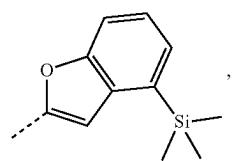
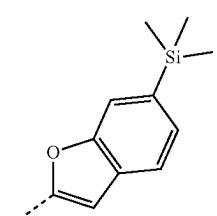
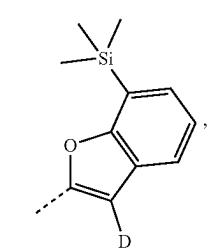
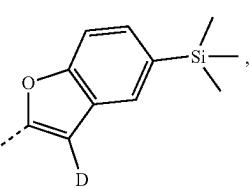
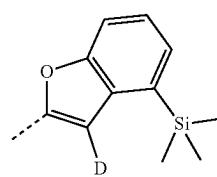
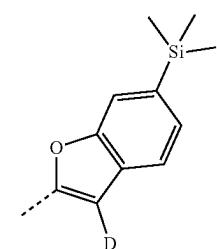
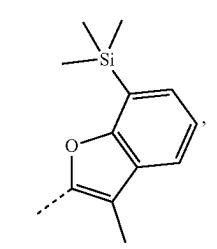
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R₁₂₅R₁₂₆R₁₂₇R₁₂₈R₁₂₉R₁₃₀R₁₃₁

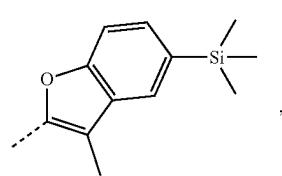
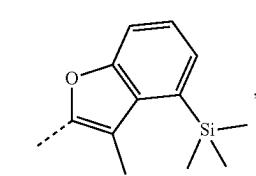
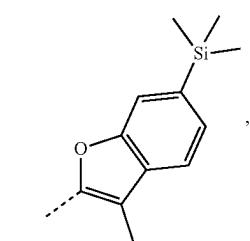
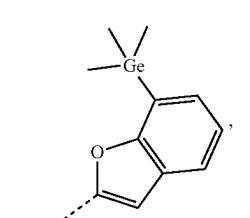
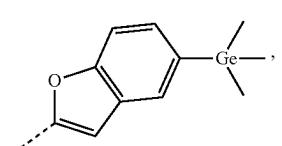
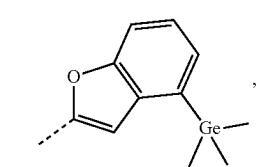
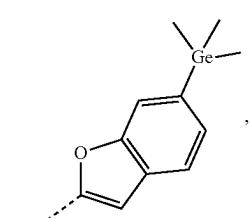
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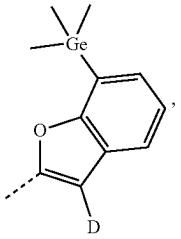
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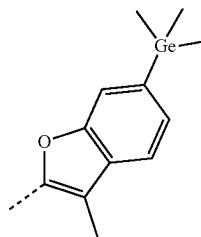
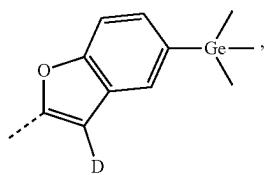
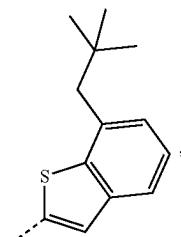
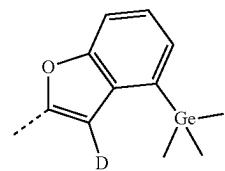
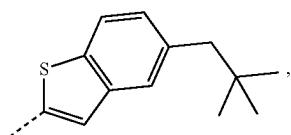
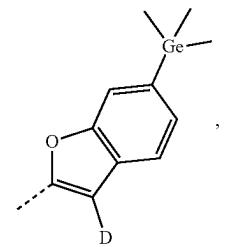
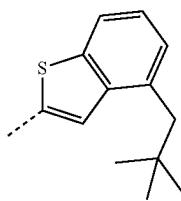
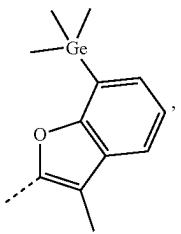
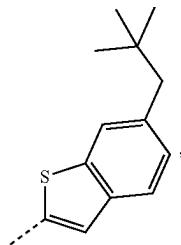
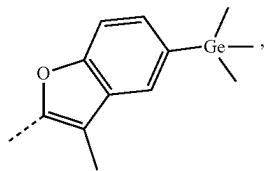
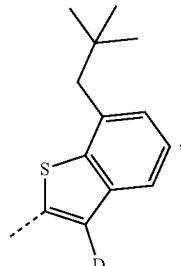
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R₁₄₆R₁₄₇R₁₄₈R₁₄₉R₁₅₀R₁₅₁R₁₅₂

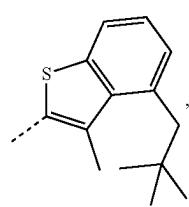
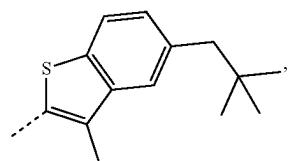
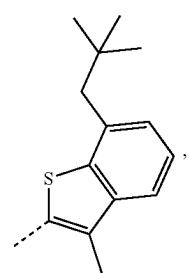
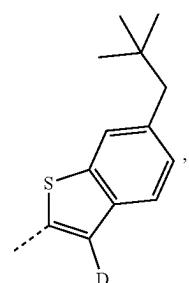
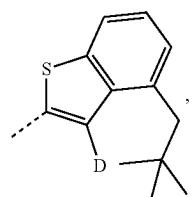
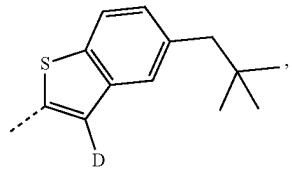
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R₁₅₃

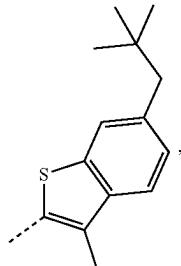
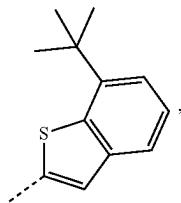
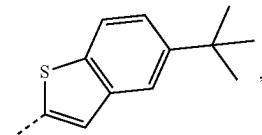
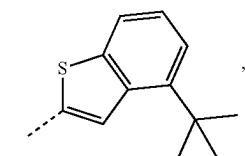
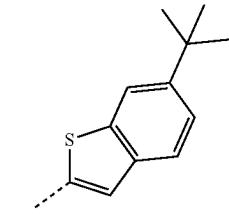
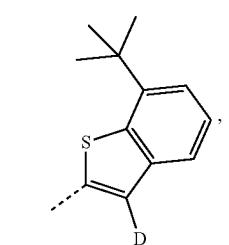
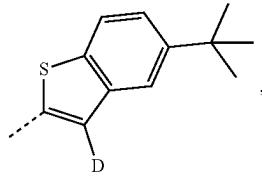
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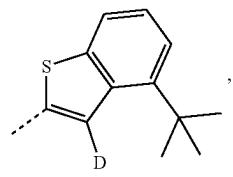
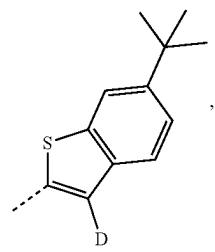
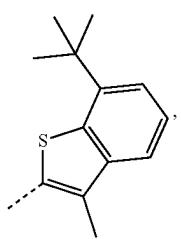
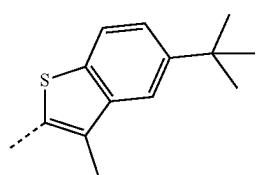
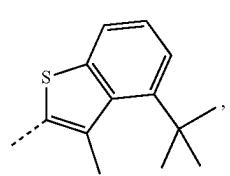
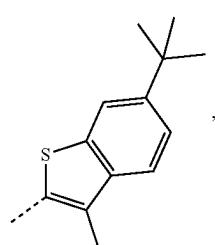
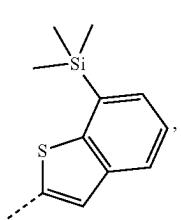
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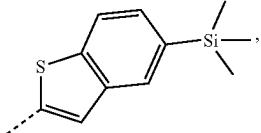
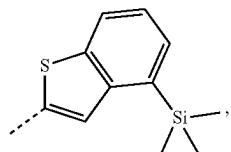
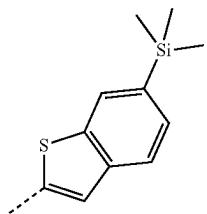
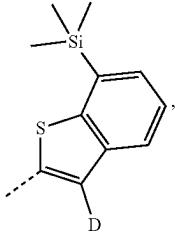
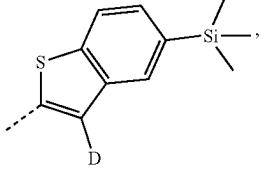
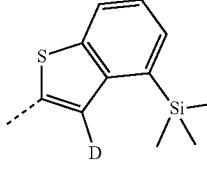
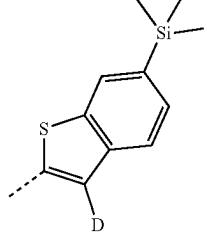
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 R_{172}  R_{173}  R_{174}  R_{175}  R_{176}  R_{177}  R_{178} 

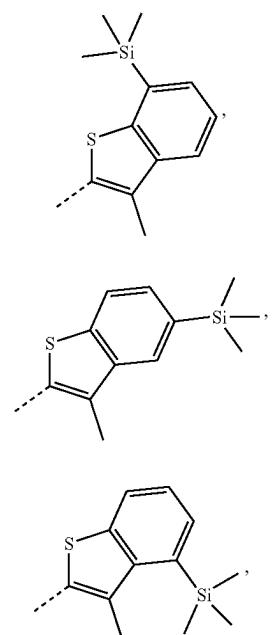
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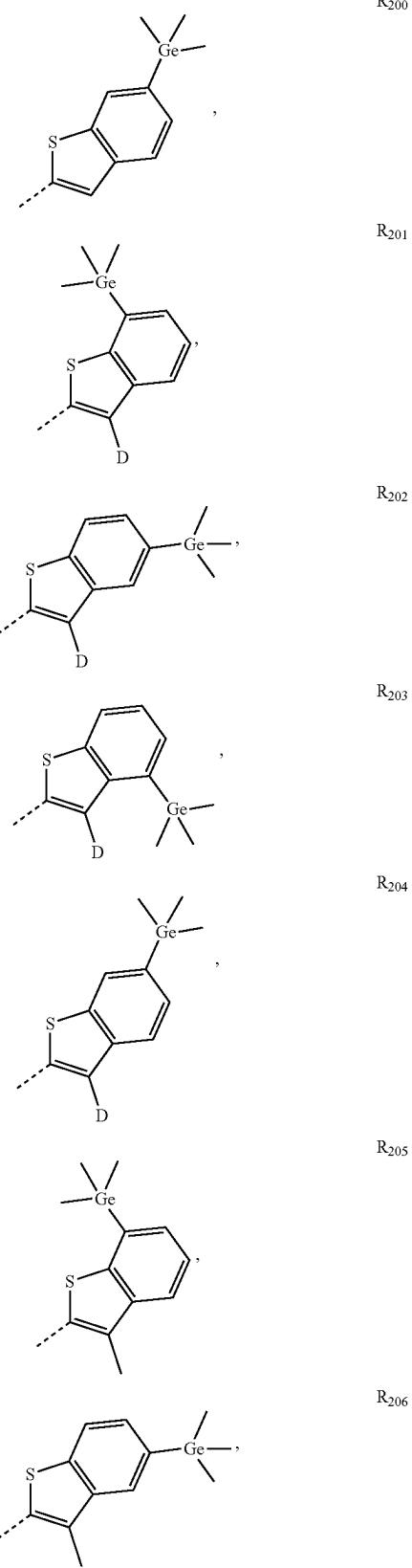
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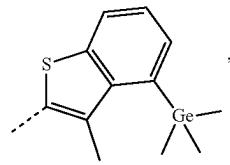
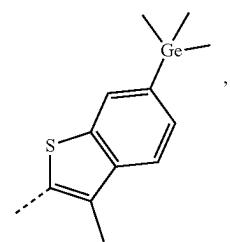
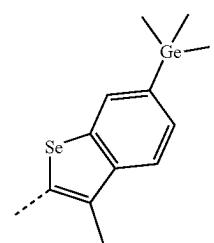
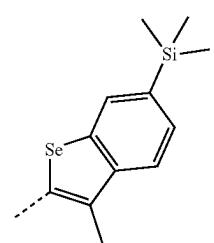
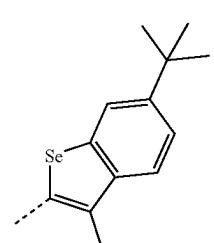
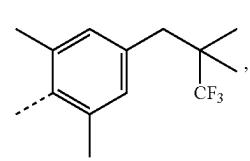
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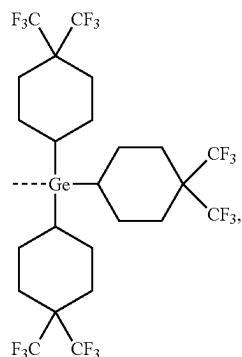
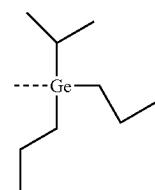
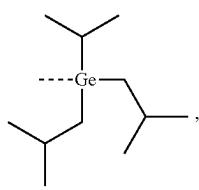
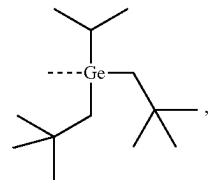
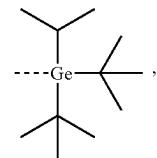
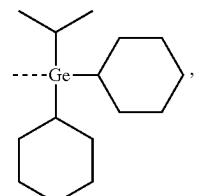
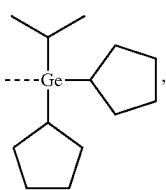
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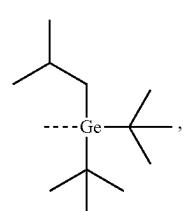
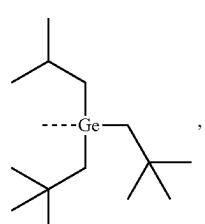
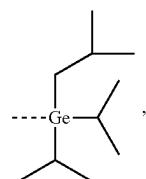
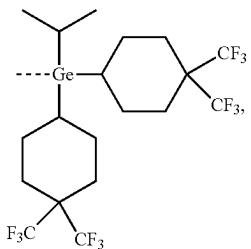
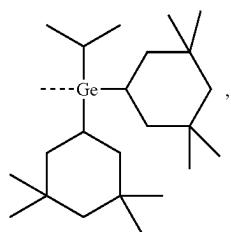
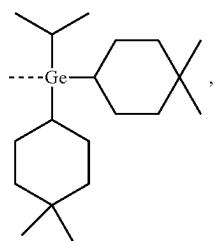
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R₂₀₇R₂₀₈R₂₀₉R₂₁₀R₂₁₁R₂₁₂

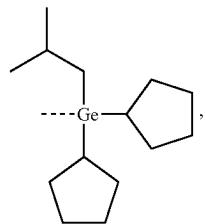
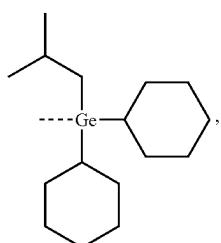
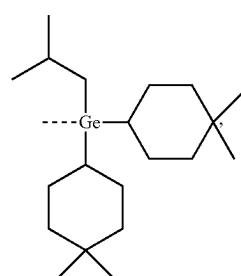
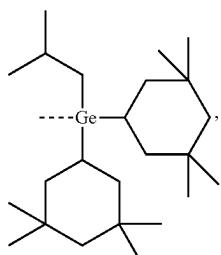
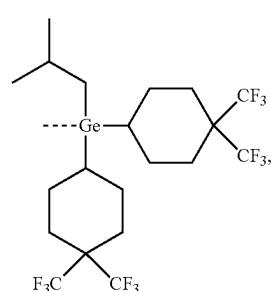
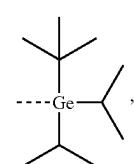
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R₂₁₃R₂₁₄R₂₁₅R₂₁₆R₂₁₇R₂₁₈R₂₁₉

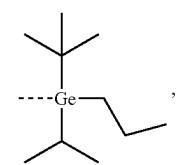
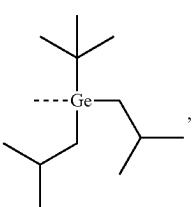
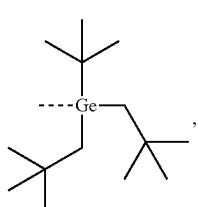
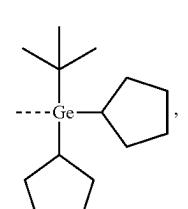
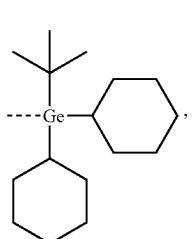
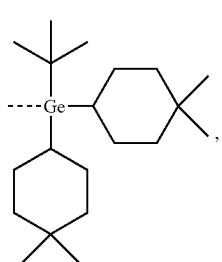
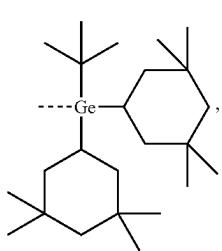
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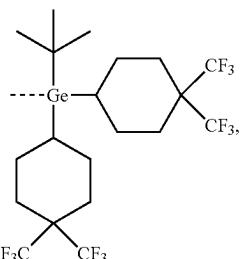
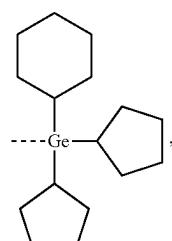
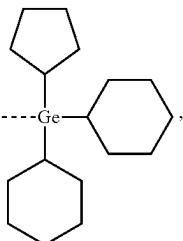
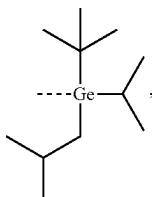
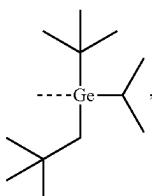
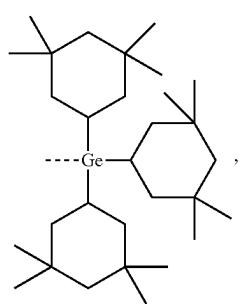
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R₂₂₀R₂₂₁R₂₂₂R₂₂₃R₂₂₄R₂₂₅

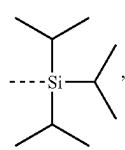
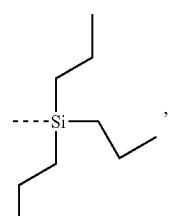
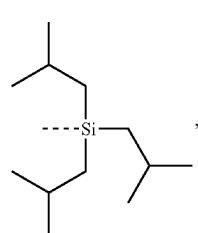
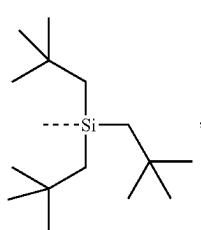
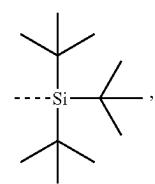
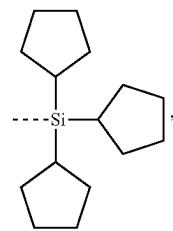
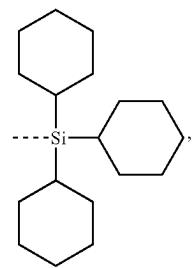
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R₂₃₂R₂₃₃R₂₃₄R₂₃₅R₂₃₆R₂₃₇R₂₃₈

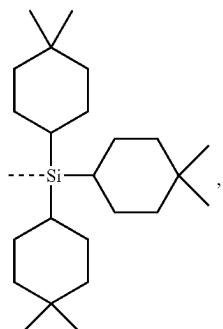
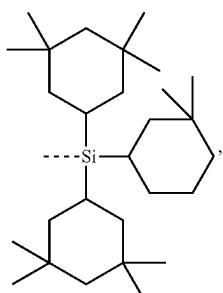
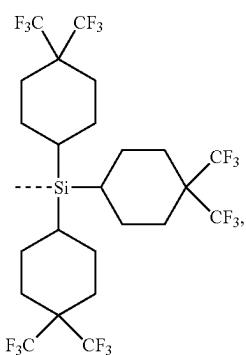
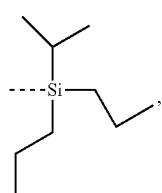
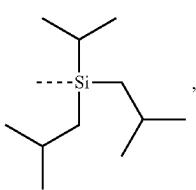
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R₂₃₉R₂₄₀R₂₄₁R₂₄₂R₂₄₃R₂₄₄

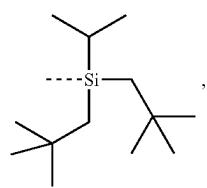
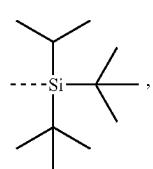
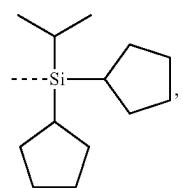
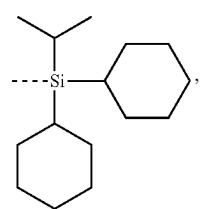
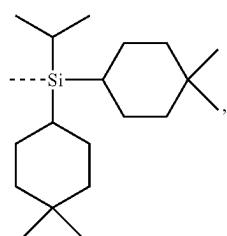
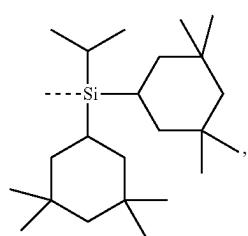
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R₂₄₅R₂₄₆R₂₄₇R₂₄₈R₂₄₉R₂₅₀R₂₅₁

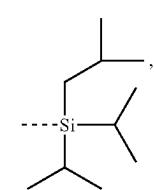
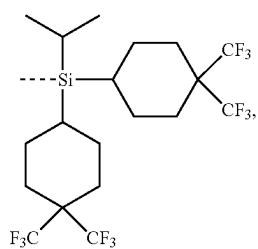
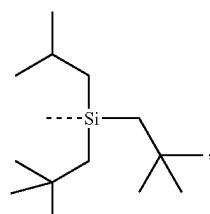
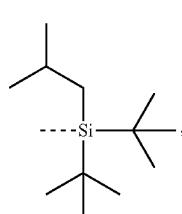
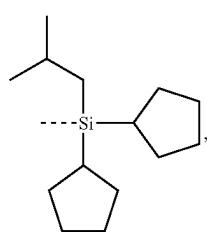
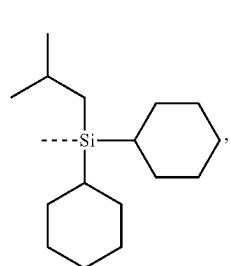
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R₂₅₂R₂₅₃R₂₅₄R₂₅₅R₂₅₆

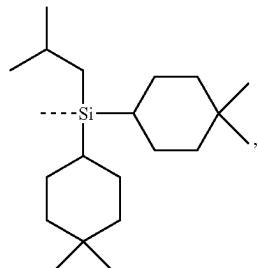
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R₂₅₇R₂₅₈R₂₅₉R₂₆₀R₂₆₁R₂₆₂

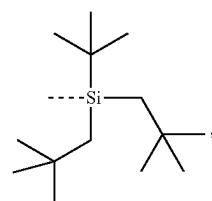
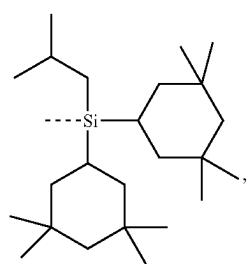
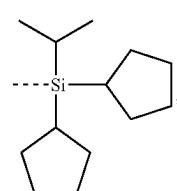
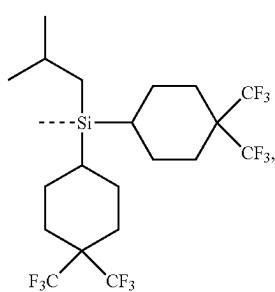
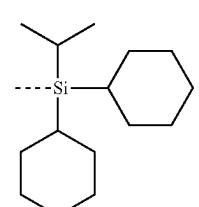
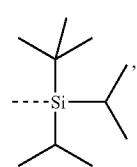
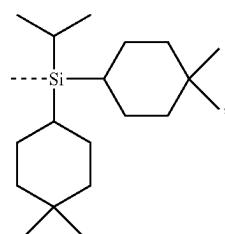
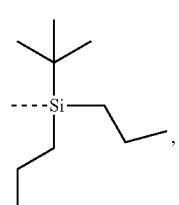
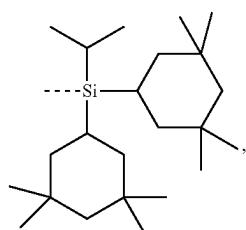
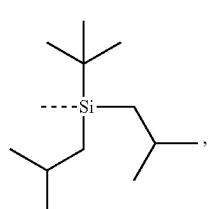
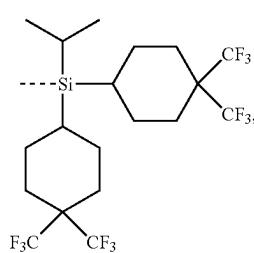
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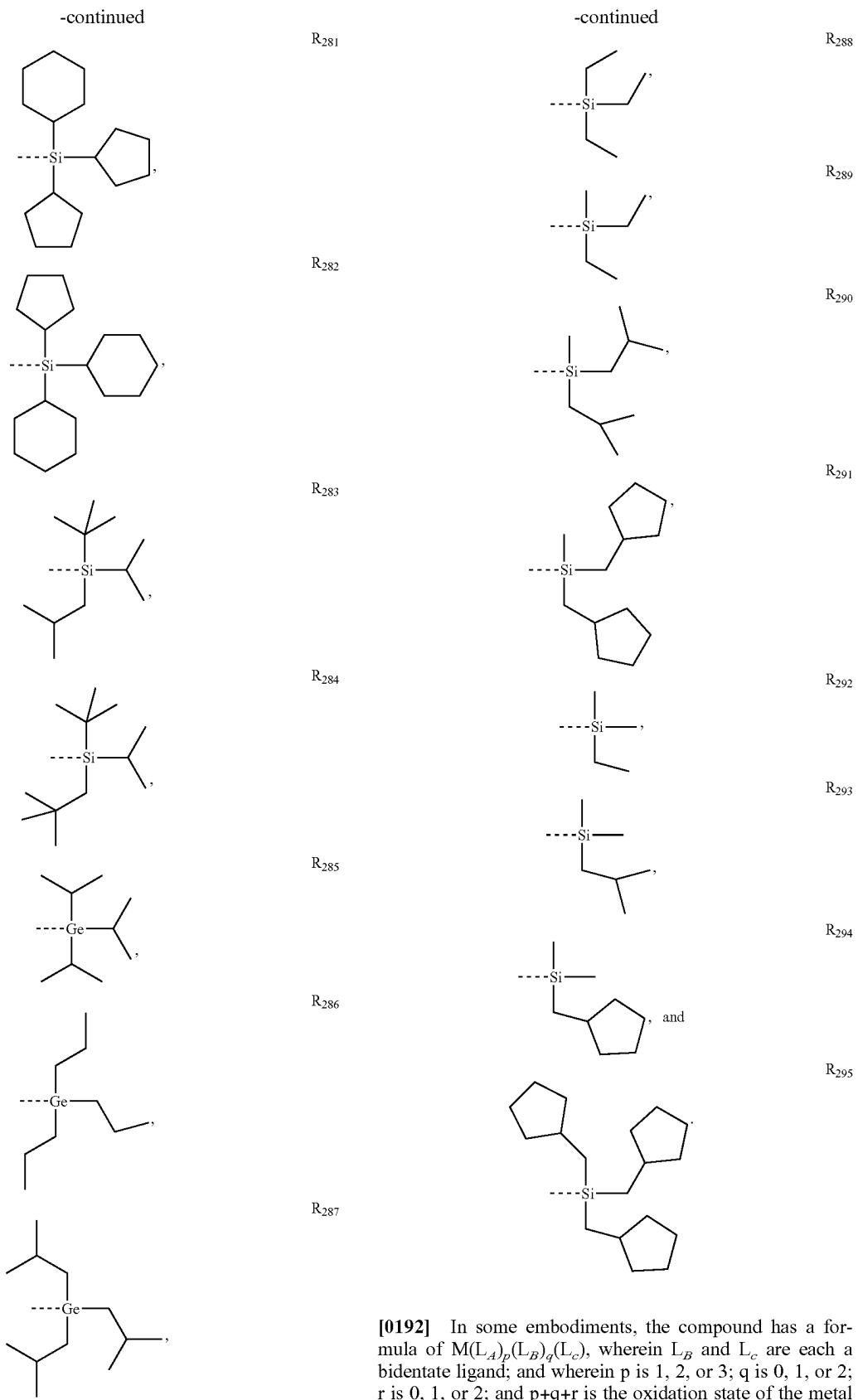
R₂₆₃R₂₆₄R₂₆₅R₂₆₆R₂₆₇R₂₆₈

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R₂₆₉

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R₂₇₅R₂₇₀R₂₇₆R₂₇₁R₂₇₇R₂₇₂R₂₇₈R₂₇₃R₂₇₉R₂₇₄R₂₈₀



[0192] In some embodiments, the compound has a formula of $M(L_A)_p(L_B)_q(L_c)$, wherein L_B and L_c are each a bidentate ligand; and wherein p is 1, 2, or 3; q is 0, 1, or 2; r is 0, 1, or 2; and $p+q+r$ is the oxidation state of the metal M .

[0193] In some embodiments, L_B comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, L_B comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, L_B comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, L_B comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, L_B comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

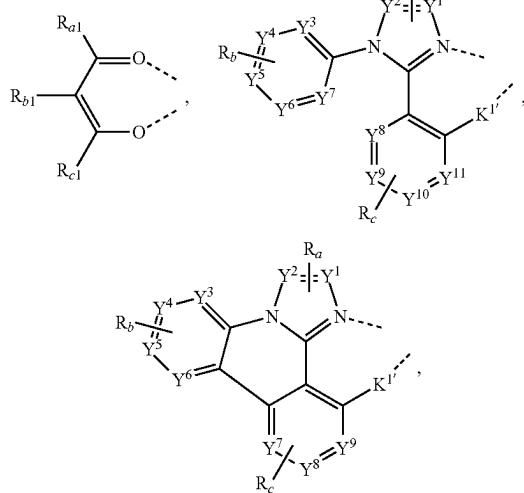
[0194] In some embodiments, L_c comprises an electron-withdrawing group from the EWG1 LIST as defined herein. In some embodiments, L_c comprises an electron-withdrawing group from the EWG2 LIST as defined herein. In some embodiments, L_c comprises an electron-withdrawing group from the EWG3 LIST as defined herein. In some embodiments, L_c comprises an electron-withdrawing group from the EWG4 LIST as defined herein. In some embodiments, L_c comprises an electron-withdrawing group from the Pi-EWG LIST as defined herein.

[0195] In some embodiments, the compound has a formula selected from the group consisting of $\text{Ir}(L_A)_3$, $\text{Ir}(L_A)(L_B)_2$, $\text{Ir}(L_A)_2(L_B)$, $\text{Ir}(L_A)_2(L_c)$, and $\text{Ir}(L_A)(L_B)(L_c)$; and wherein L_A , L_B , and L_c are different from each other.

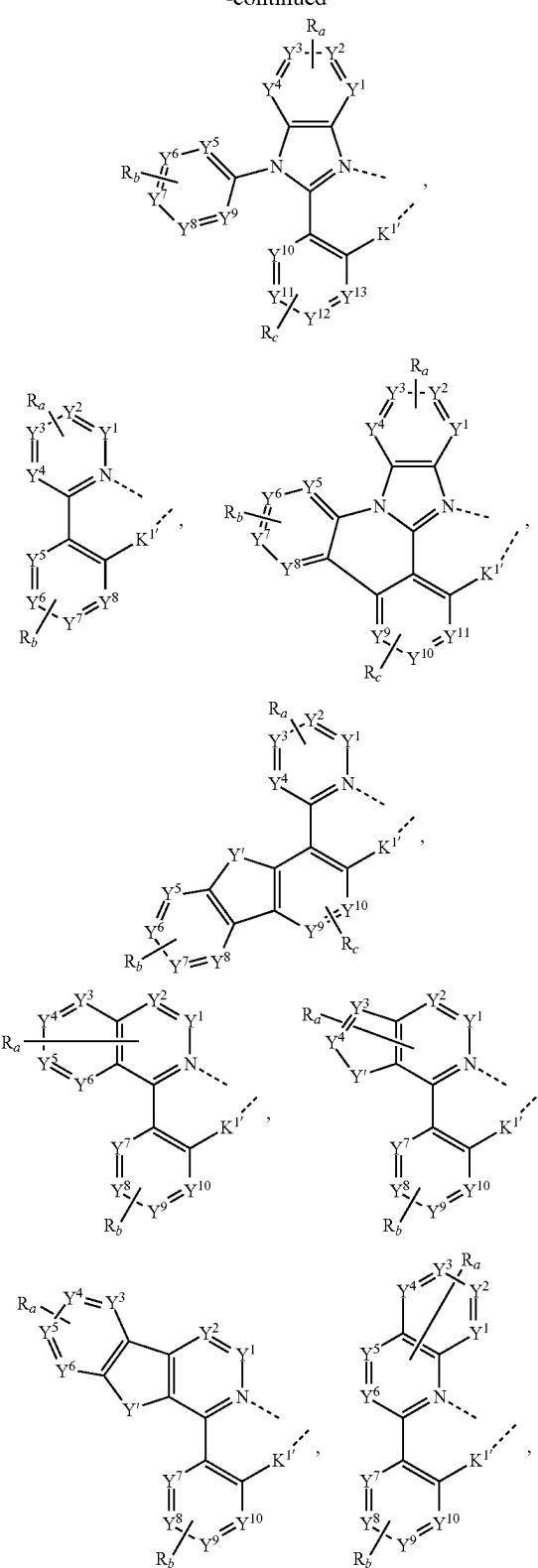
[0196] In some embodiments, L_B is a substituted or unsubstituted phenylpyridine, and L_c is a substituted or unsubstituted acetylacetone.

[0197] In some embodiments, the compound has a formula of $\text{Pt}(L_A)(L_B)$; and wherein L_A and L_B can be same or different. In some embodiments, L_A and L_B are connected to form a tetradeятate ligand.

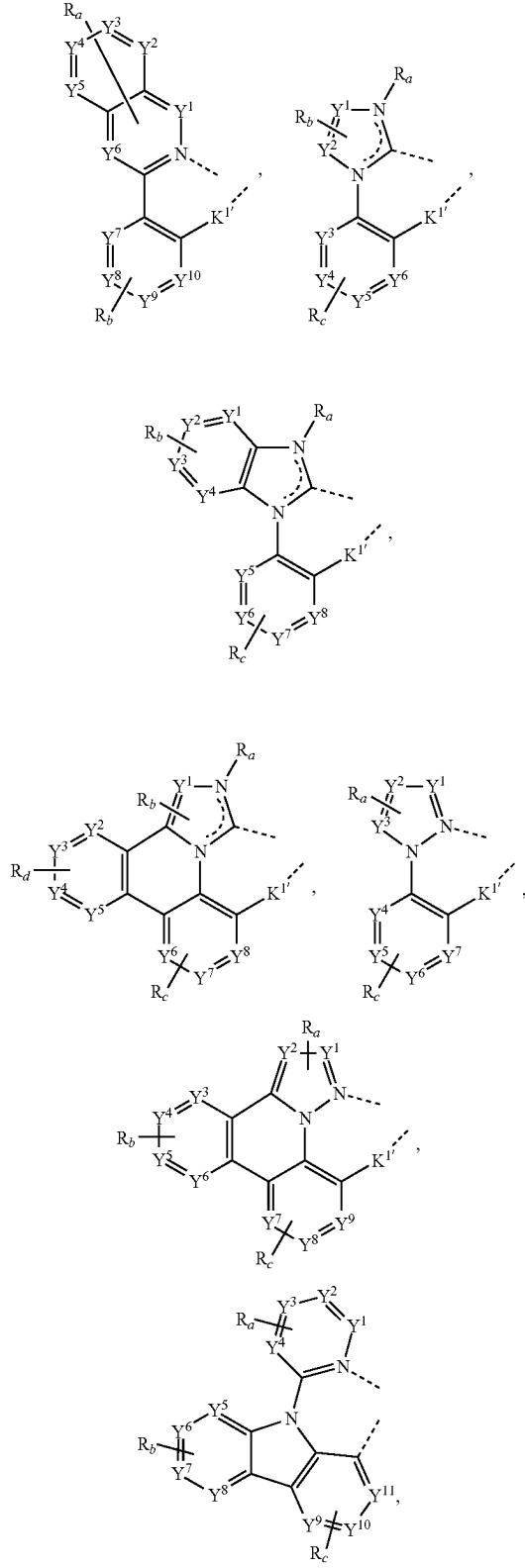
[0198] In some embodiments, L_B and L_c are each independently selected from the group consisting of the structures of the following LIST 6:



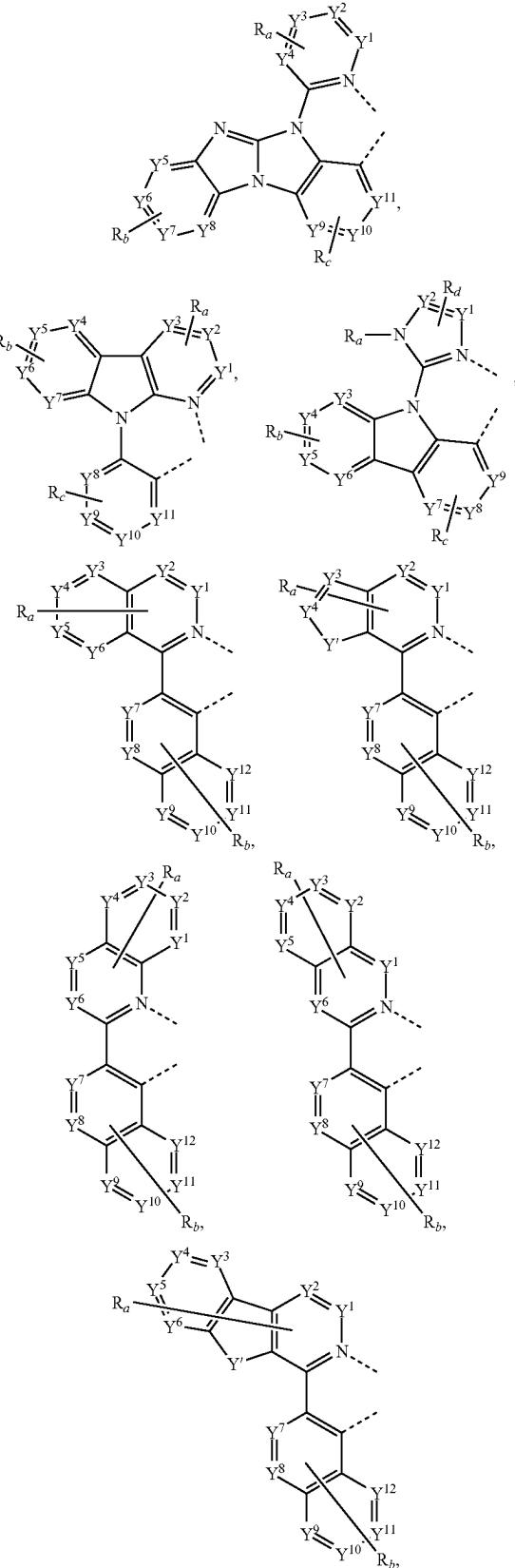
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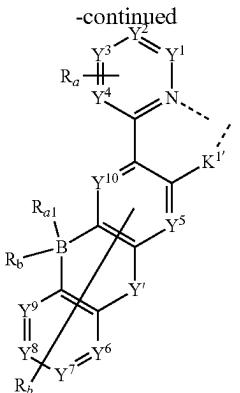
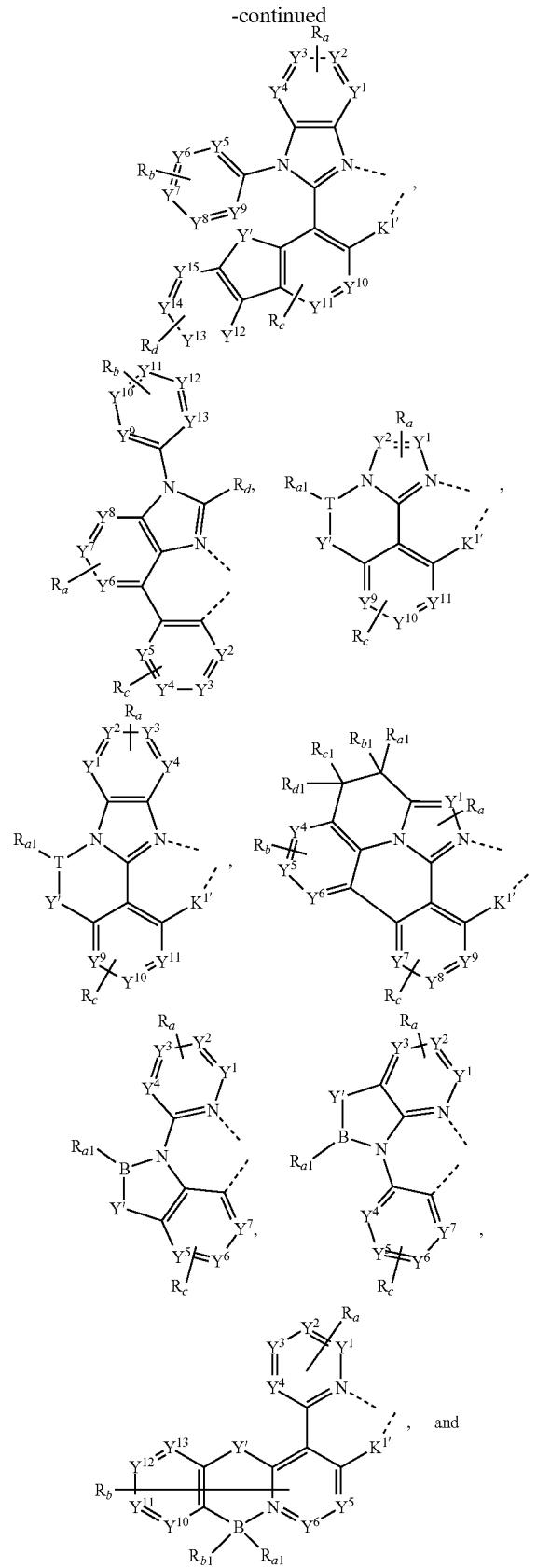


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[0199] wherein:

[0200] T is selected from the group consisting of B, Al, Ga, and In;

[0201] K¹ is selected from the group consisting of a single bond, O, S, NR_e, PR_e, BR_e, CR_eR_f and SiR_eR_f;

[0202] each of Y¹ to Y¹³ is independently selected from the group consisting of C and N;

[0203] Y' is selected from the group consisting of BR_e, BR_eR_f, NR_e, PR_e, P(O)R_e, O, S, Se, C=O, C=S, C=Se, C=NR_e, C=CR_eR_f, S=O, SO₂, CR_eR_f, SiR_eR_f and GeR_eR_f;

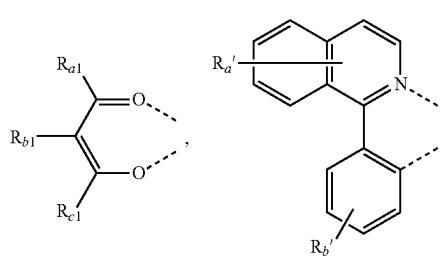
[0204] R_e and R_f can be fused or joined to form a ring;

[0205] each R_a, R_b, R_c, and R_d independently represents from mono to the maximum allowed number of substitutions, or no substitution;

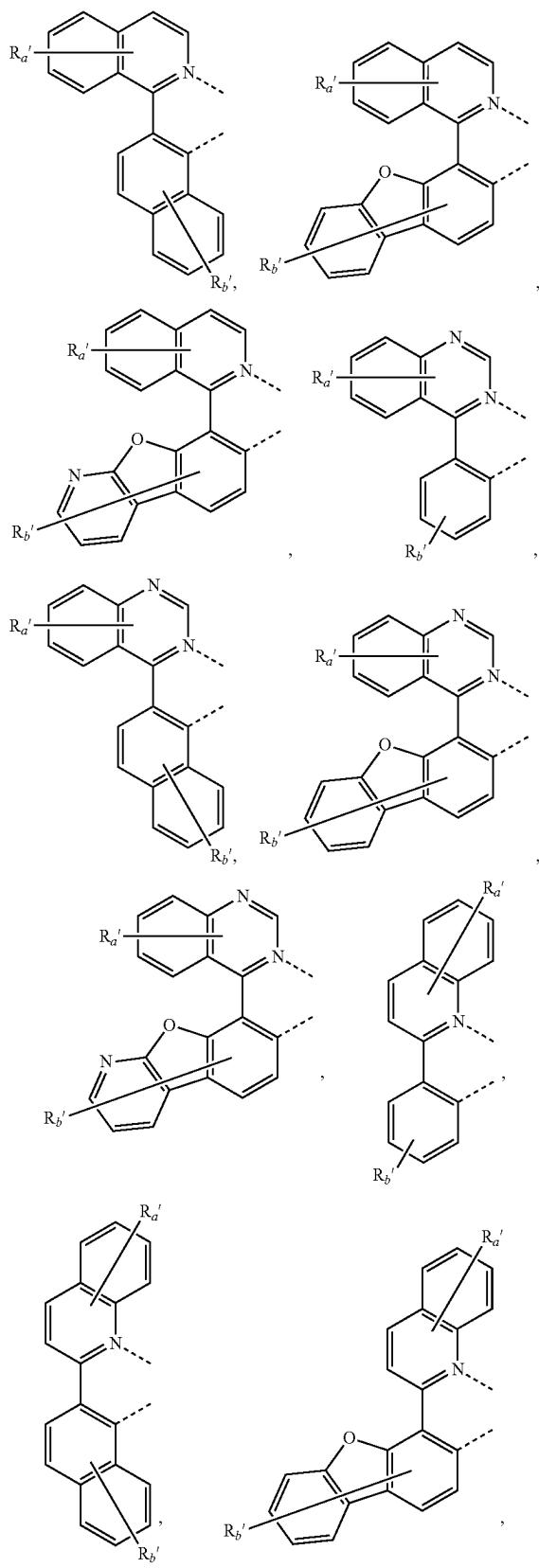
[0206] each of R_{a1}, R_{b1}, R_{c1}, R_{d1}, R_a, R_b, R_c, R_d, R_e, and R_f is independently a hydrogen or a substituent selected from the group consisting of deuterium, halide, alkyl, cycloalkyl, heteroalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germinal, boryl, alkynyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carbonyl, carboxylic acid, ester, nitrile, isonitrile, sulfanyl, seleanyl, sulfinyl, sulfonyl, phosphino, and combinations thereof; and

[0207] any two substituents of R_{a1}, R_{b1}, R_{c1}, R_{d1}, R_a, R_b, R_c, R_d, R_e, and R_f can be fused or joined to form a ring or form a multidentate ligand.

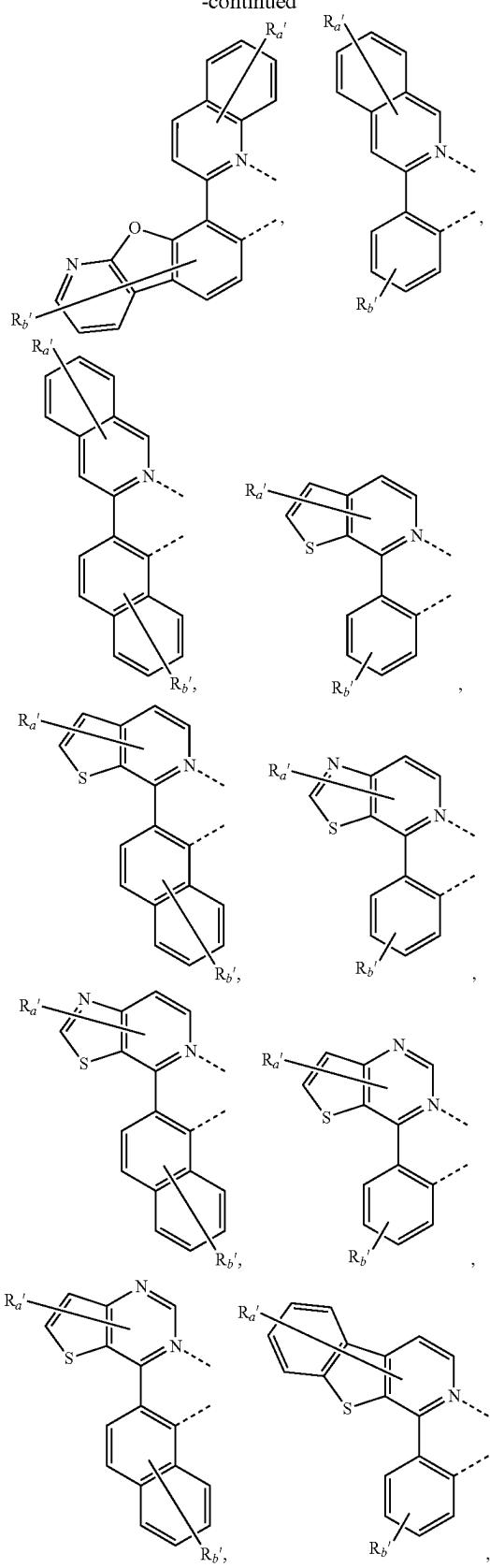
[0208] In some embodiments, L_B and L_C are each independently selected from the group consisting of the structures of the following LIST 7:



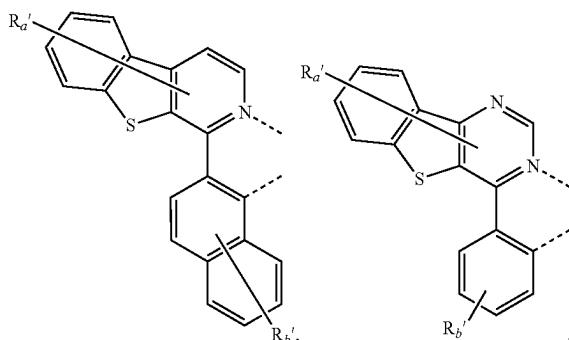
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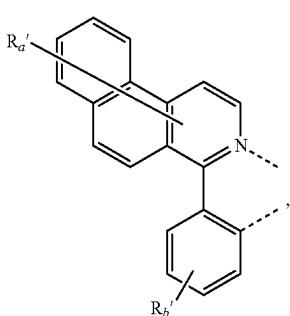
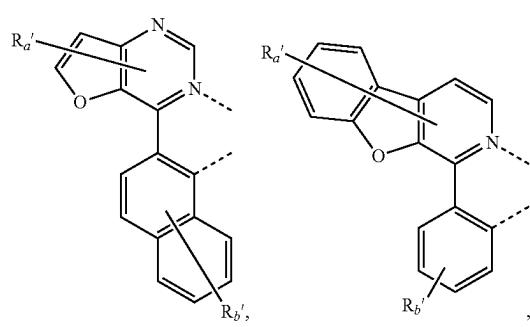
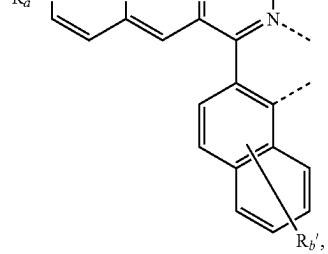
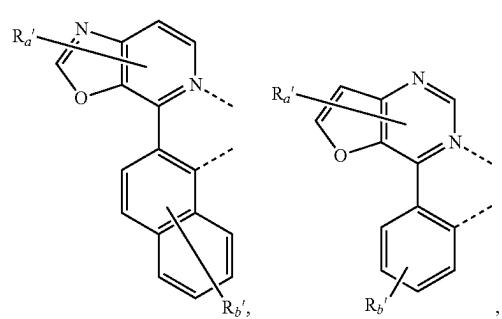
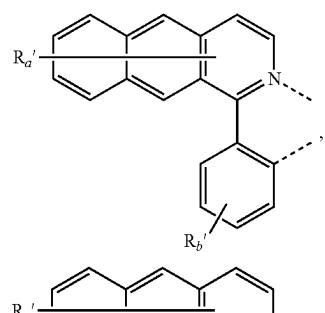
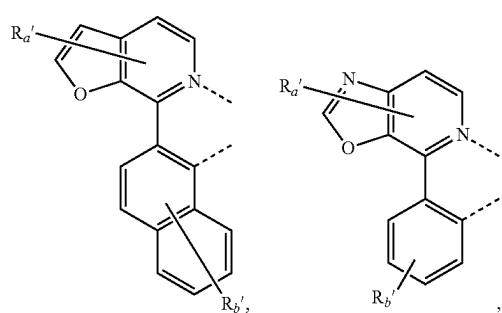
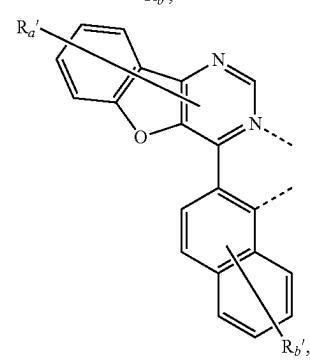
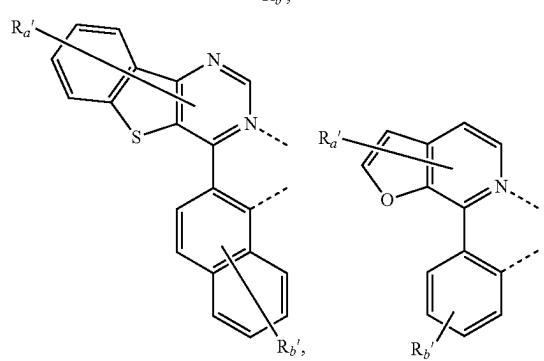
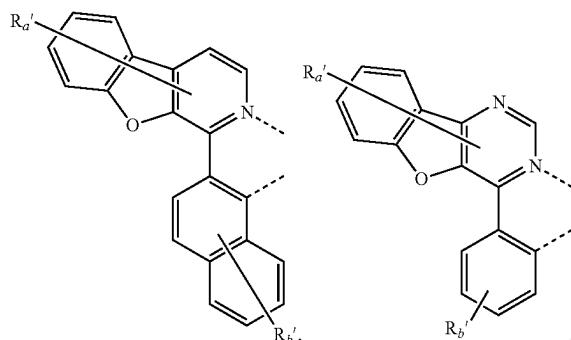
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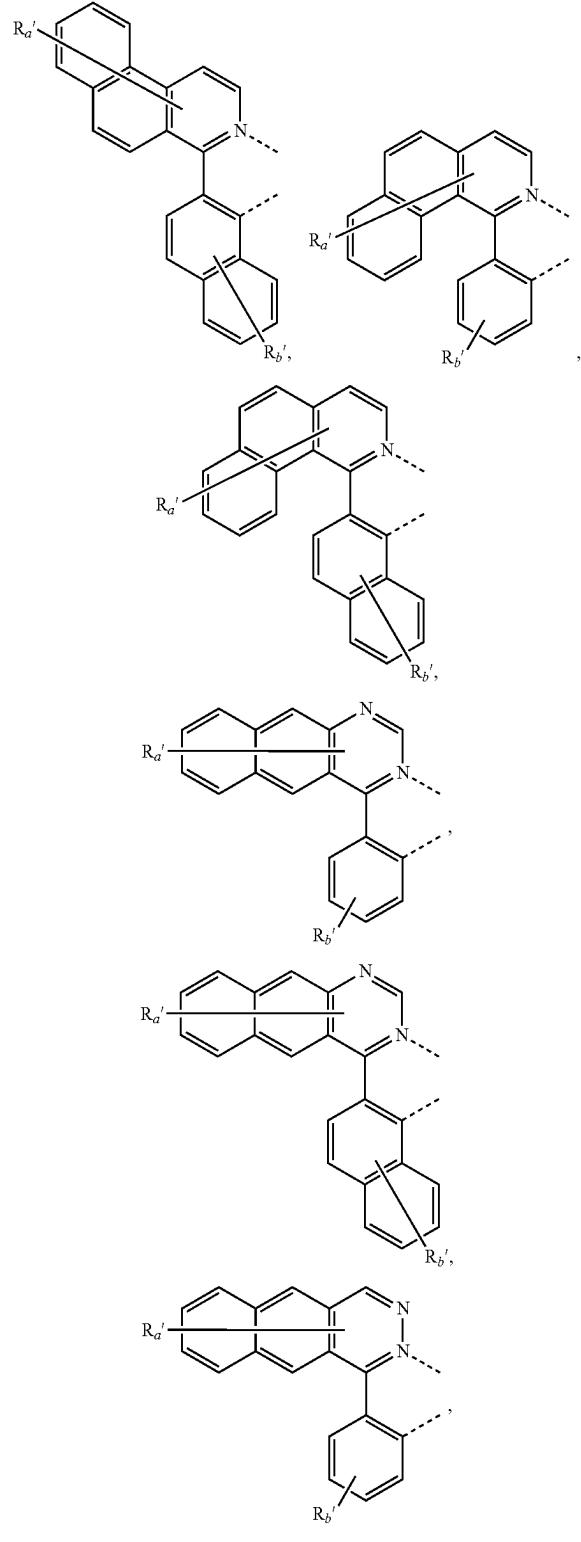
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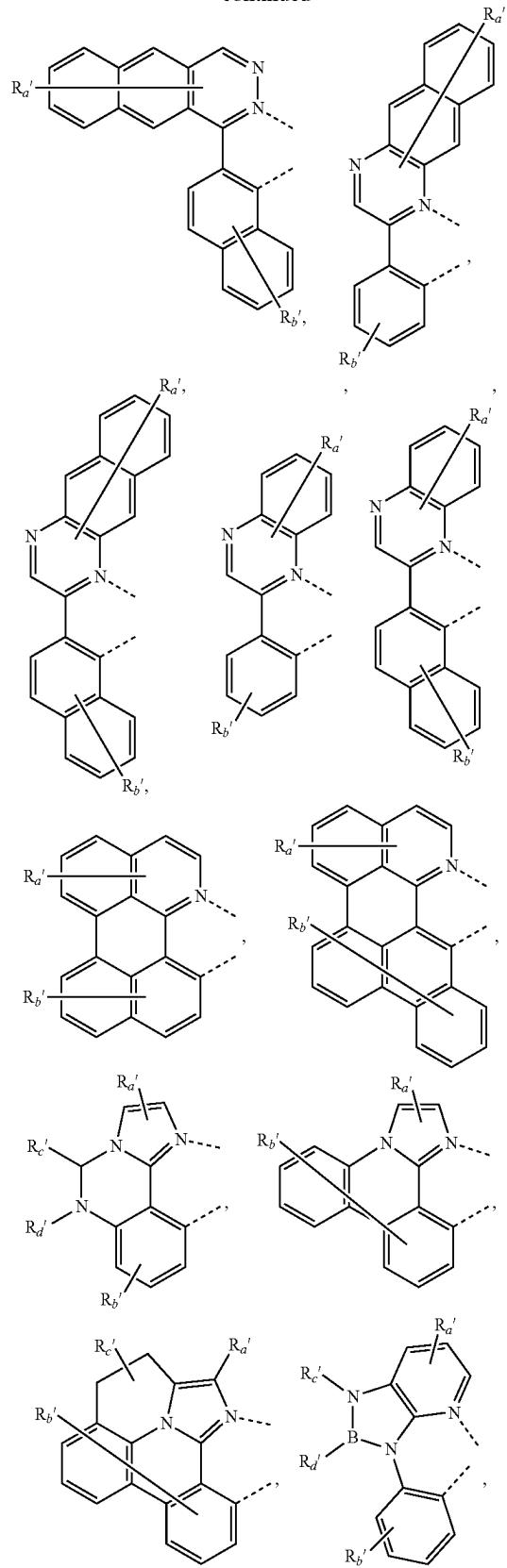
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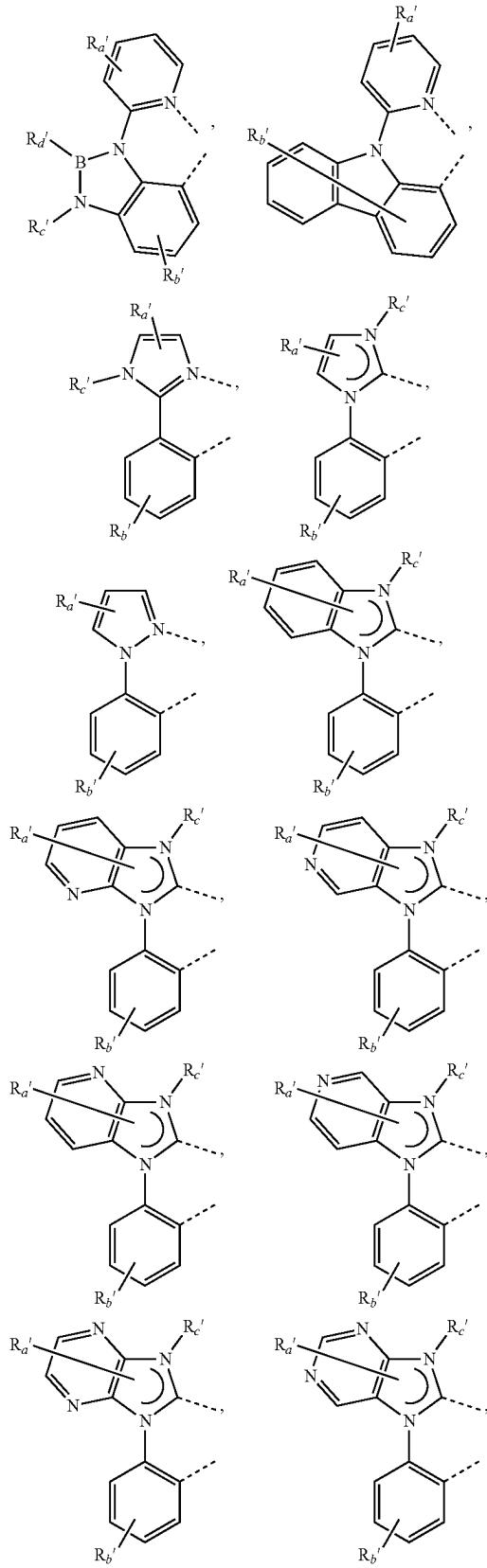
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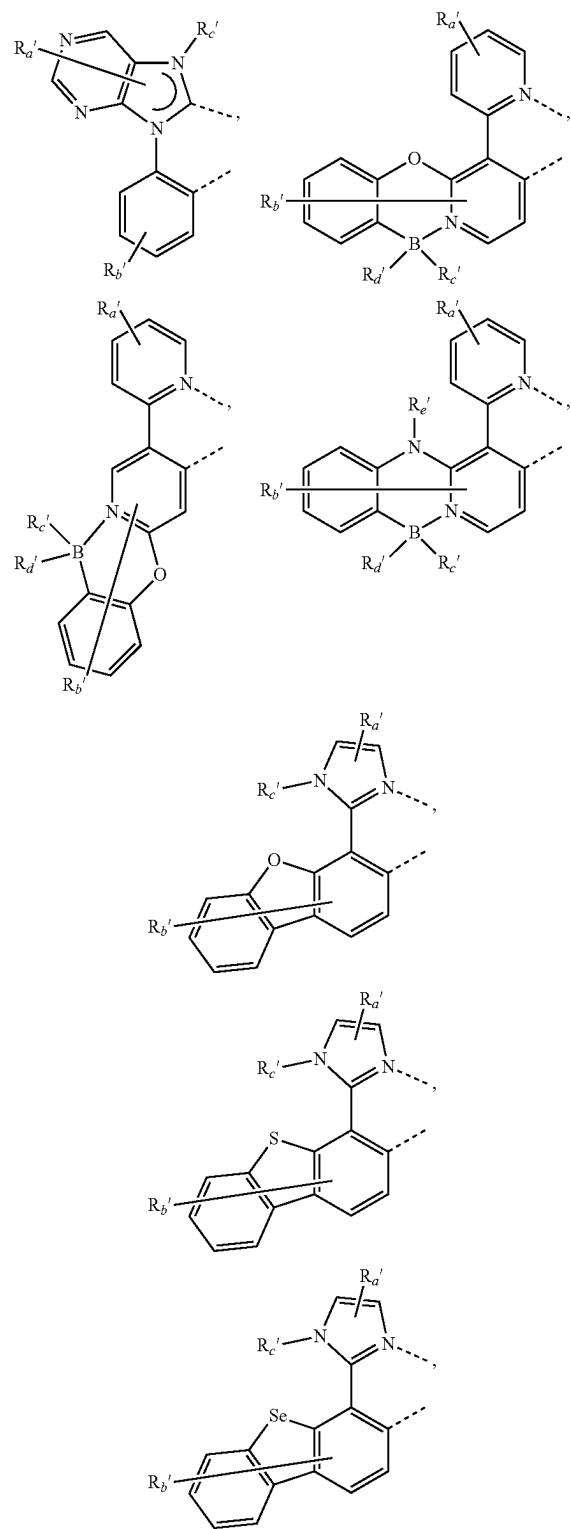
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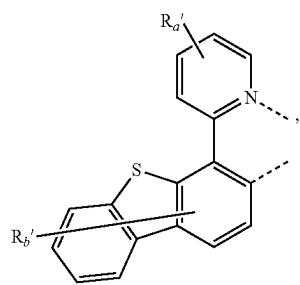
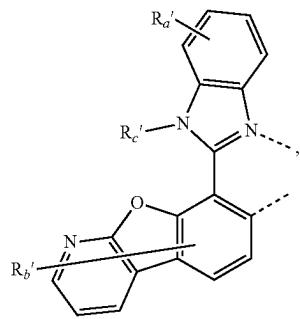
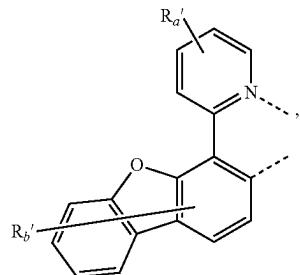
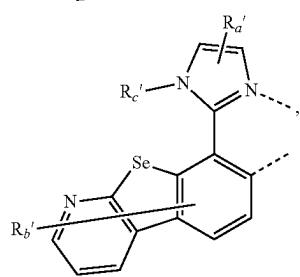
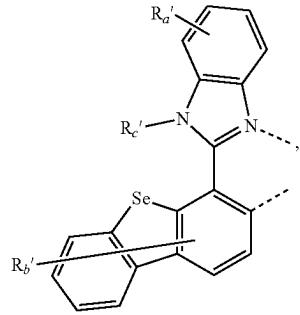
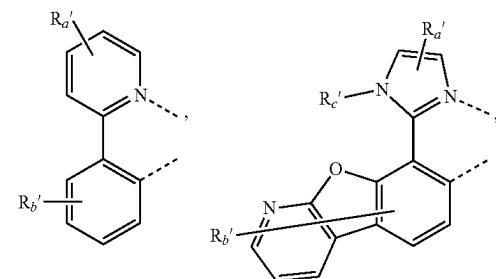
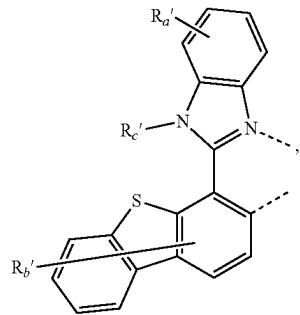
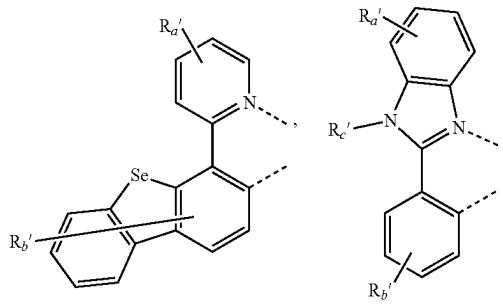
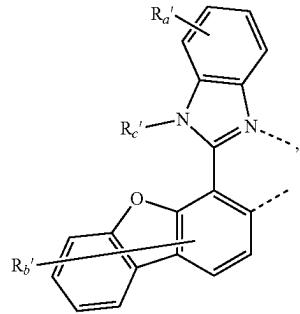


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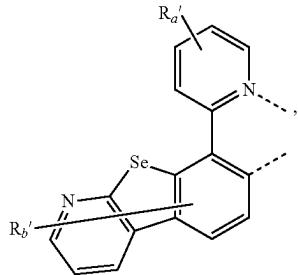
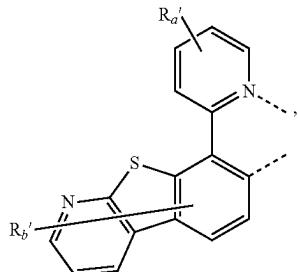
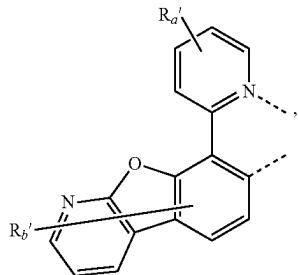
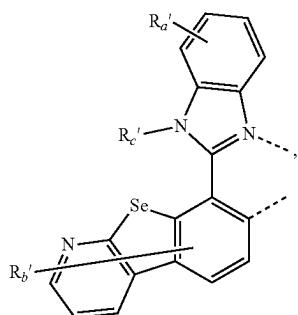
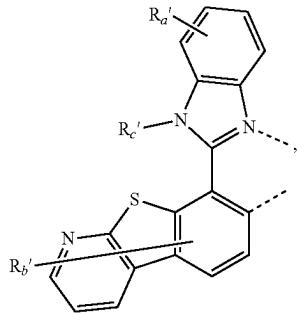


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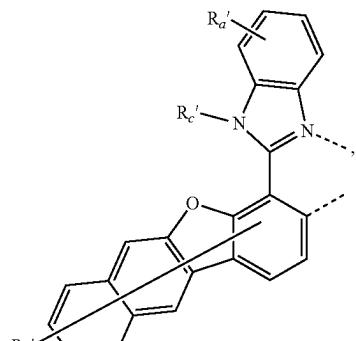
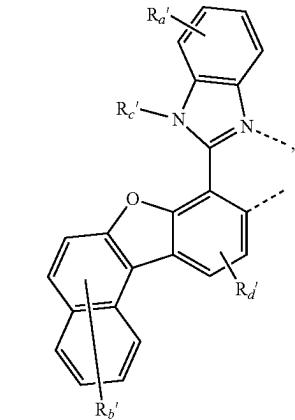
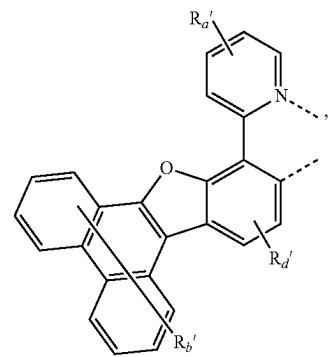
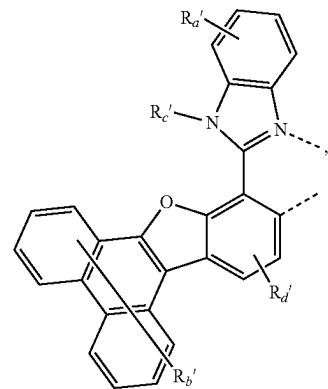
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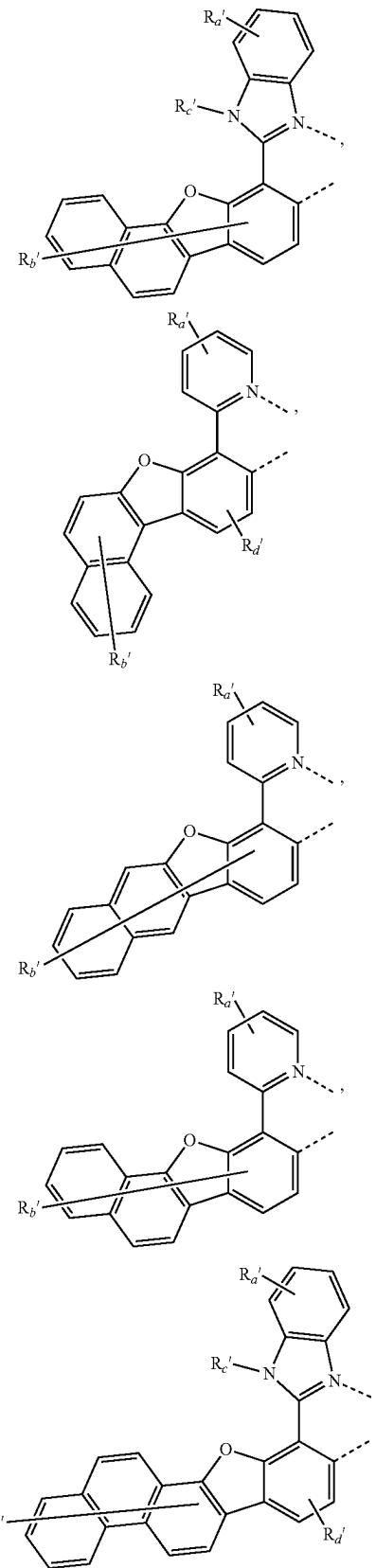
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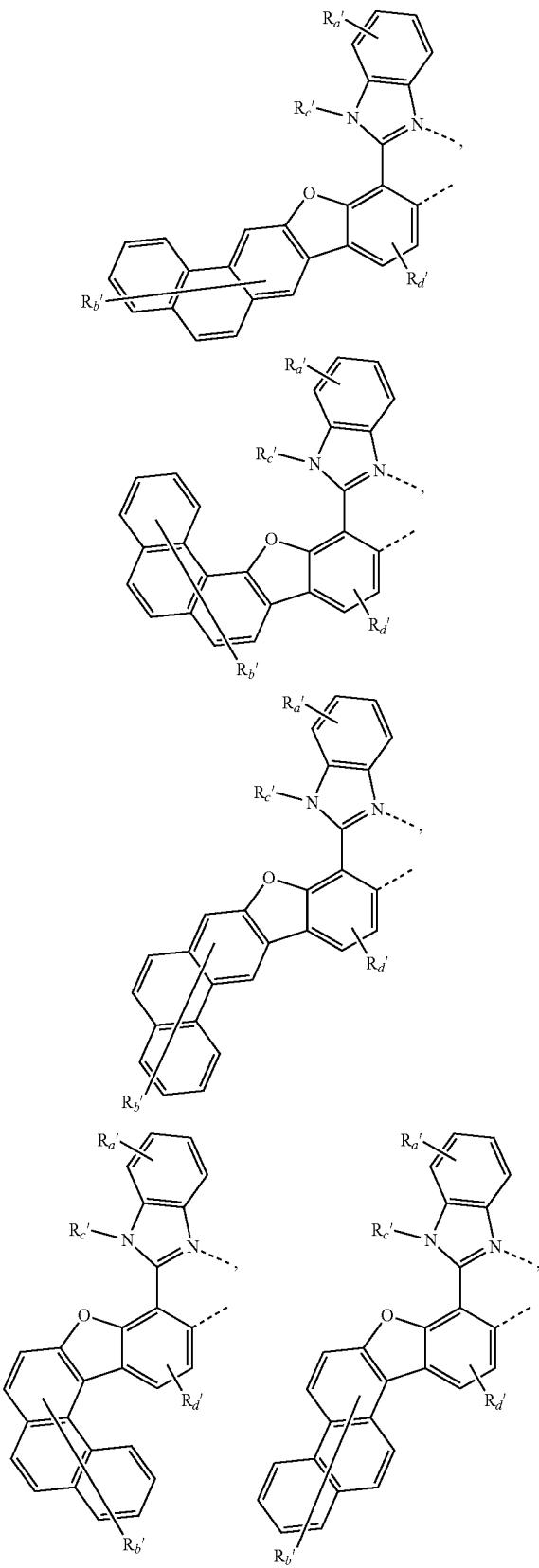
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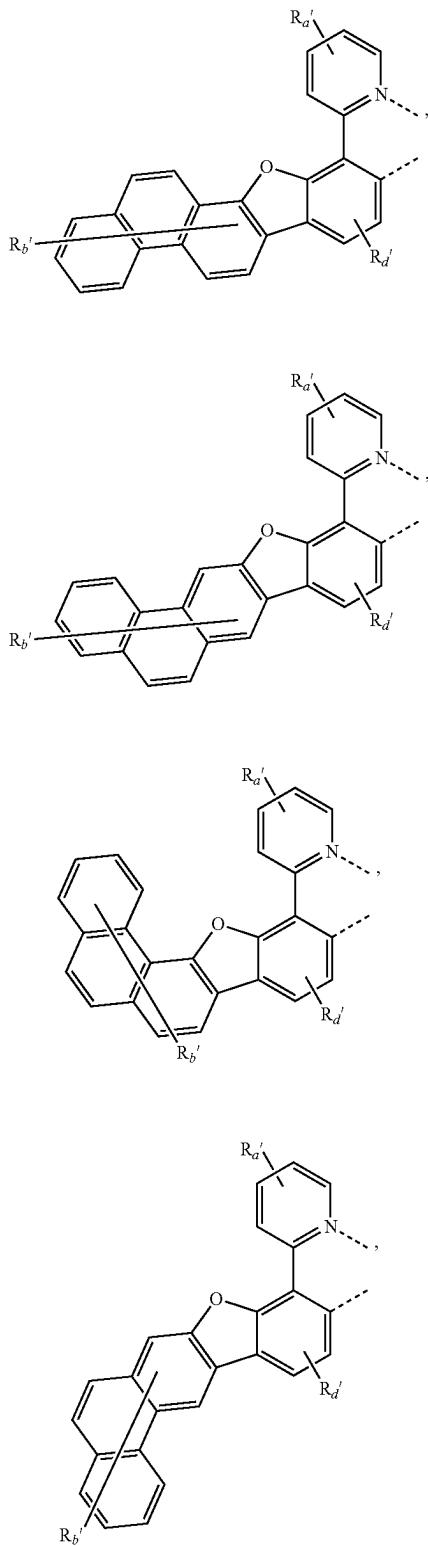
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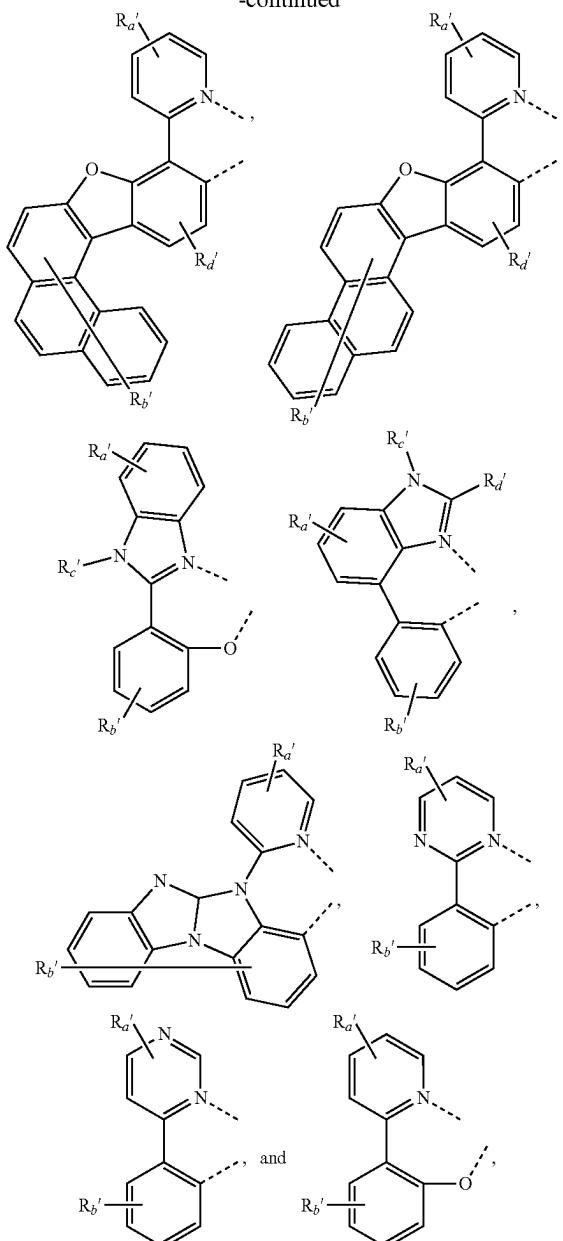
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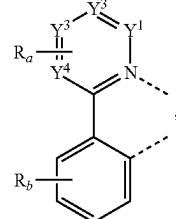


[0209] wherein:

[0210] R_a' , R_b' , R_c' , R_d' , and R_e' each independently represents zero, mono, or up to a maximum allowed number of substitution to its associated ring;

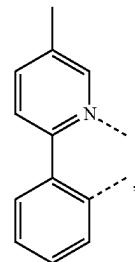
[0211] R_a' , R_b' , R_c' , R_d' , and R_e' each independently hydrogen or a substituent selected from the group consisting of deuterium, halide, alkyl, cycloalkyl, heteroalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkyanyl, aryl, heteroaryl, acyl, carbonyl, carboxylic acid, ester, nitrile, isonitrile, sulfanyl, selenyl, sulfinyl, sulfonyl, phosphino, and combinations thereof; and two substituents of R_a' , R_b' , R_c' , R_d' , and R_e' can be fused or joined to form a ring or form a multidentate ligand.

[0212] In some embodiments, L_B comprises a structure of

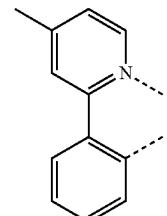


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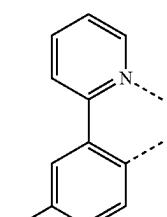
L_{B3}



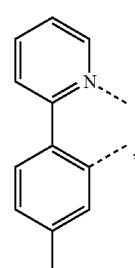
L_{B4}



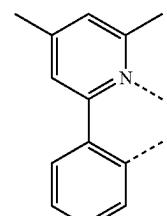
L_{B5}



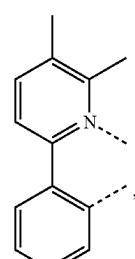
L_{B6}



L_{B7}



L_{B8}

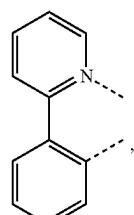


wherein the variables are the same as previously defined. In some embodiments, each of Y^1 to Y^4 is independently carbon. In some embodiments, at least one of Y^1 to Y^4 is N. In some embodiments, exactly one of Y^1 to Y^4 is N. In some embodiments, Y^1 is N. In some embodiments, Y^2 is N. In some embodiments, Y^3 is N. In some embodiments, Y^4 is N. In some embodiments, at least one of R_a is a tertiary alkyl, silyl or germyl. In some embodiments, at least one of R_a is a tertiary alkyl. In some embodiments, Y^3 is C and the R_a attached thereto is a tertiary alkyl, silyl or germyl. In some embodiments, Y^1 to Y^3 is C, Y^4 is N, and the R_a attached to Y^3 is a tertiary alkyl, silyl or germyl. In some embodiments, Y^1 to Y^3 is C, Y^4 is N, and the R_a attached to Y^2 is a tertiary alkyl, silyl or germyl. In some embodiments, at least one of R_b is a tertiary alkyl, silyl, or germyl. In some embodiments, the tertiary alkyl is tert-butyl. In some embodiments, at least one pair of R_a and R_b are joined or fused to form a ring.

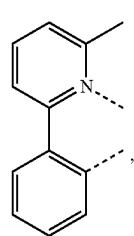
[0213] In some embodiments, the compound has formula $\text{Ir}(L_A)_3$, formula $\text{Ir}(L_A)(L_{Bk})_2$, formula $\text{Ir}(L_A)_2(L_{Bk})$, formula $\text{Ir}(L_A)_2(L_{Cj-I})$, or $\text{Ir}(L_A)_2(L_{Cj-H})$,

[0214] wherein L_A can be any embodiment described herein, including $L_A1(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_A152(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$;

[0215] wherein k is an integer from 1 to 541, and each L_{Bk} has the structure defined in the following LIST 8:

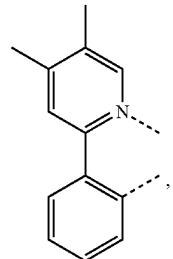


L_{B1}

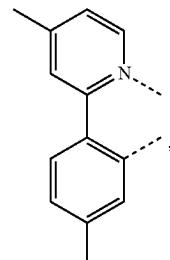
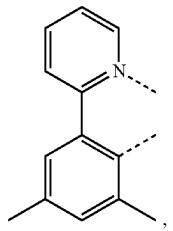
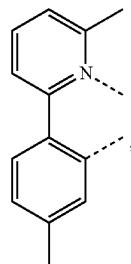
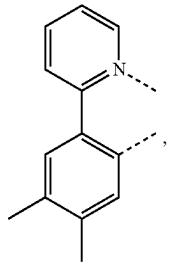
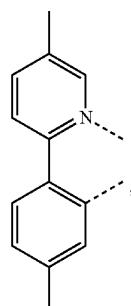
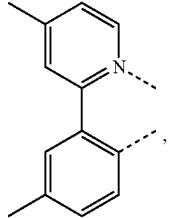
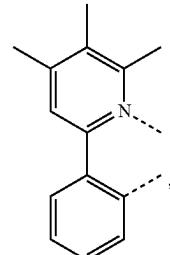
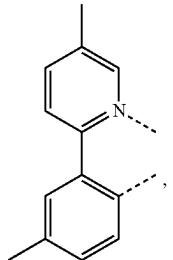
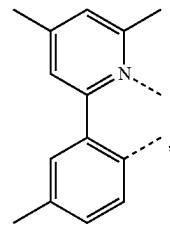
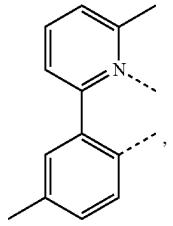


L_{B2}

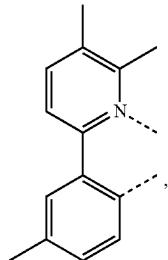
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 L_{B9} 

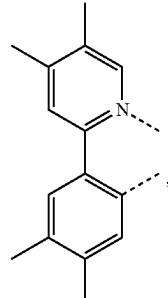
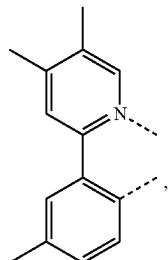
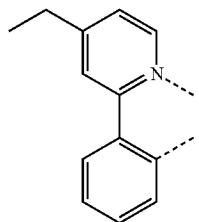
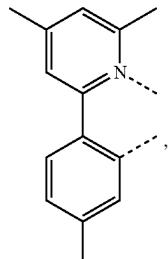
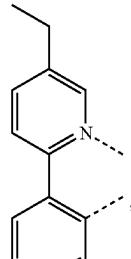
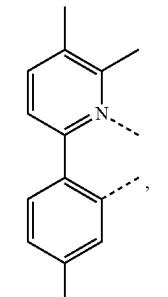
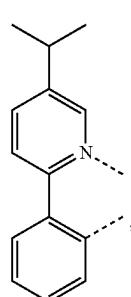
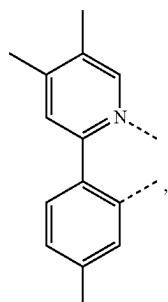
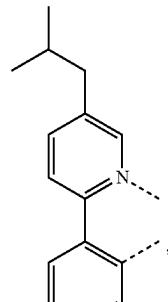
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 L_{B15}  L_{B10}  L_{B16}  L_{B11}  L_{B17}  L_{B12}  L_{B18}  L_{B13}  L_{B19}  L_{B14} 

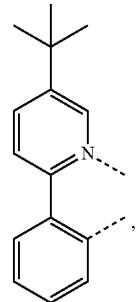
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 L_{B20} 

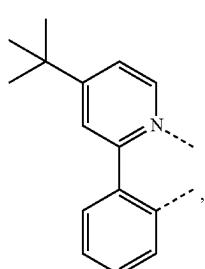
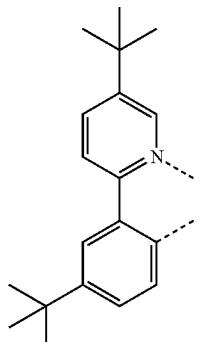
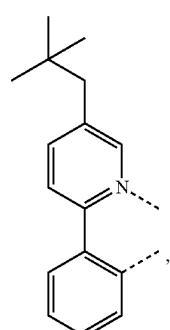
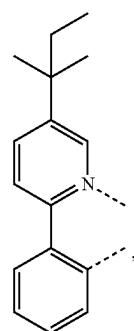
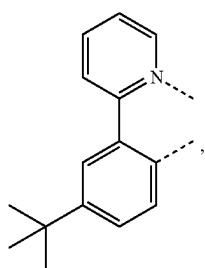
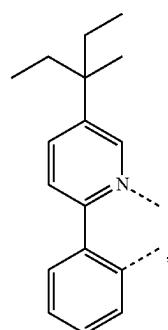
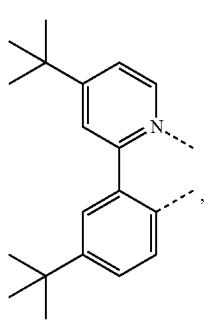
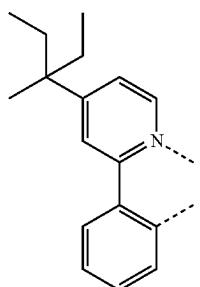
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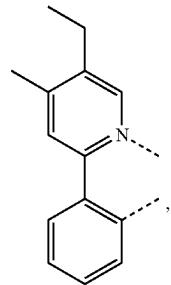
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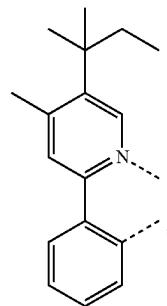
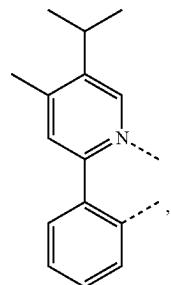
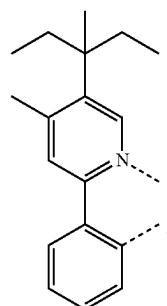
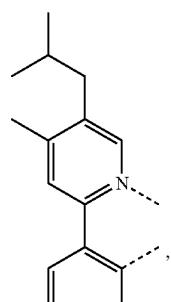
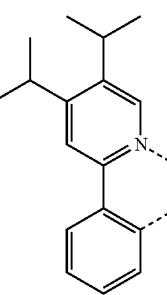
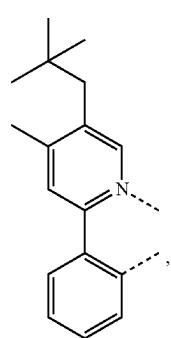
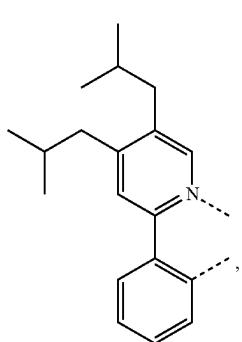
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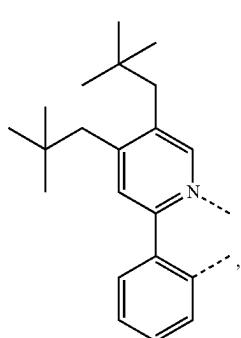
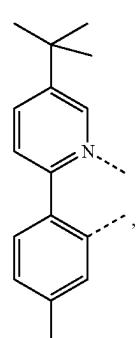
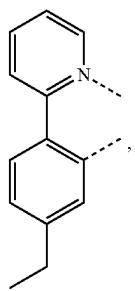
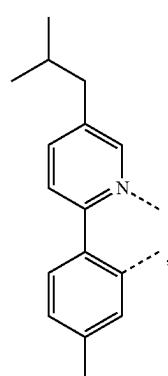
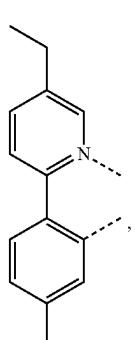
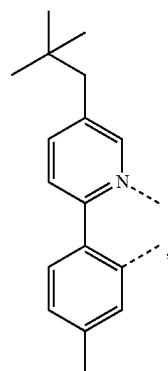
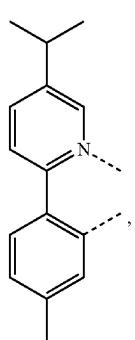
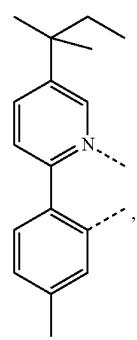
 L_{B39} 

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 L_{B44}  L_{B40}  L_{B41}  L_{B45}  L_{B42}  L_{B43}  L_{B47} 

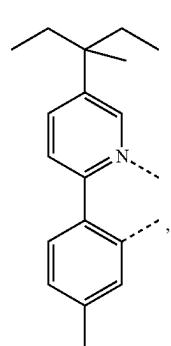
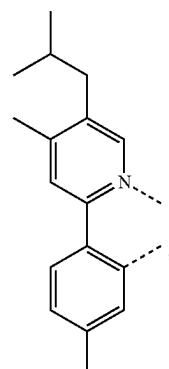
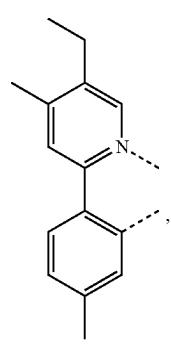
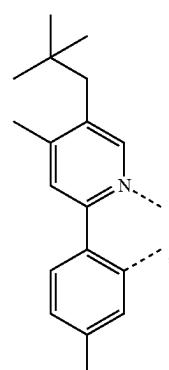
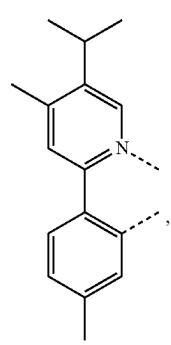
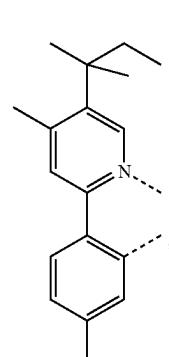
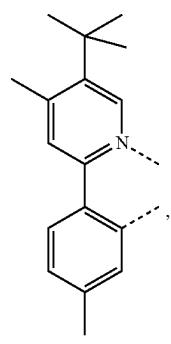
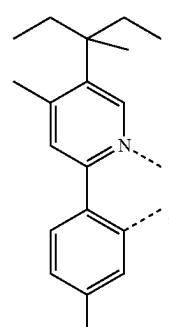
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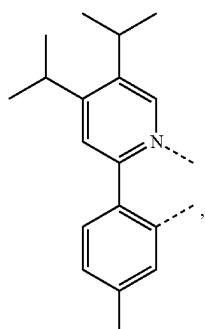
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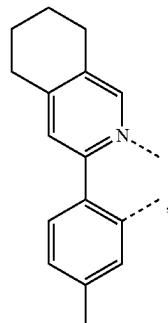
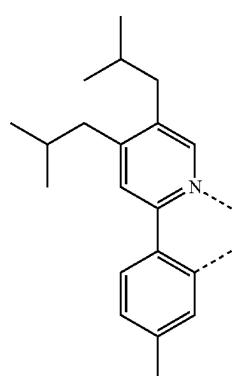
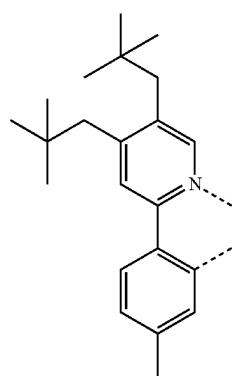
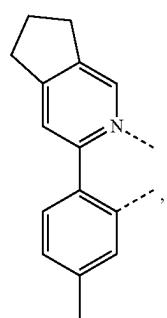
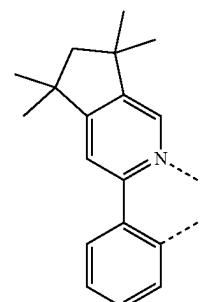
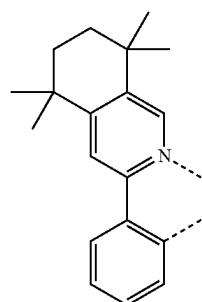
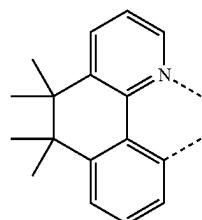
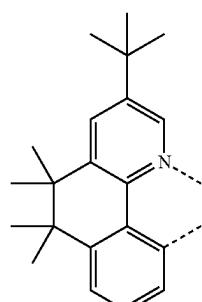
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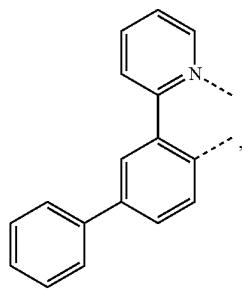
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L_B64

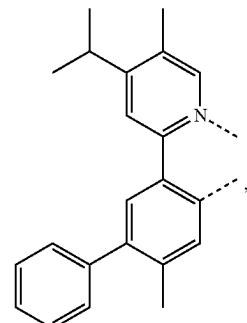
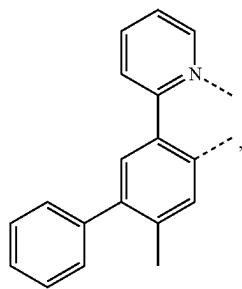
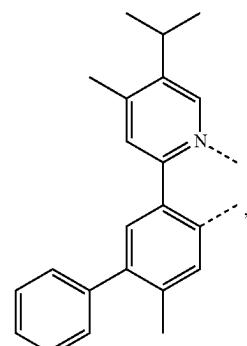
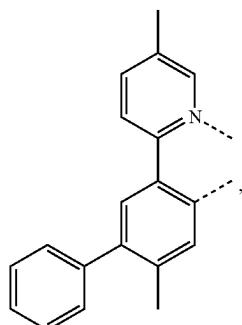
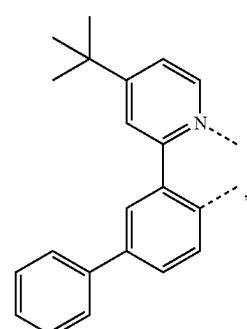
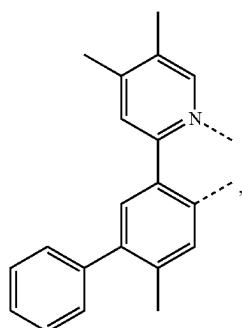
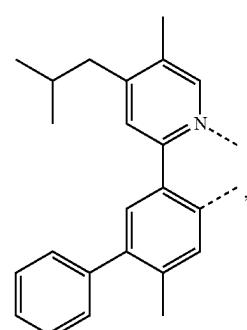
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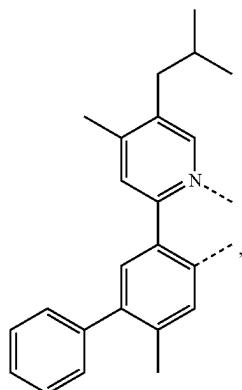
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L_B73

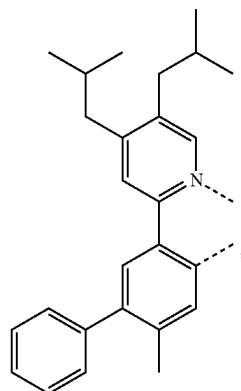
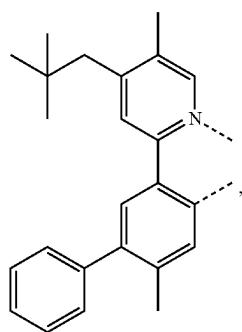
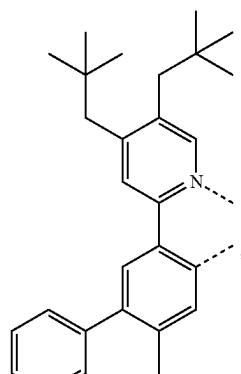
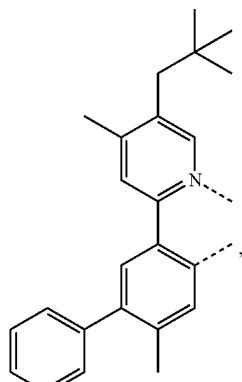
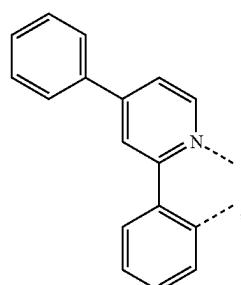
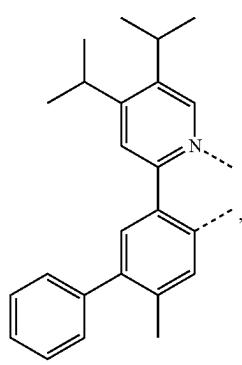
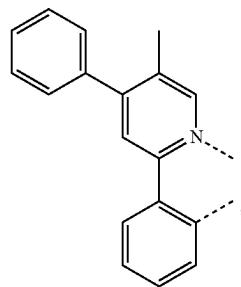
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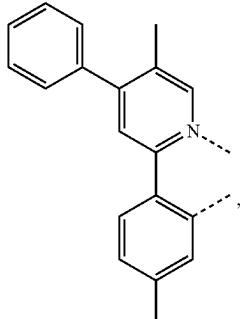
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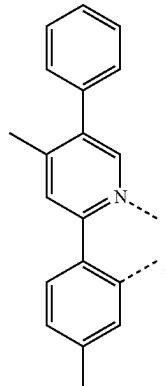
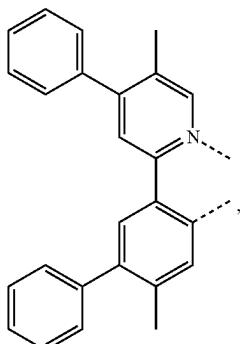
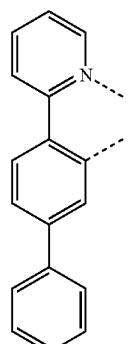
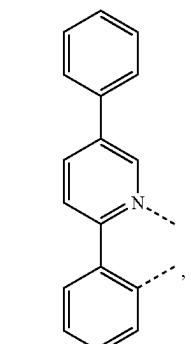
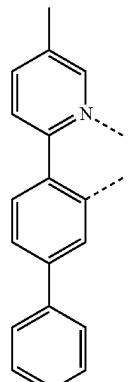
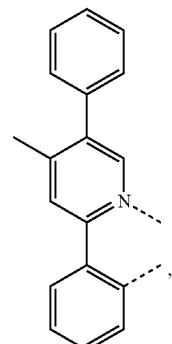
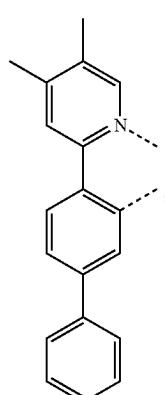
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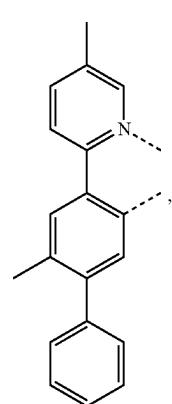
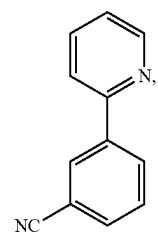
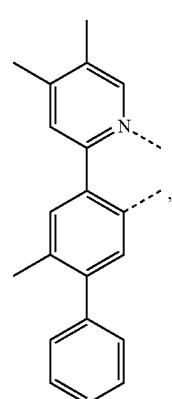
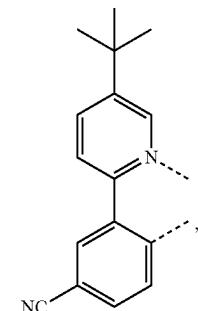
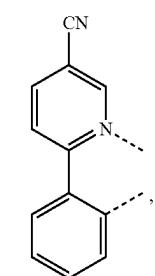
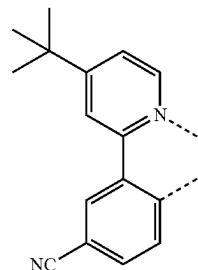
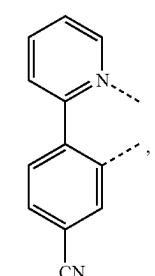
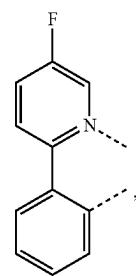
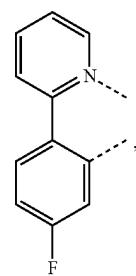
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L_B93L_B90L_B94L_B91L_B95L_B92L_B96

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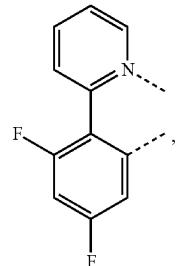
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L_{B97}L_{B101}L_{B98}L_{B102}L_{B99}L_{B103}L_{B100}L_{B104}L_{B105}

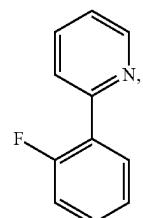
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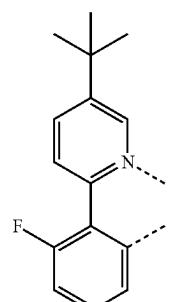
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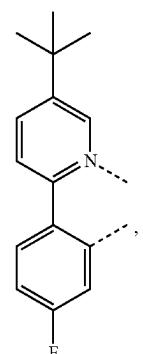
L_B107



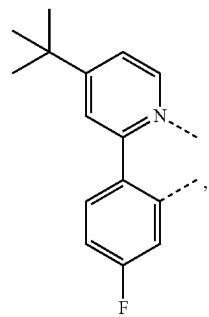
L_R108



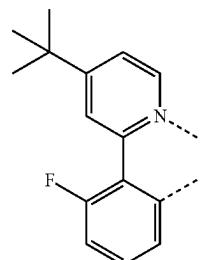
J. R. 100



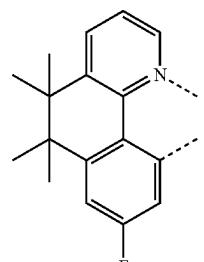
L_{B110}



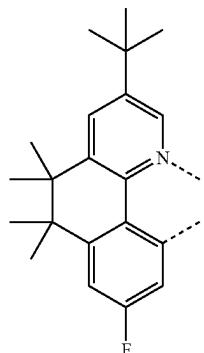
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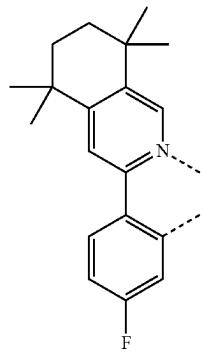
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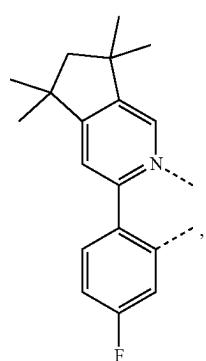
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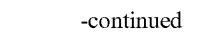
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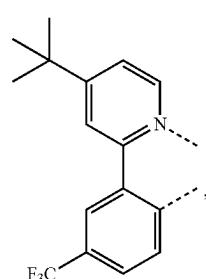
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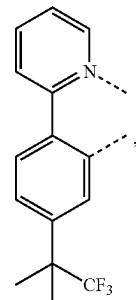
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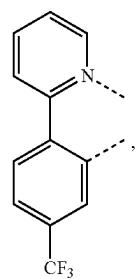
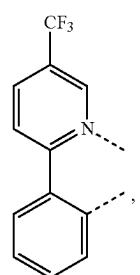
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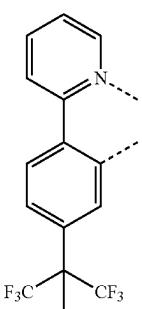
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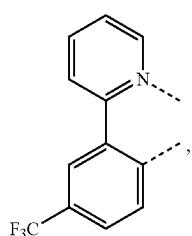
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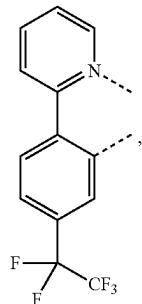
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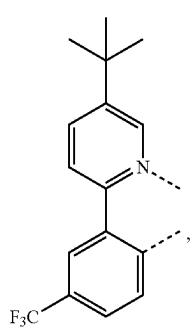
L_B122



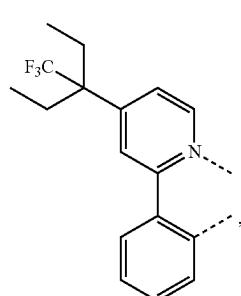
L_B118



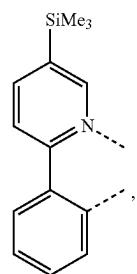
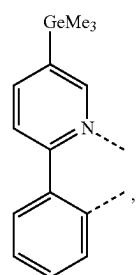
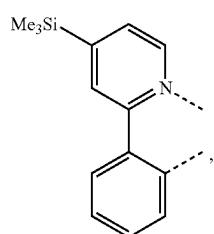
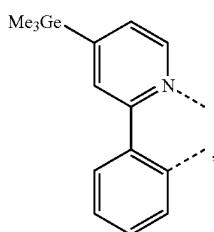
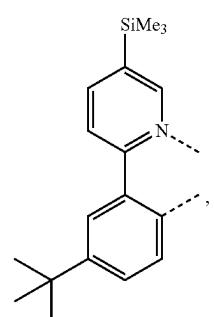
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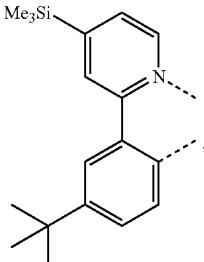
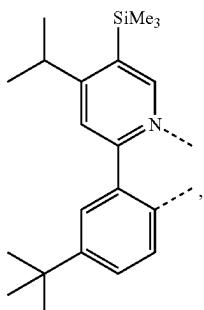
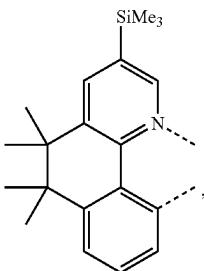
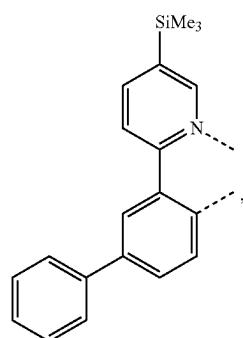
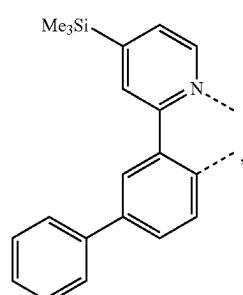
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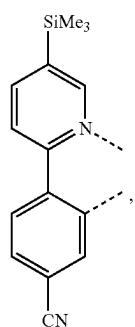
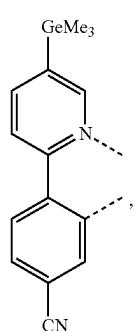
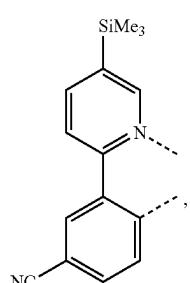
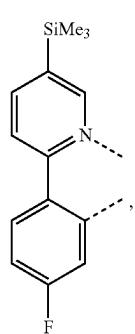
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L_B125L_B126L_B127L_B128L_B129

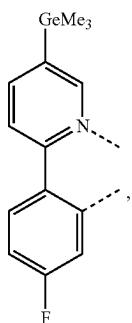
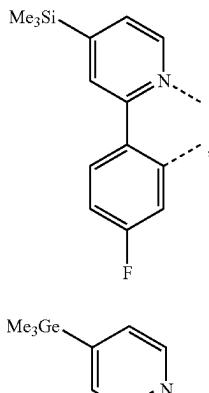
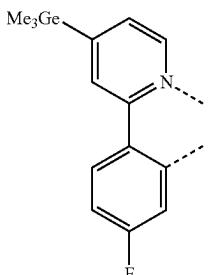
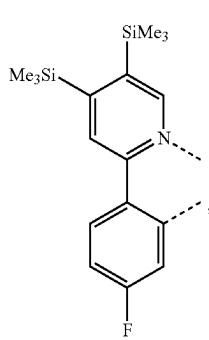
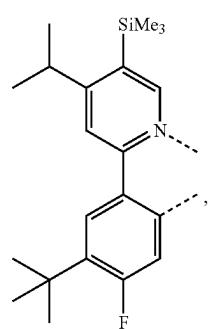
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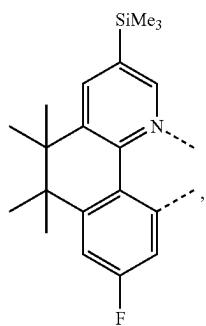
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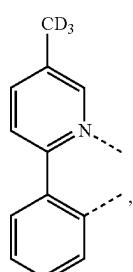
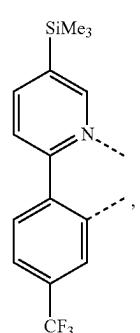
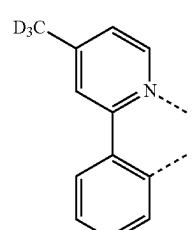
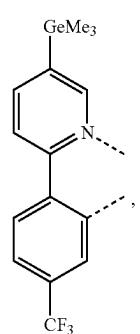
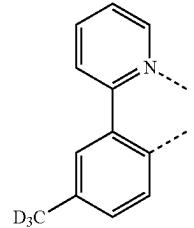
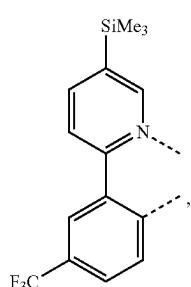
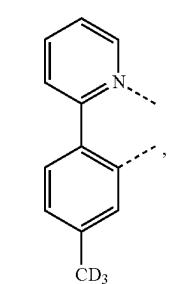
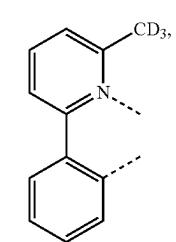
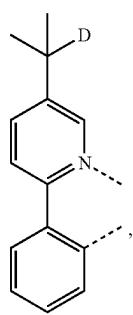
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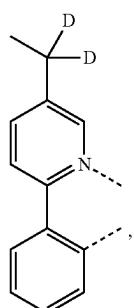
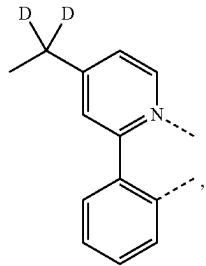
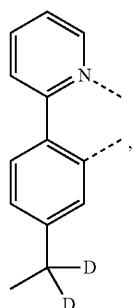
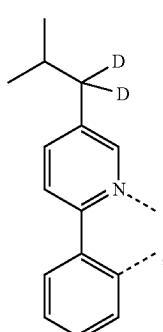
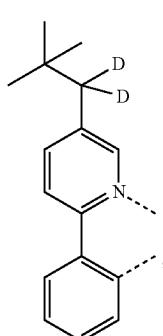
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L_B144

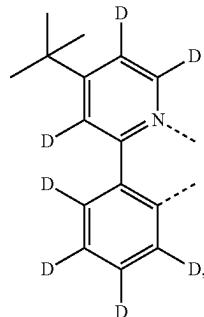
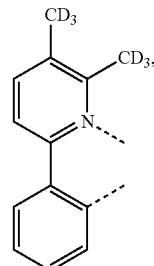
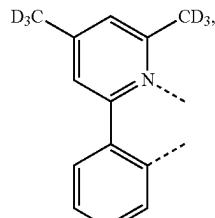
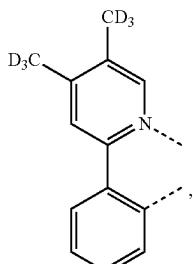
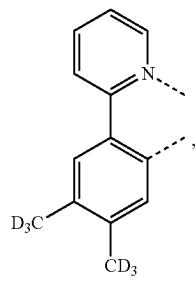
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L_B149L_B145L_B150L_B146L_B151L_B147L_B152L_B148L_B153

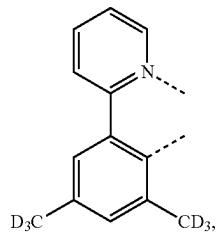
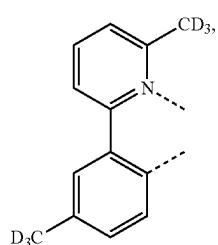
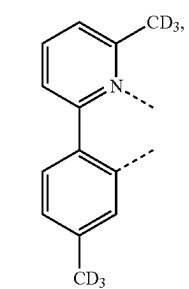
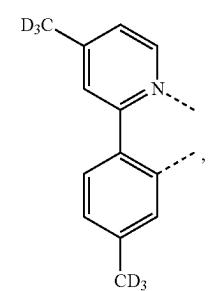
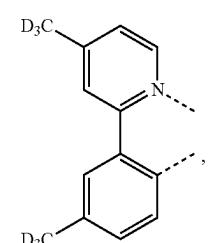
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 L_{B154}  L_{B155}  L_{B156}  L_{B157}  L_{B158}

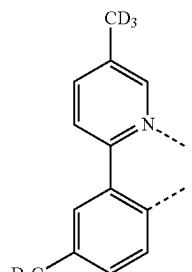
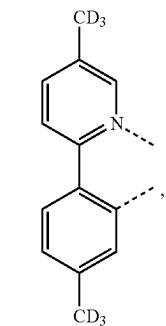
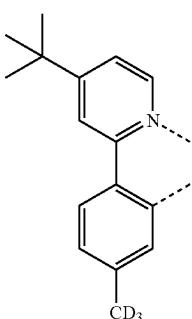
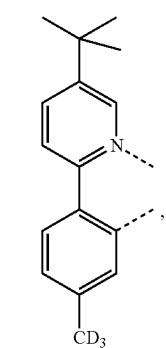
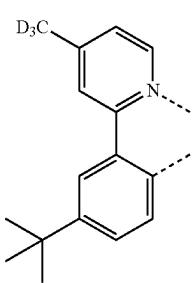
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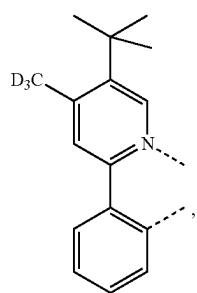
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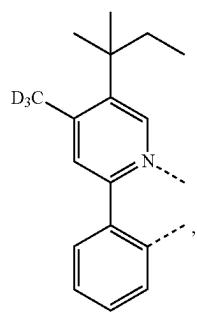
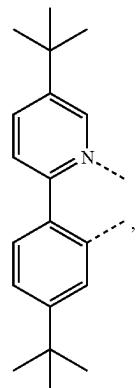
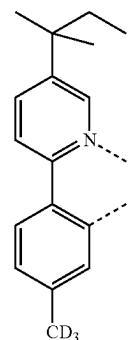
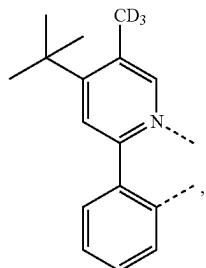
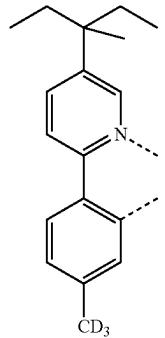
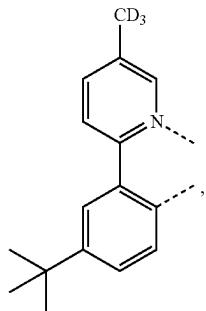
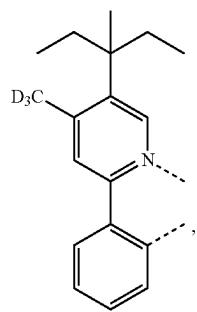
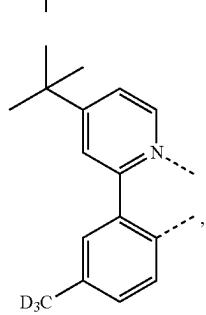
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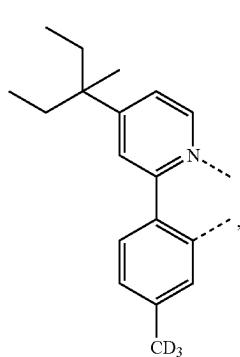
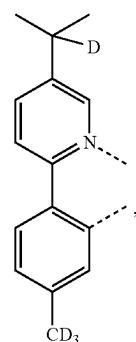
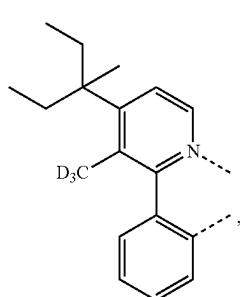
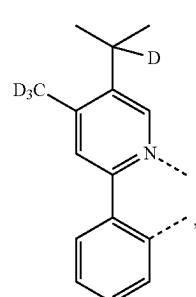
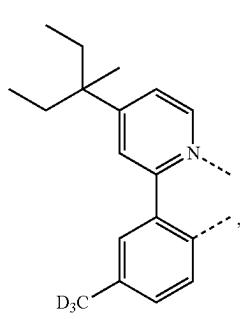
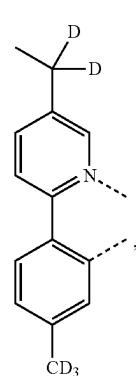
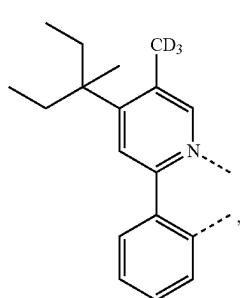
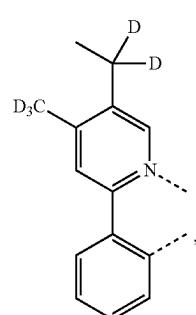
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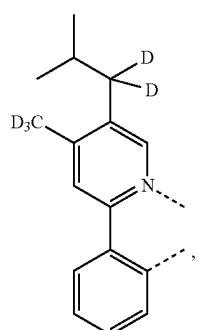
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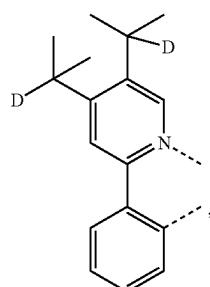
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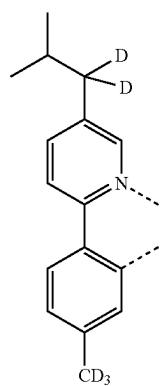
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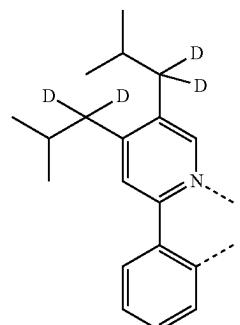


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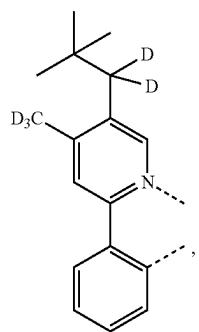
L_B192



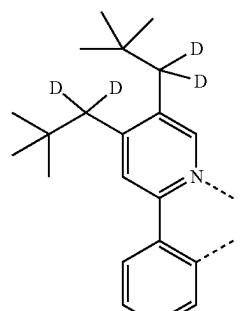
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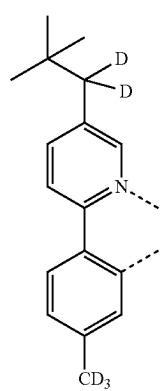
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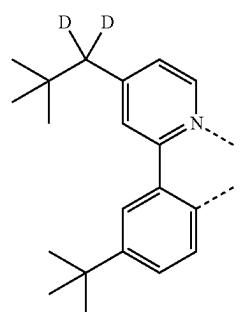
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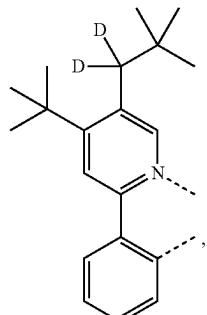
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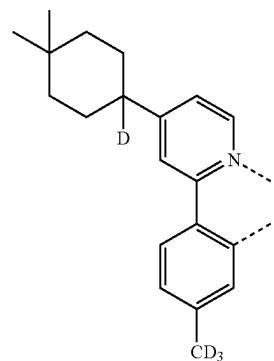
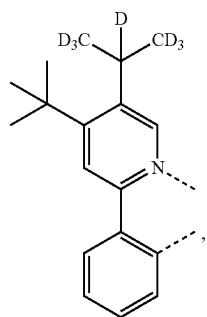
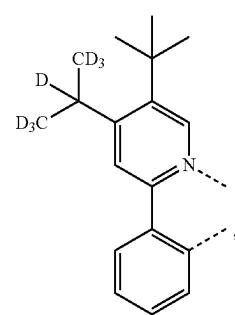
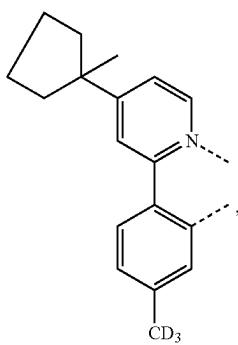
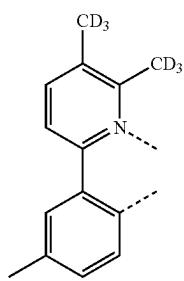
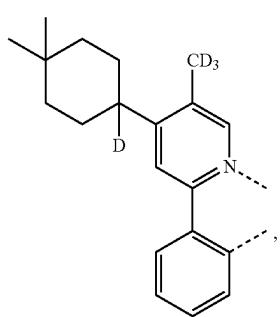
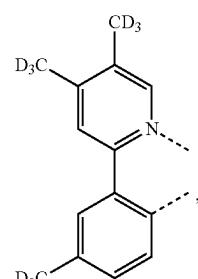
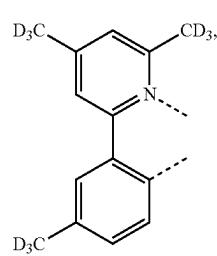
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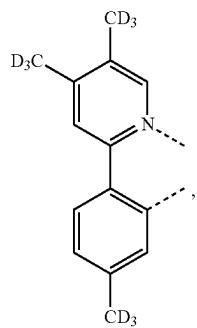
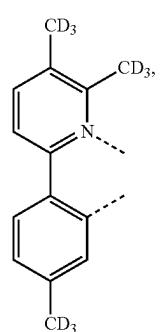
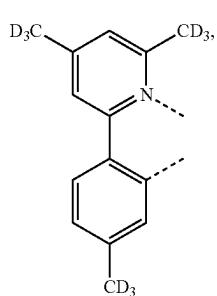
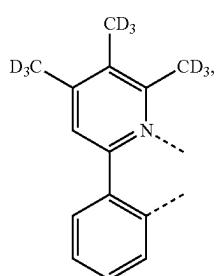
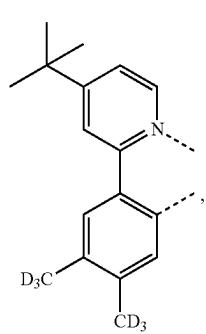
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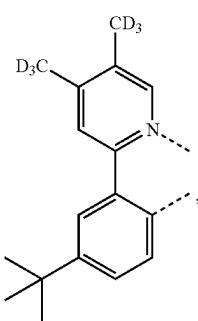
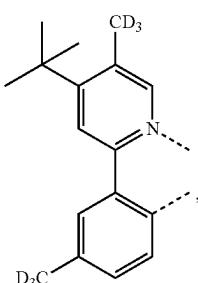
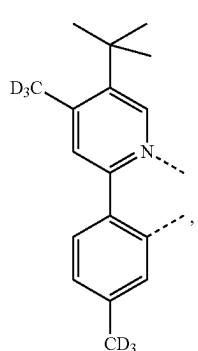
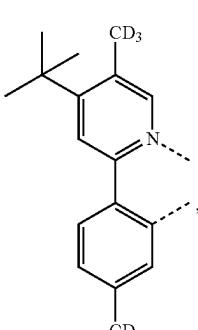
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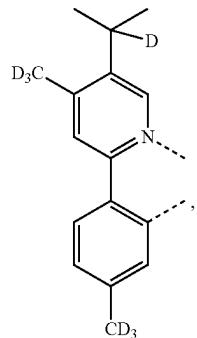
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L_{B208}L_{B209}L_{B210}L_{B211}L_{B212}

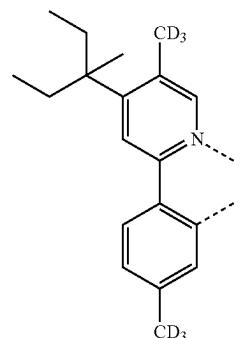
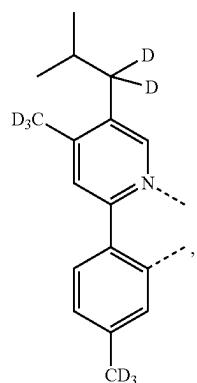
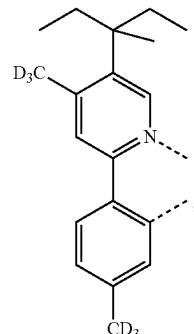
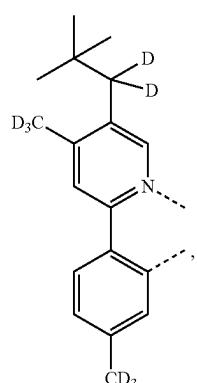
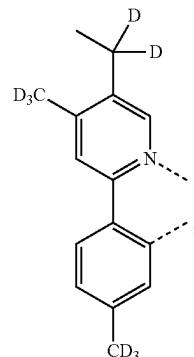
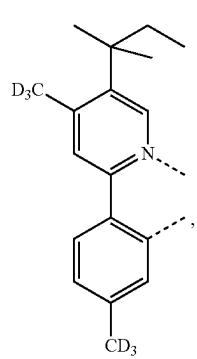
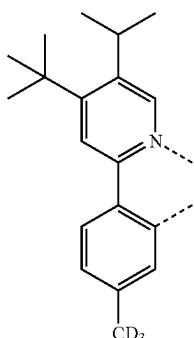
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L_{B213}L_{B214}L_{B215}L_{B216}

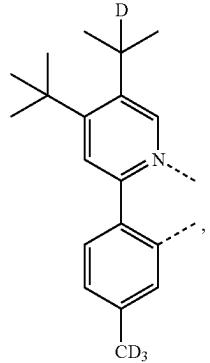
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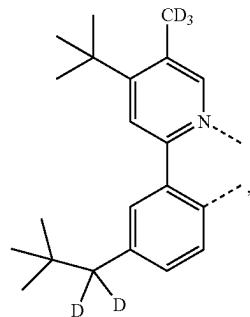
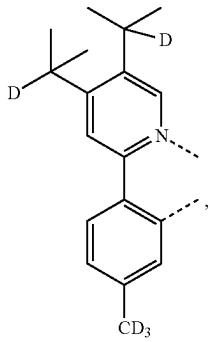
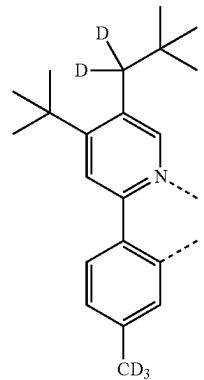
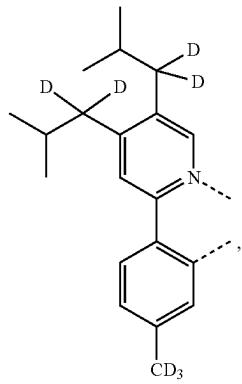
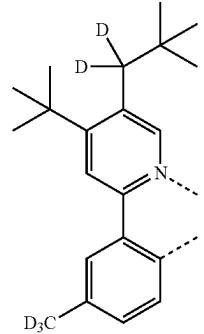
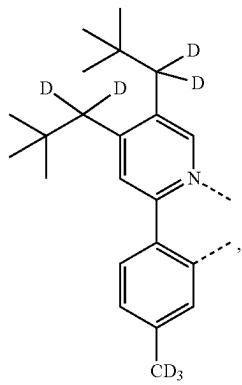
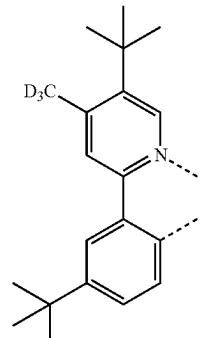
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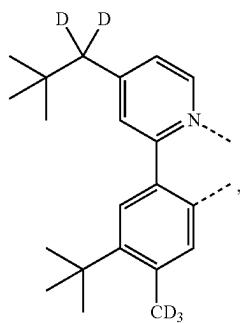
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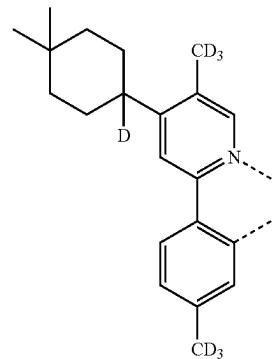
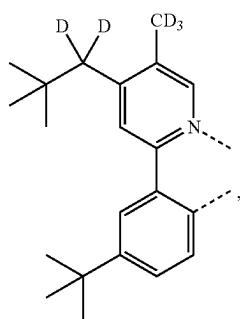
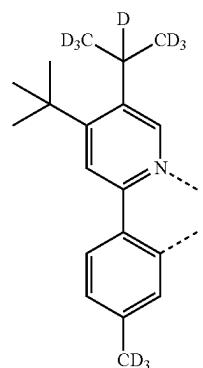
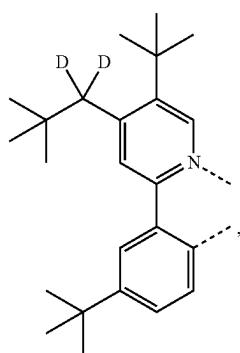
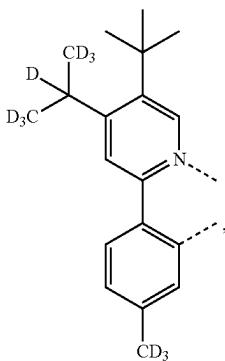
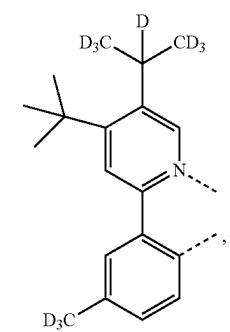
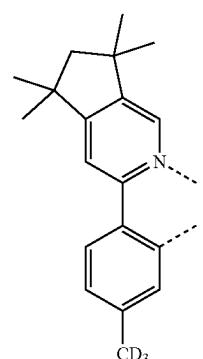
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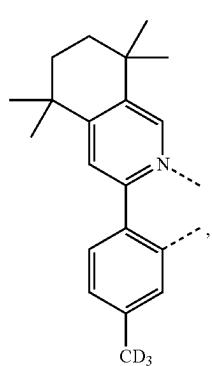
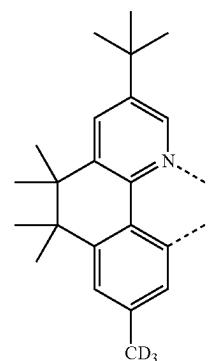
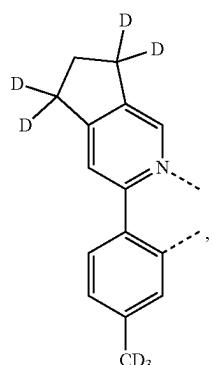
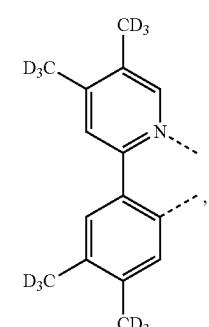
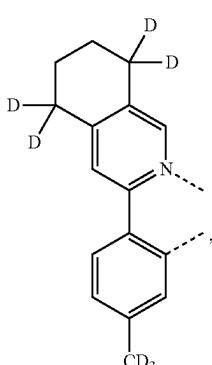
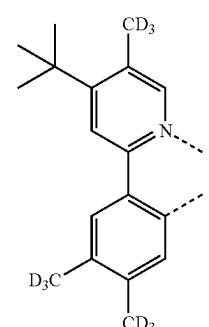
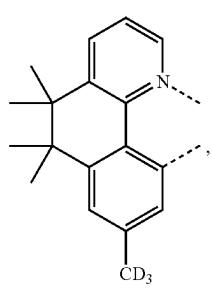
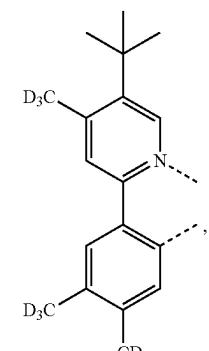
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L_B237L_B234L_B238L_B235L_B239L_B236L_B240

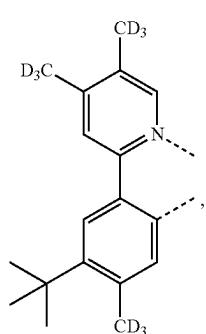
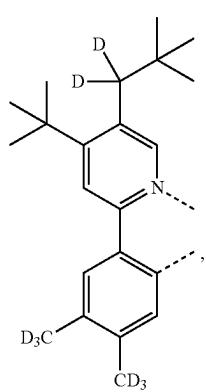
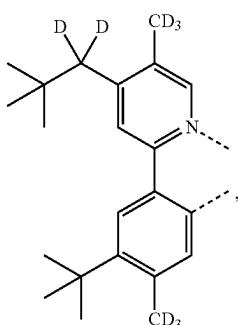
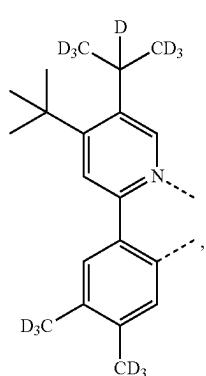
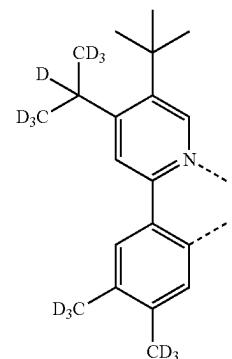
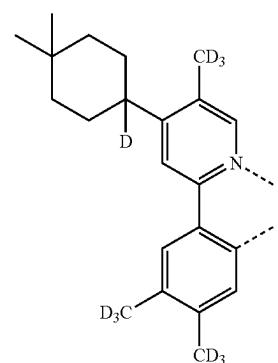
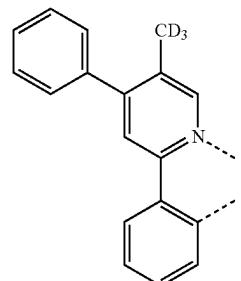
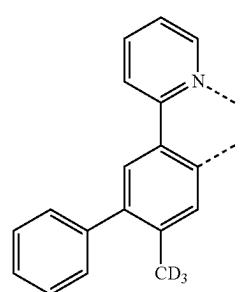
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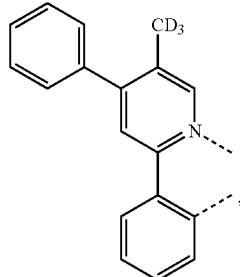
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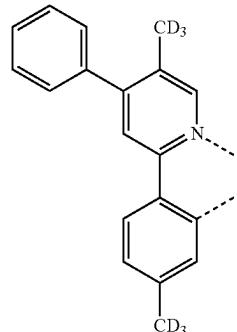
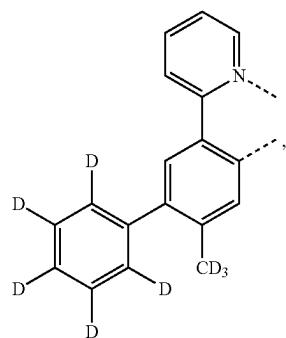
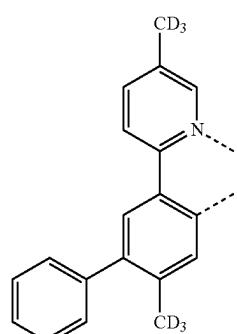
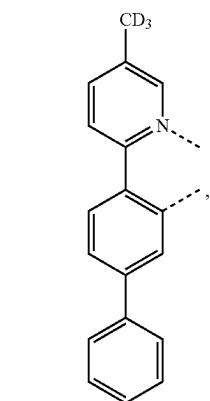
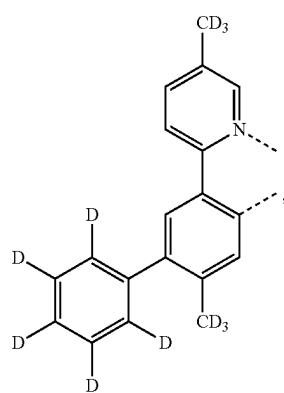
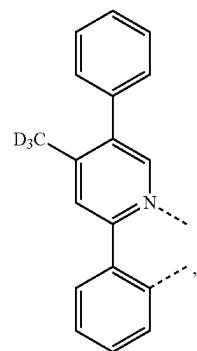
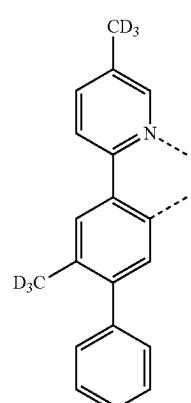
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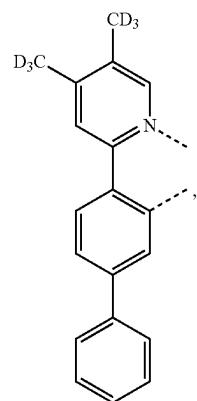
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L_B257

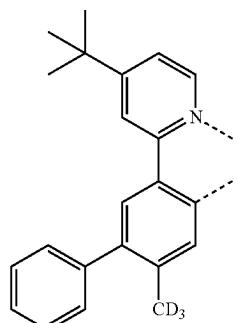
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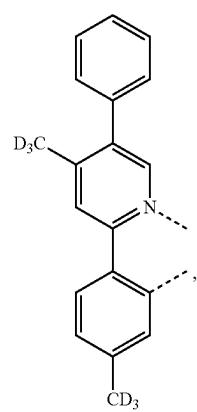
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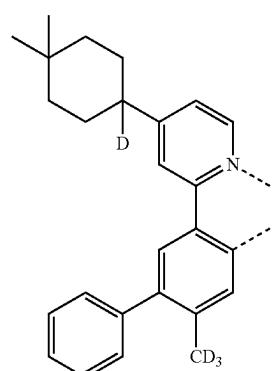
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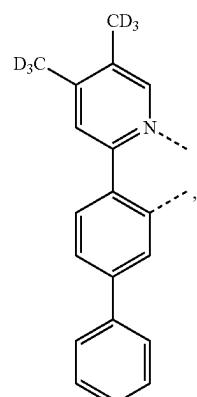
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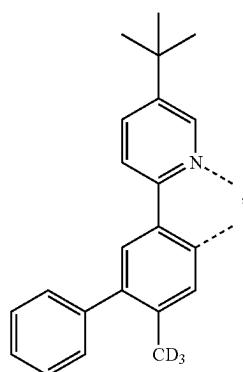
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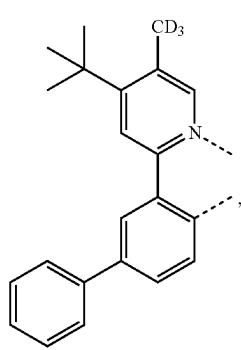
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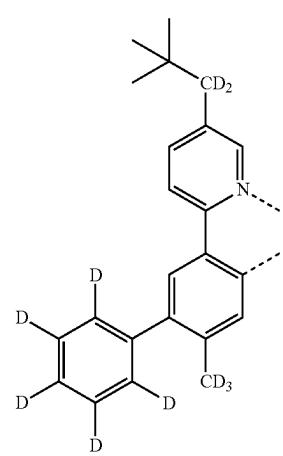
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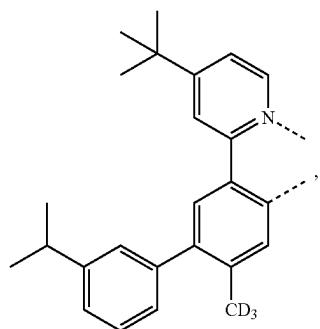
J. B. 271



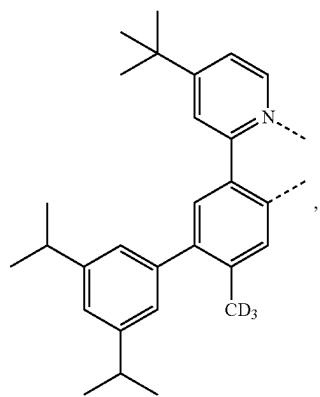
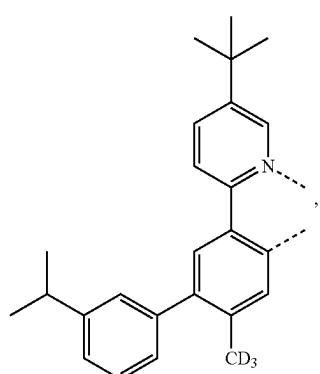
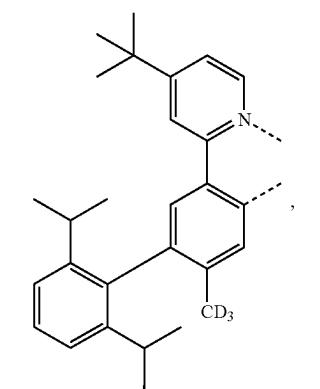
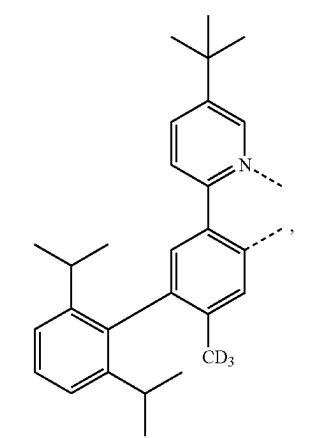
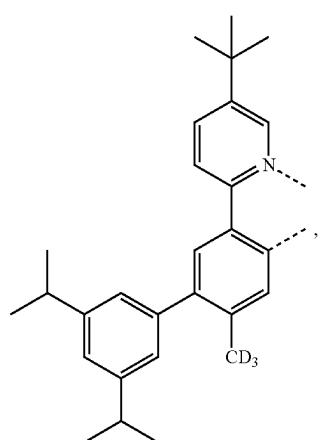
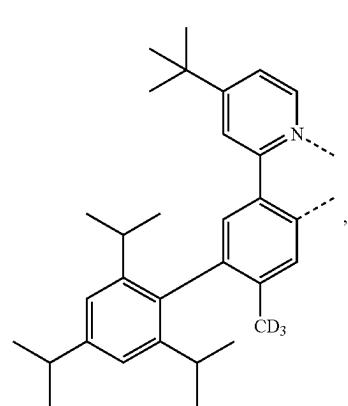
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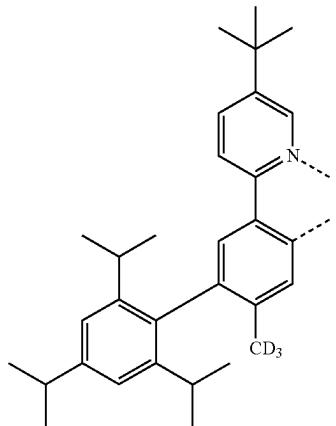
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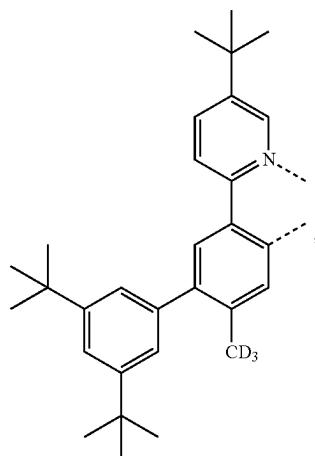
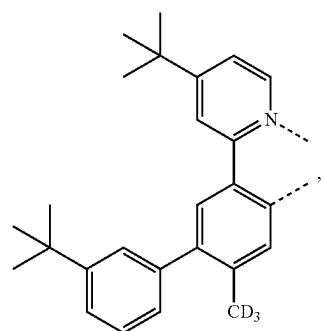
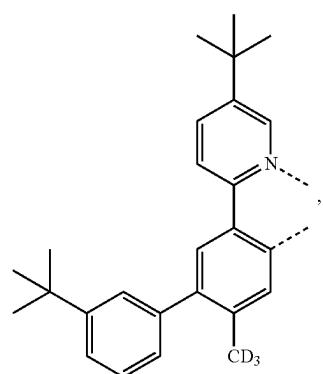
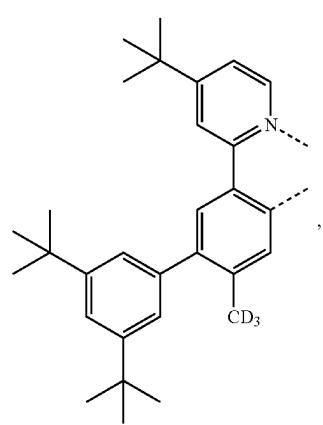
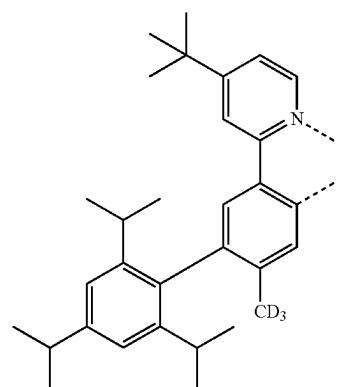
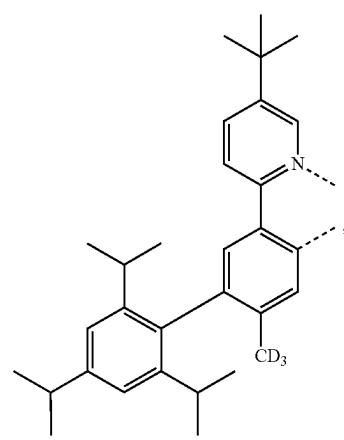
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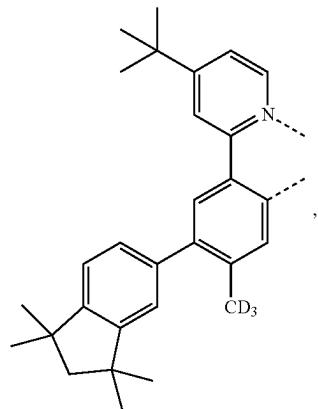
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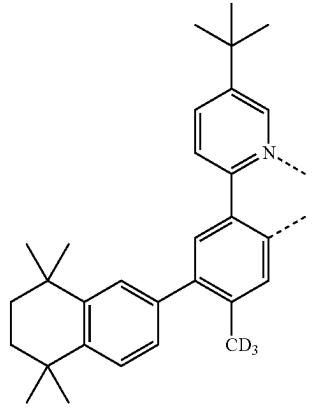
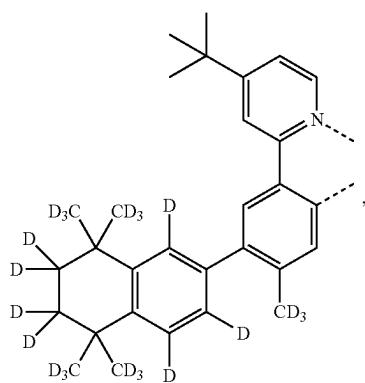
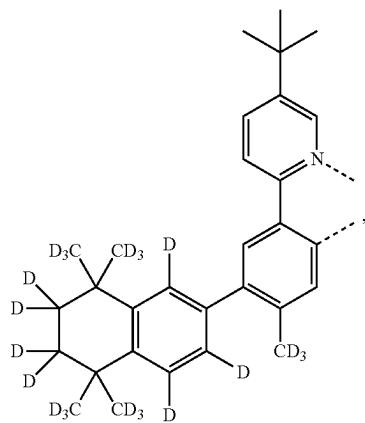
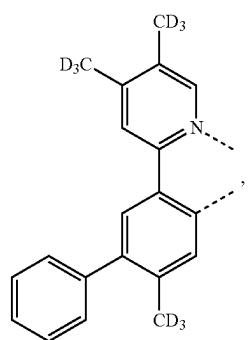
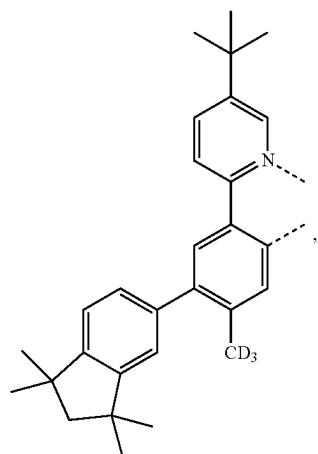
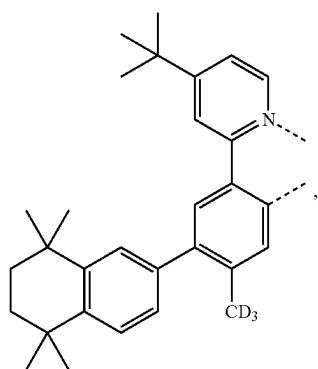
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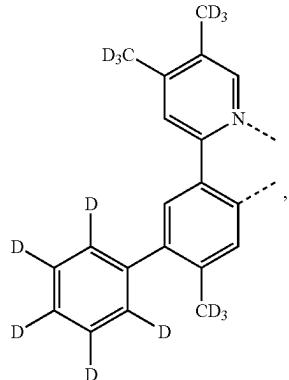
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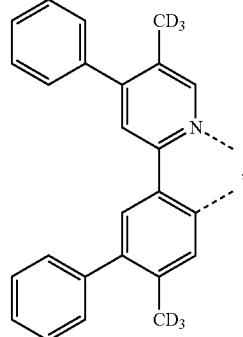
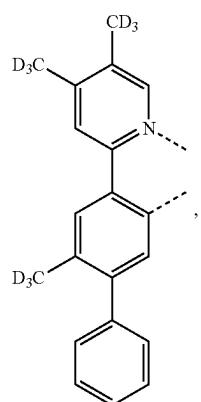
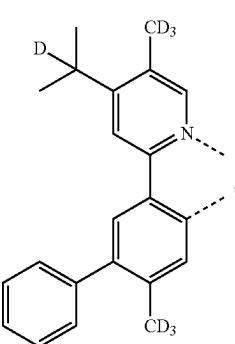
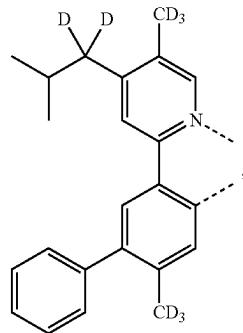
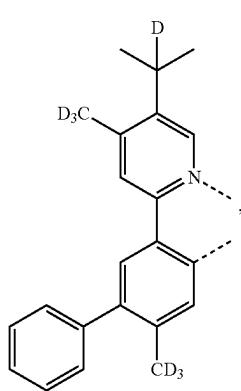
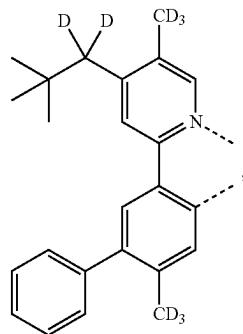
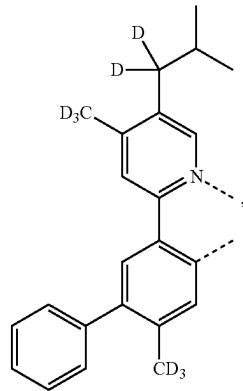
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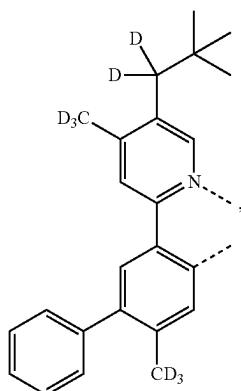
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 L_{B294} 

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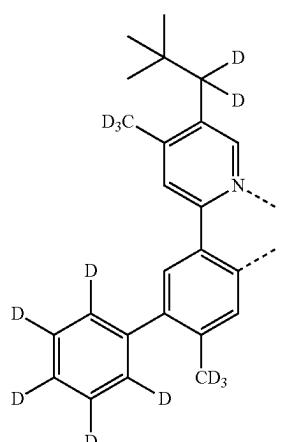
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L_{B302}

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L_B306

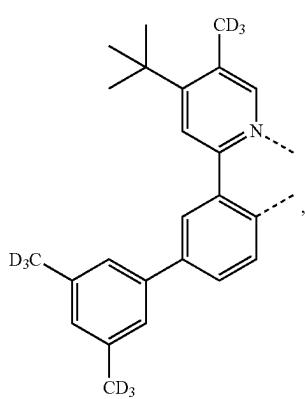
L_{B303}

L_B307

L_{B304}

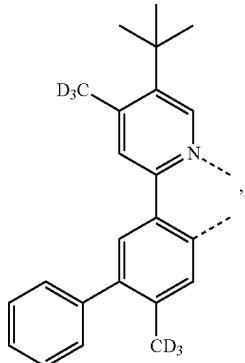
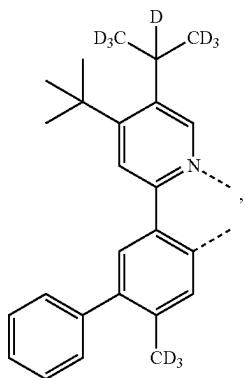
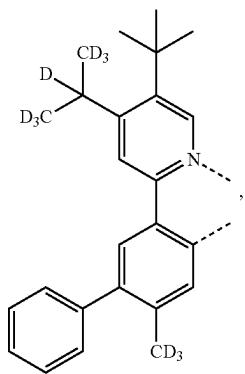
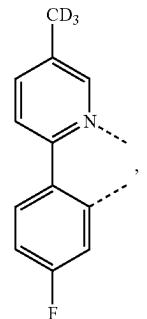
J-B305

L_{B308}

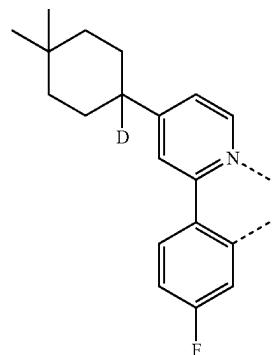
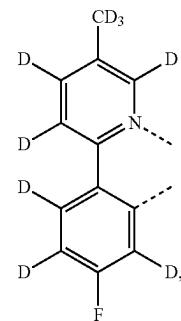
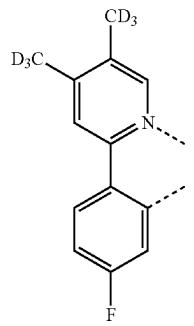
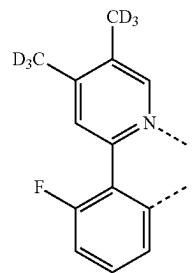


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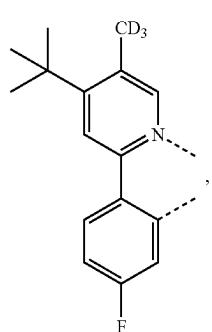
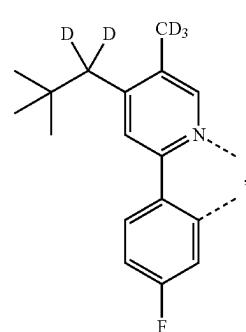
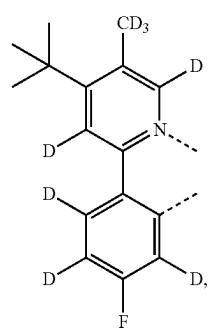
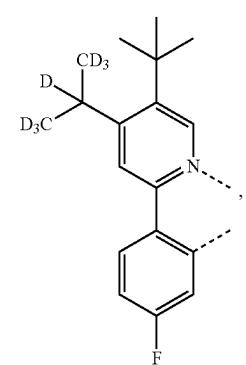
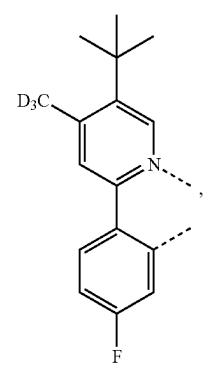
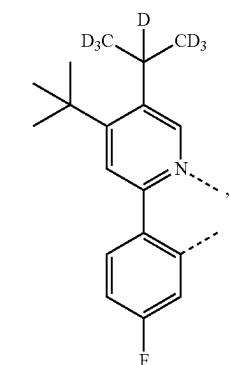
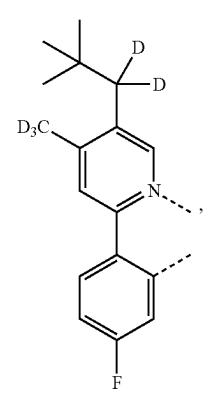
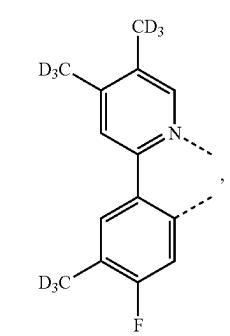
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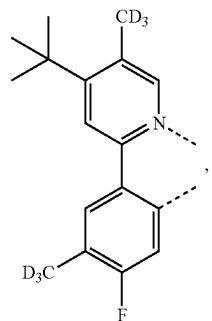
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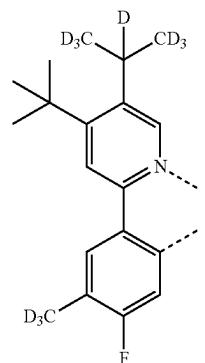
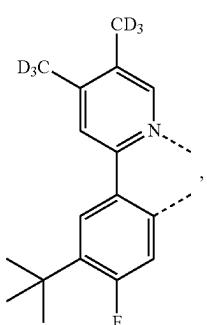
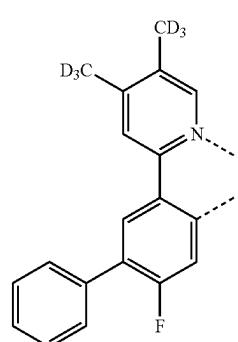
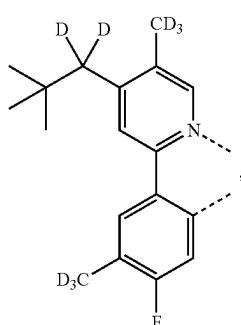
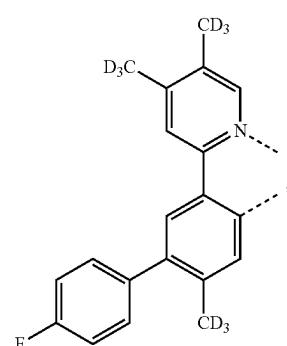
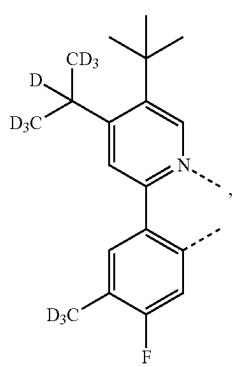
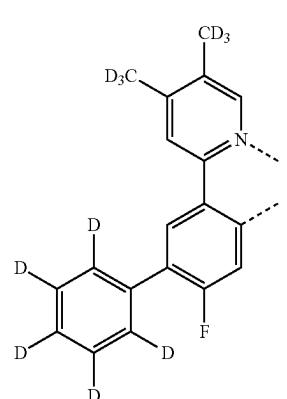
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L_B317L_B321L_B318L_B322L_B319L_B323L_B320L_B324

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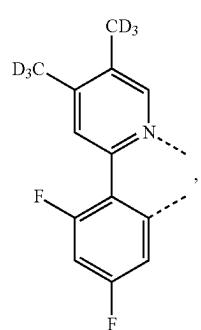
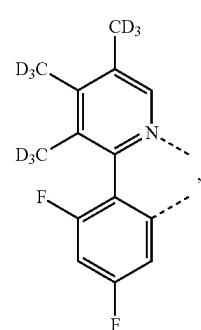
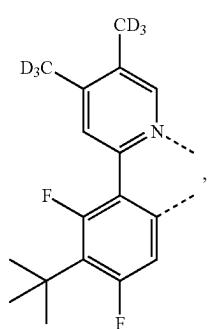
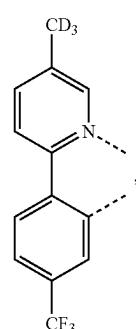
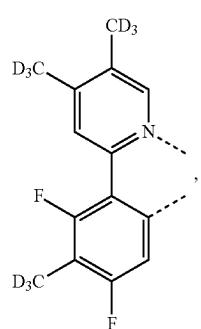
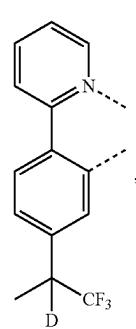
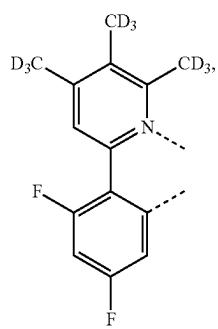
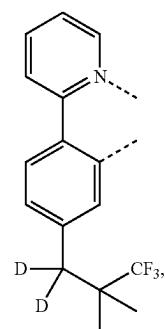
L_B325

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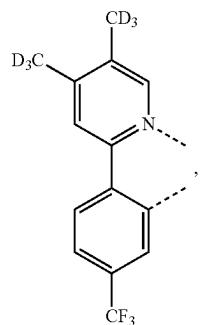
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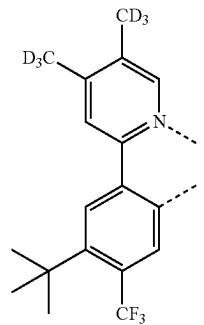
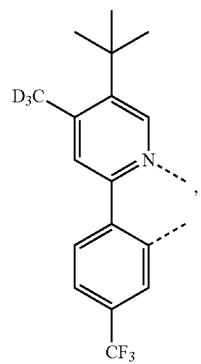
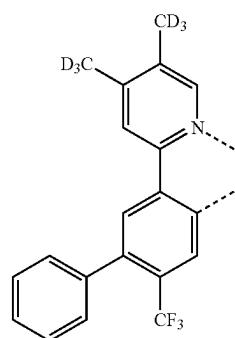
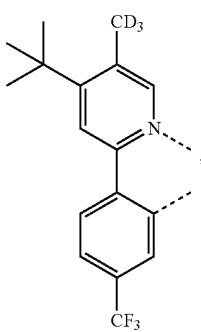
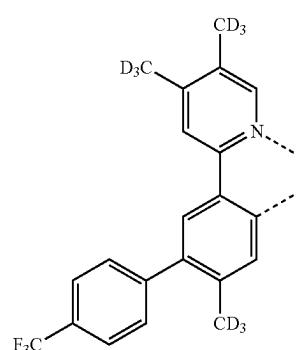
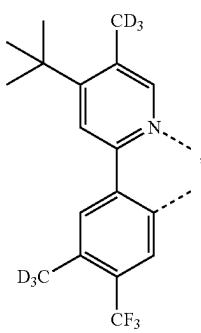
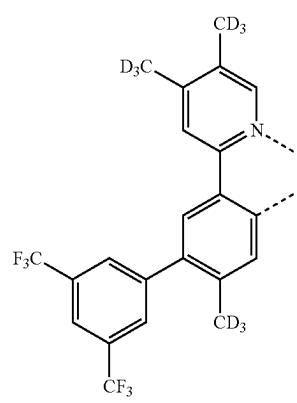
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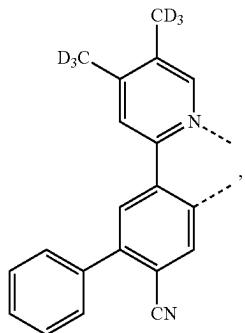
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L_B341

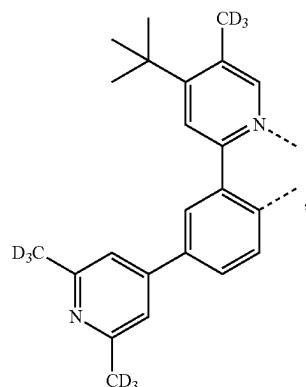
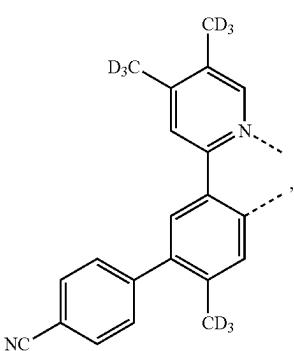
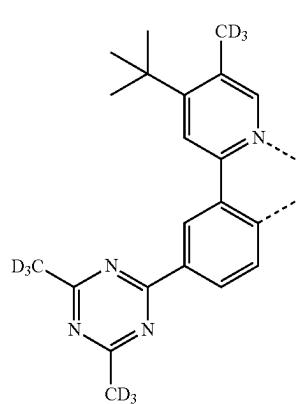
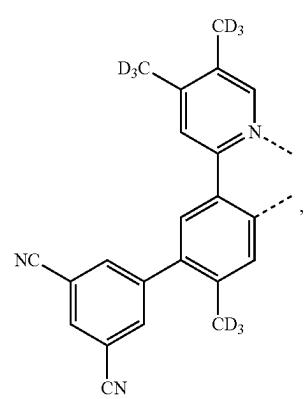
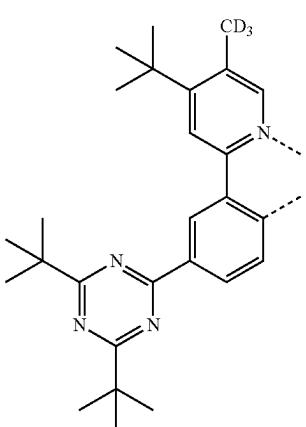
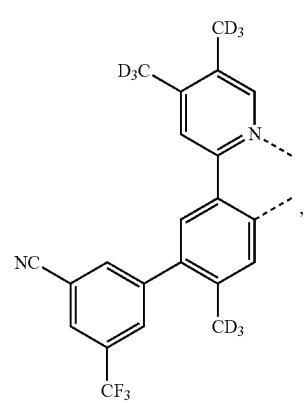
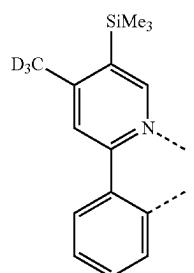
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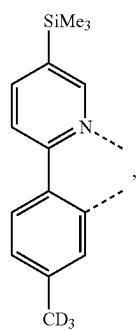
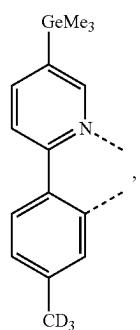
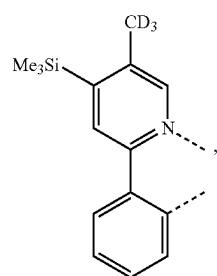
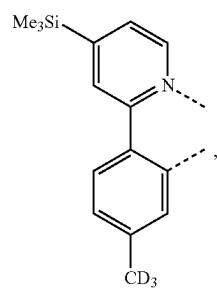
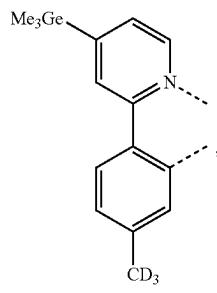
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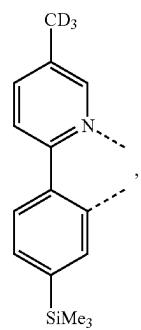
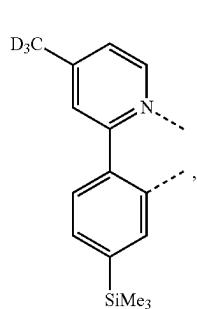
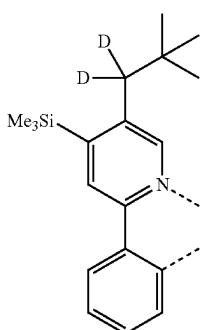
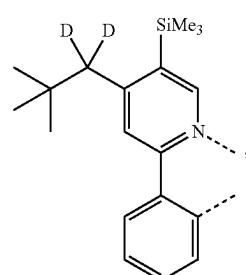
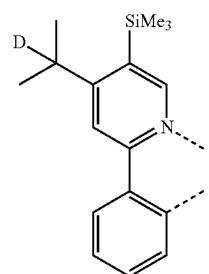
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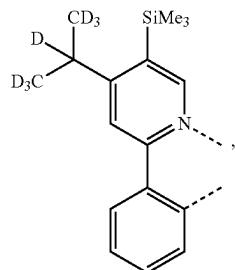
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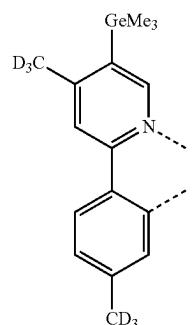
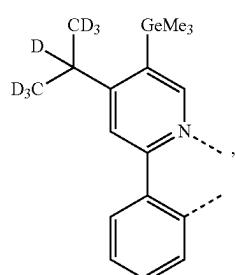
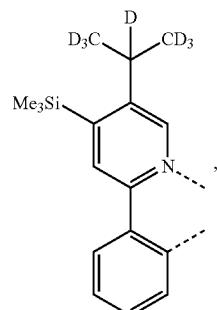
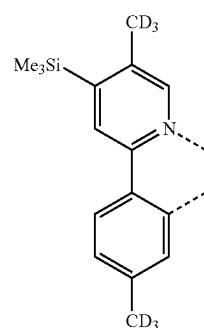
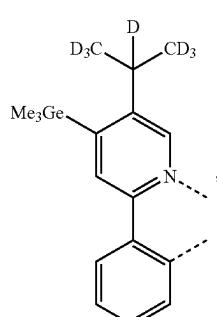
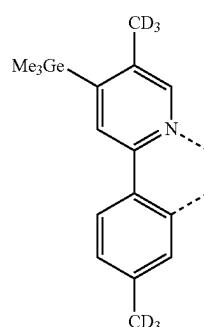
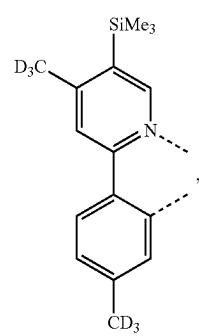
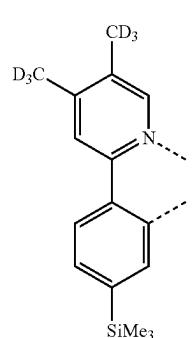
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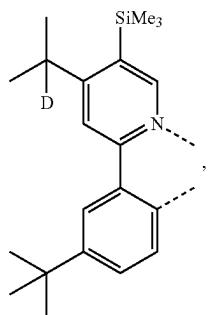
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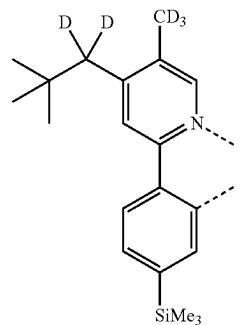
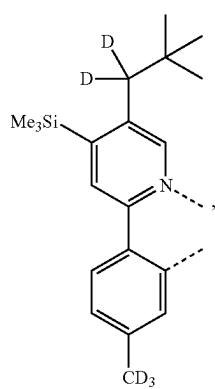
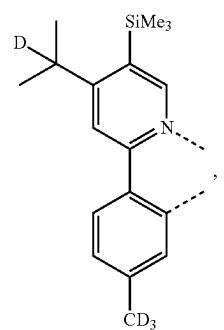
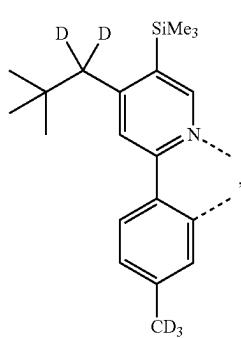
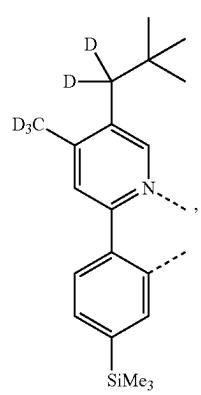
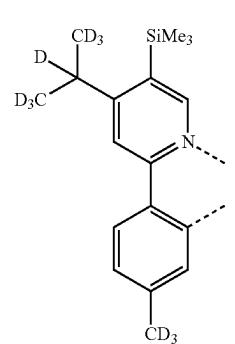
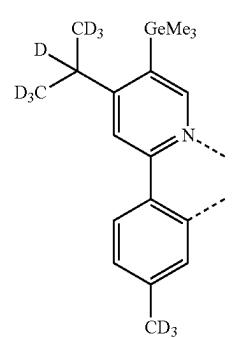
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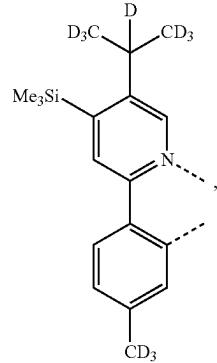
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L_B376

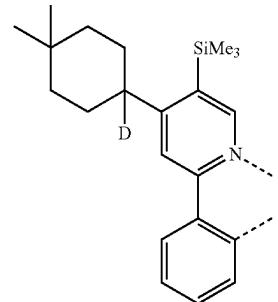
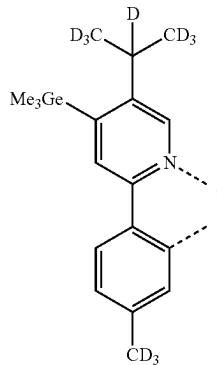
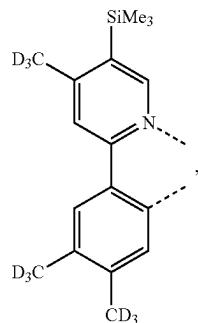
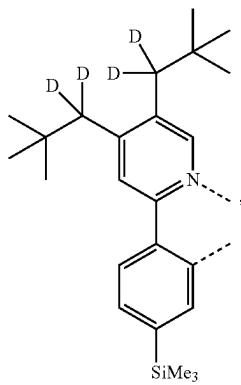
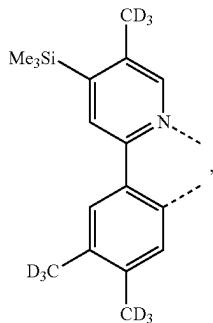
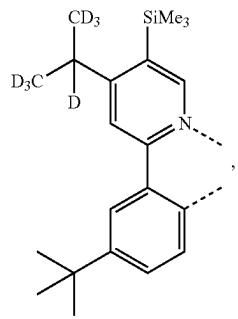
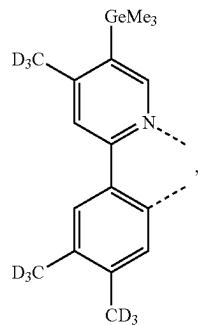
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L_B380L_B377L_B381L_B378L_B379L_B382L_B383

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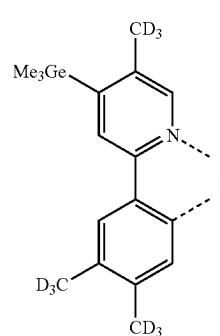
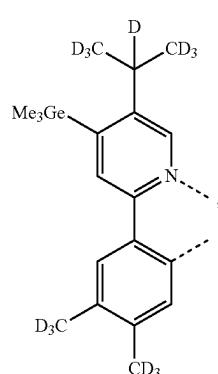
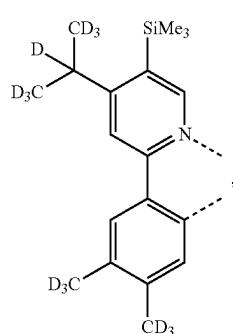
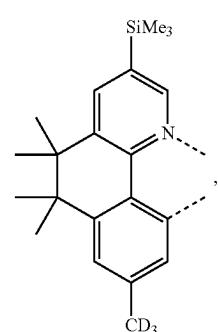
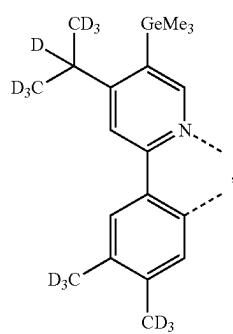
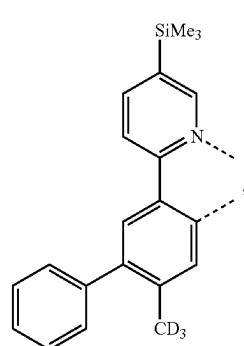
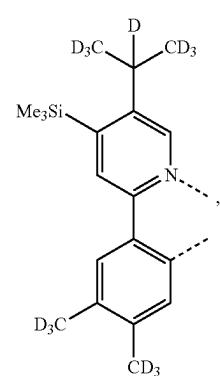
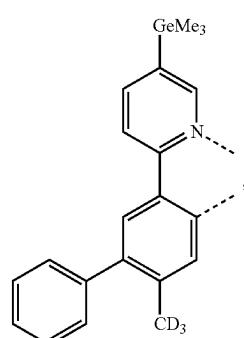
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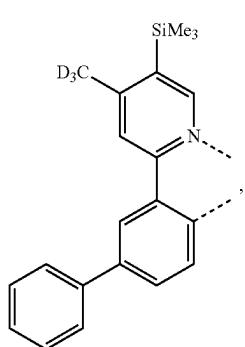
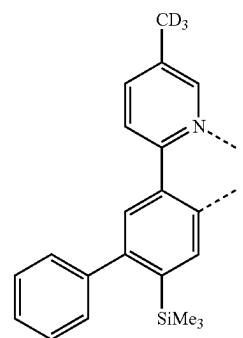
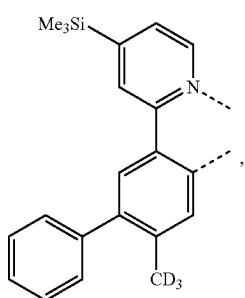
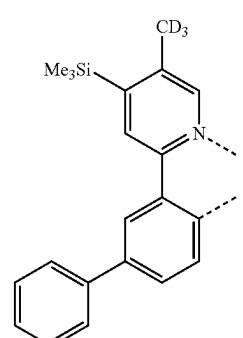
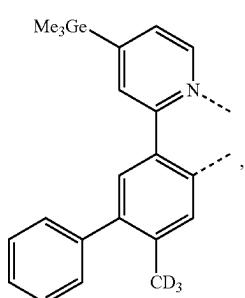
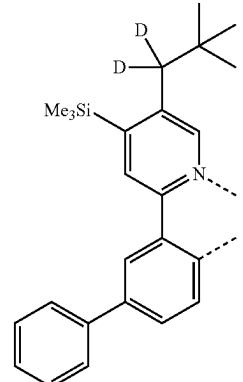
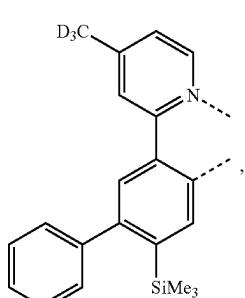
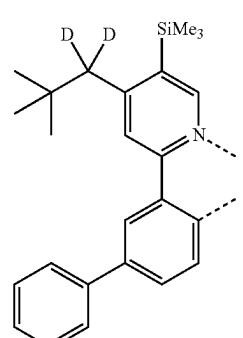
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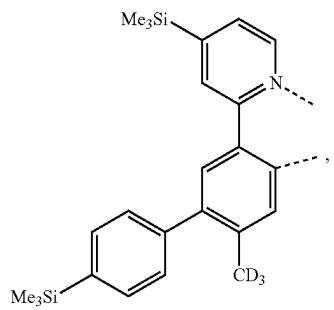
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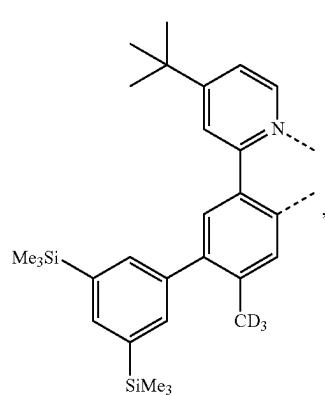
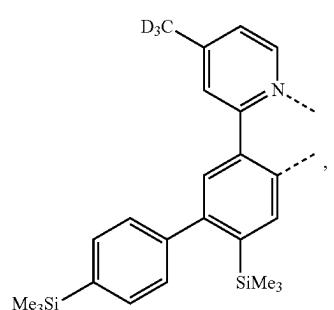
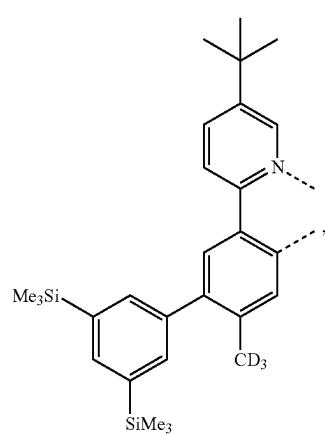
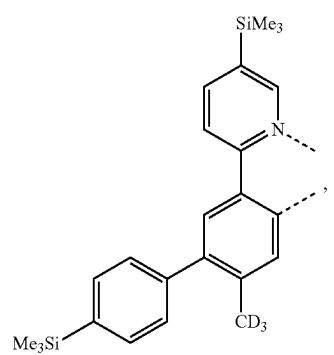
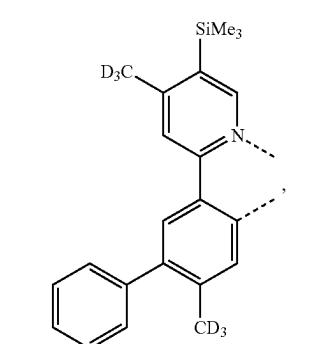
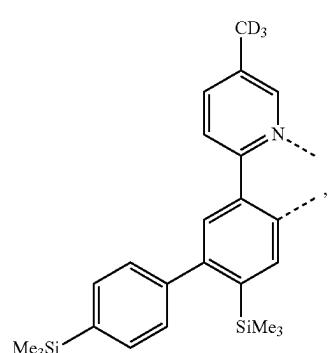
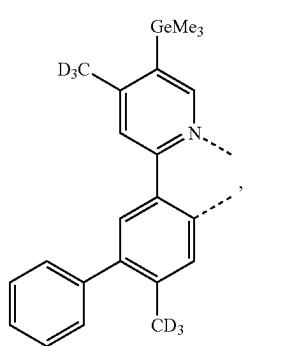
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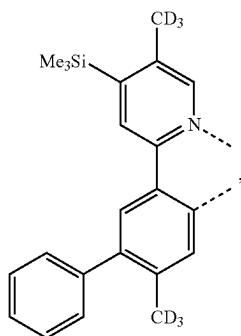
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L_B408

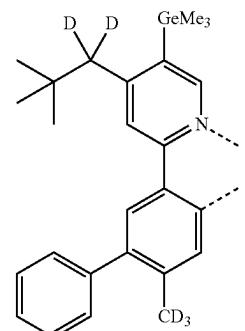
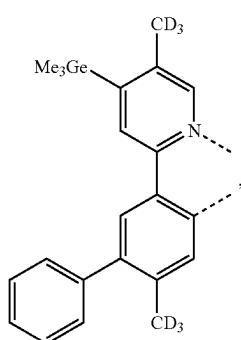
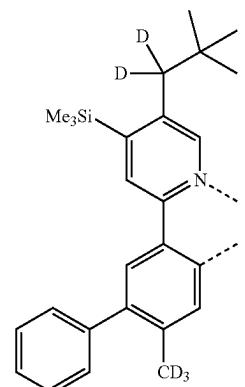
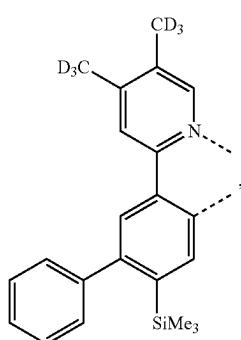
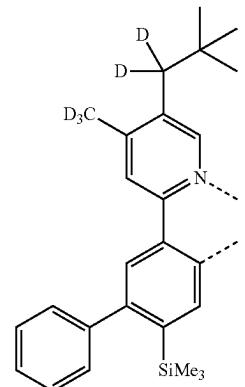
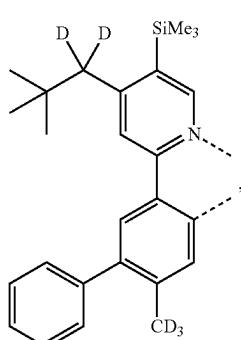
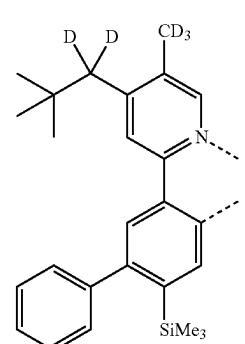
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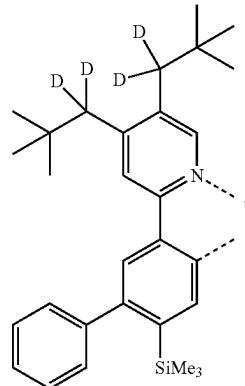
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L_B416

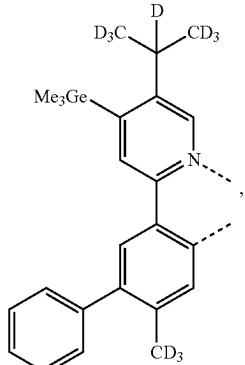
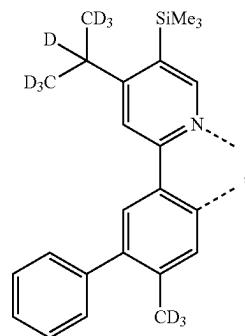
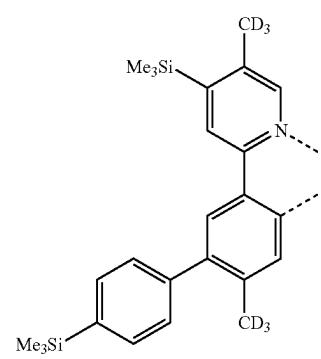
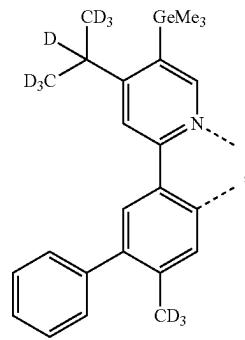
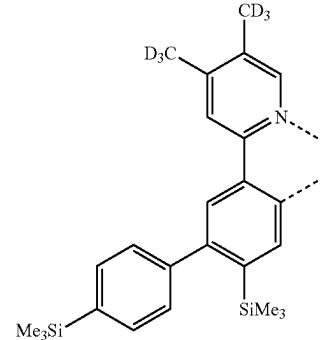
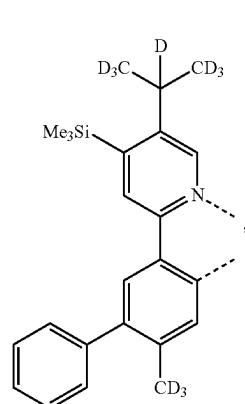
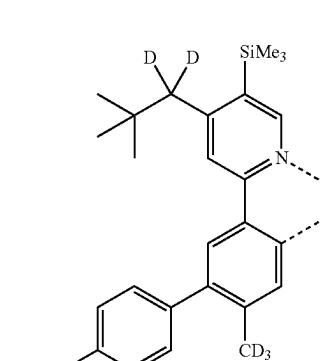
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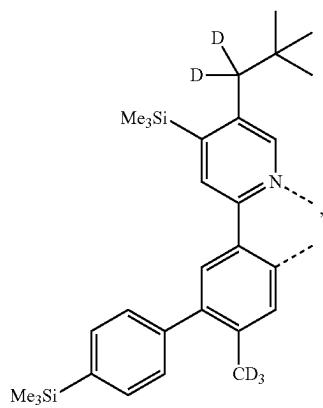
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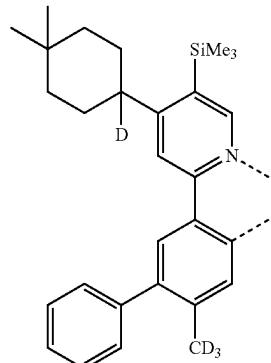
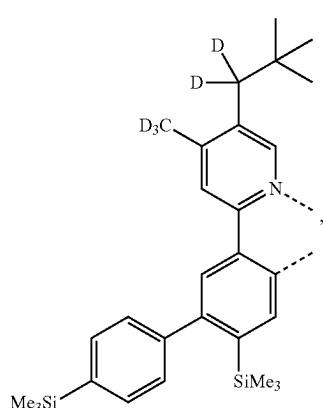
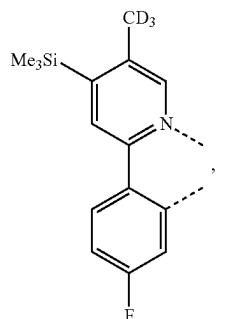
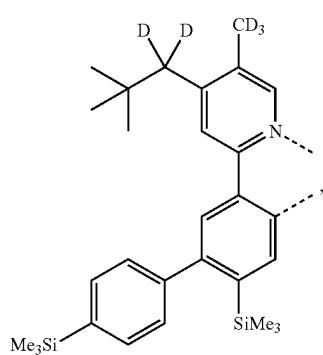
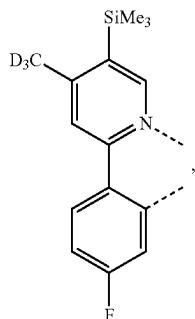
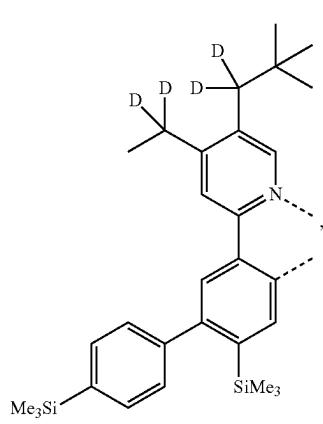
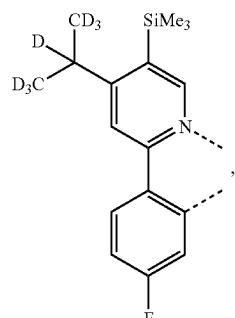
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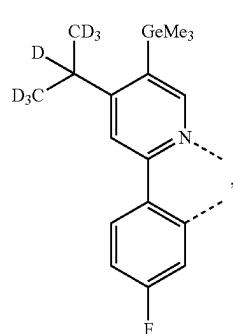
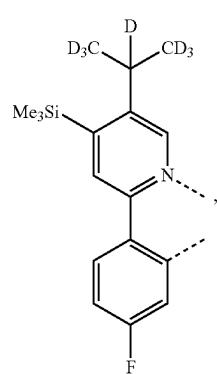
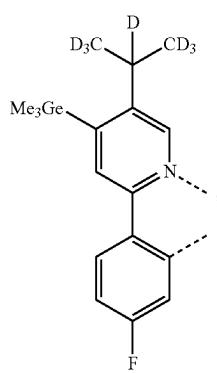
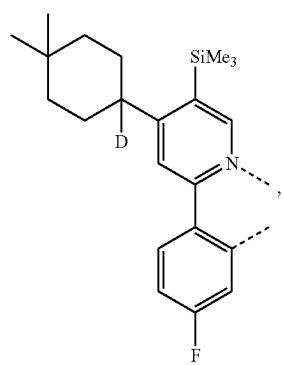
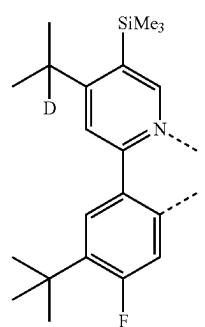
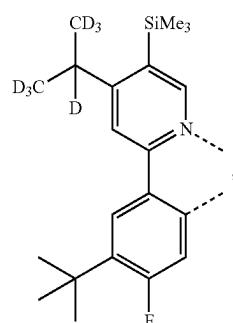
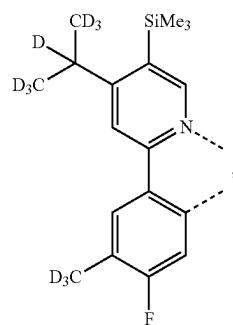
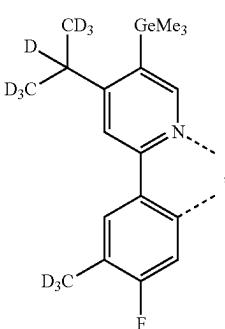
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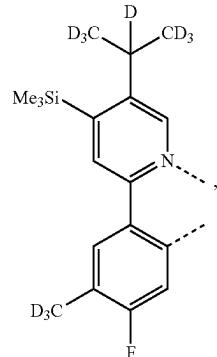
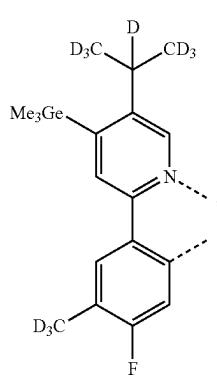
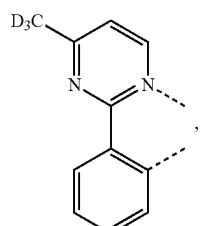
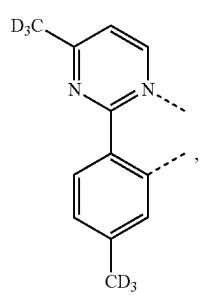
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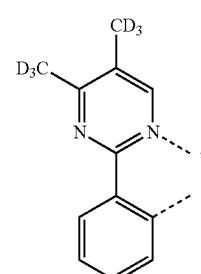
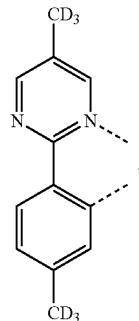
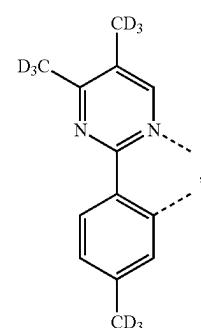
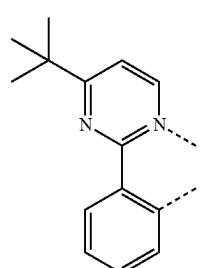
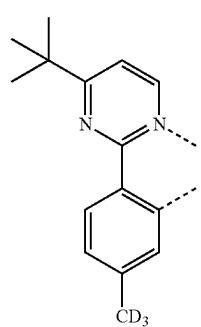
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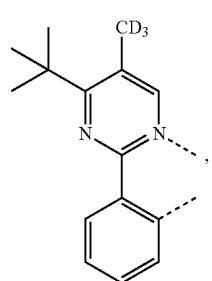
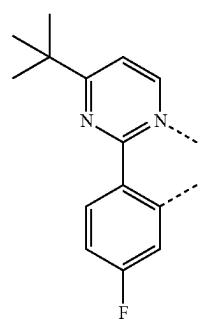
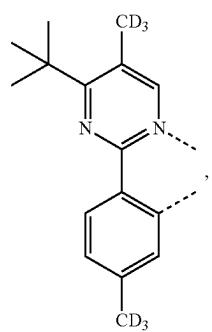
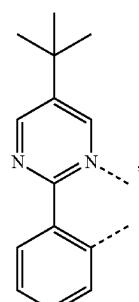
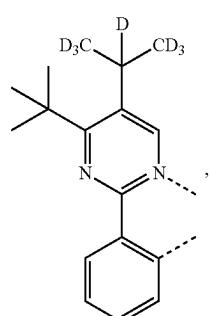
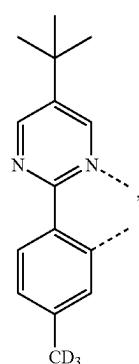
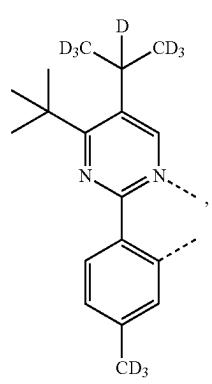
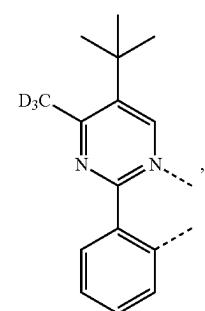
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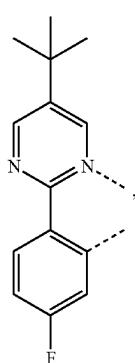
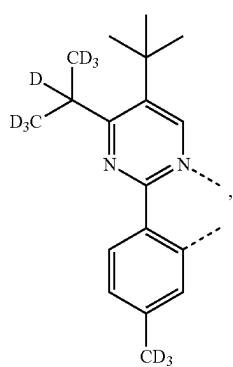
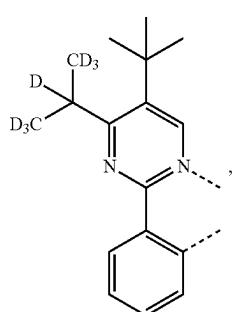
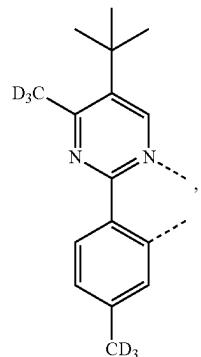
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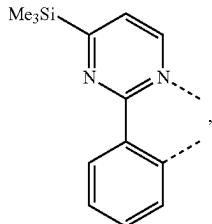
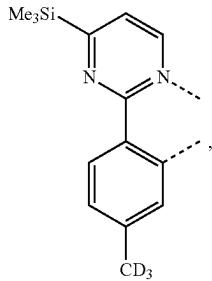
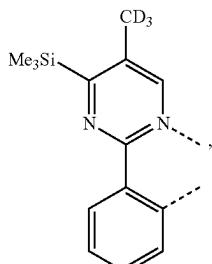
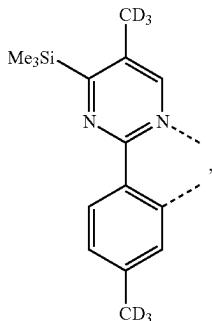
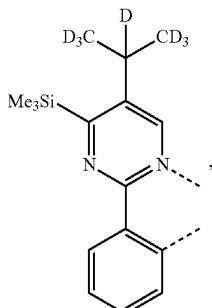
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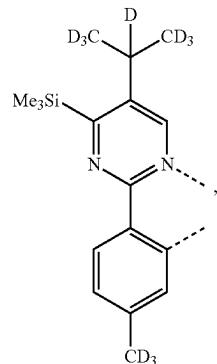
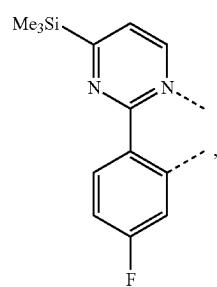
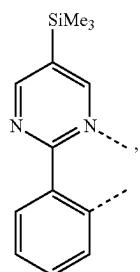
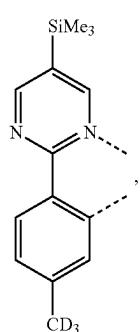
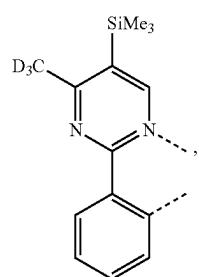
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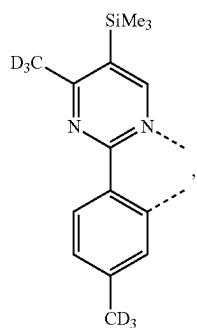
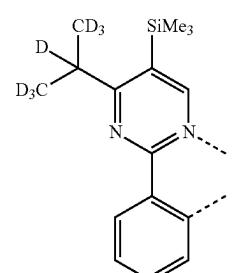
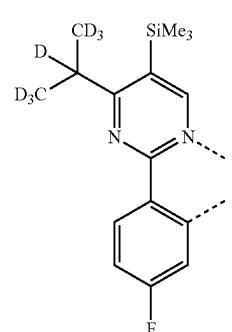
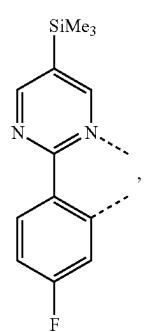
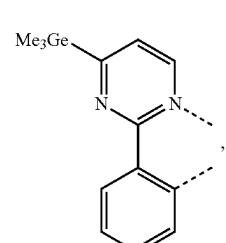
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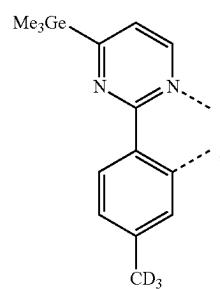
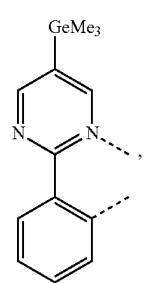
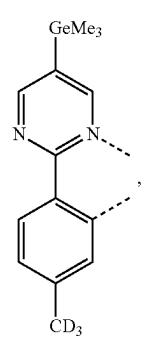
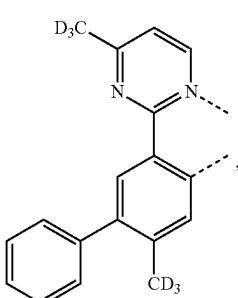
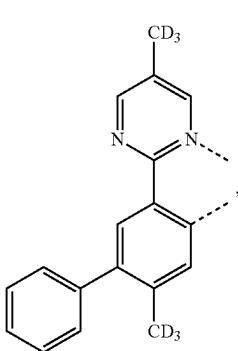
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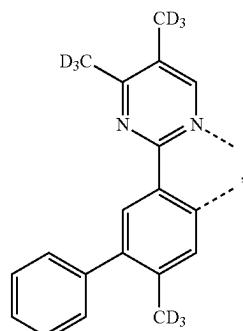
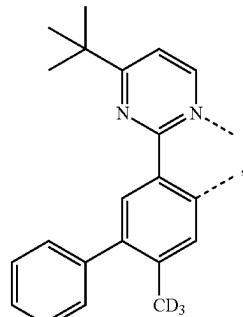
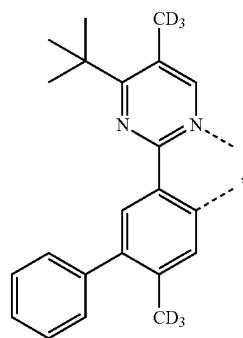
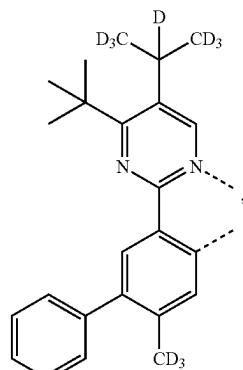
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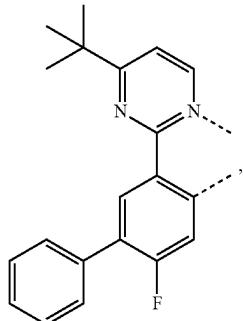
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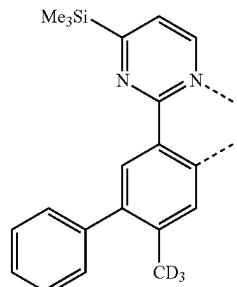
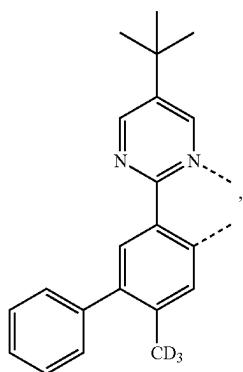
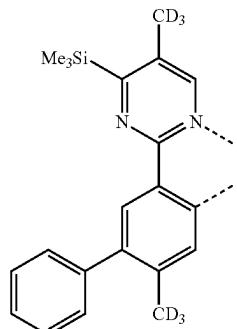
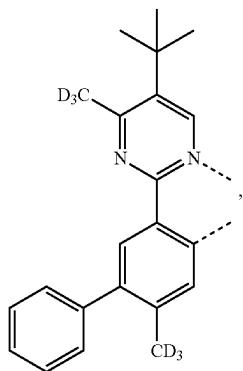
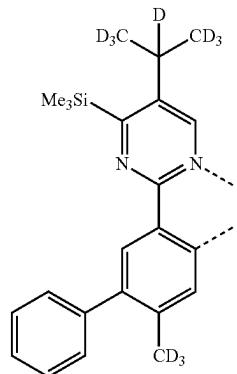
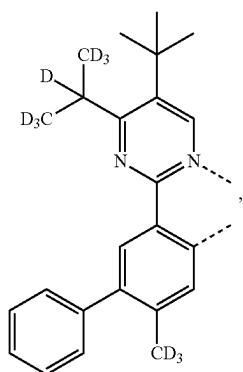
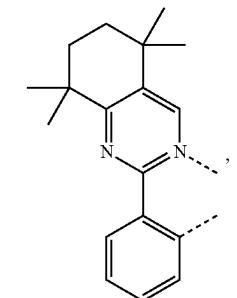
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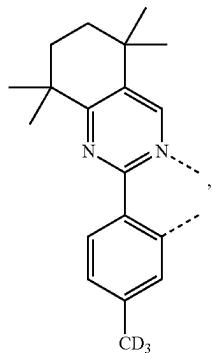
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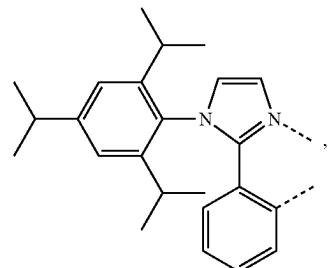
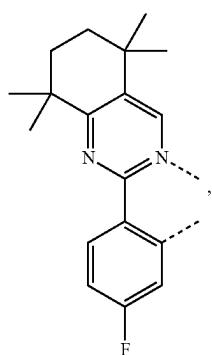
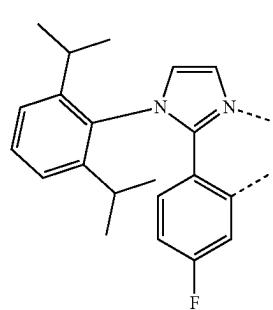
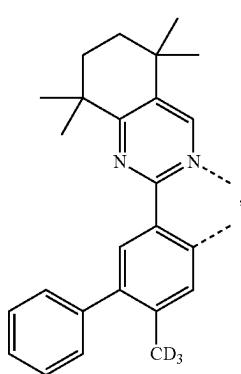
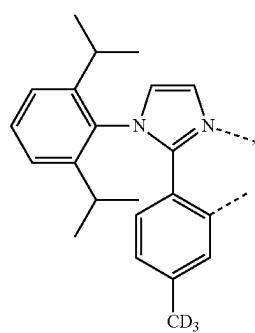
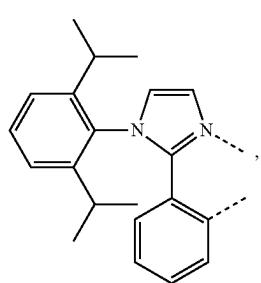
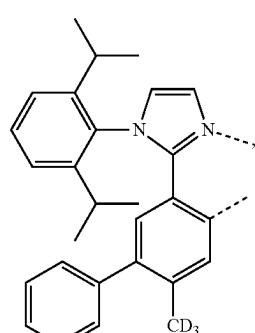
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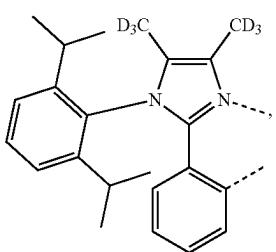
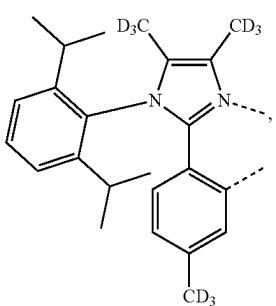
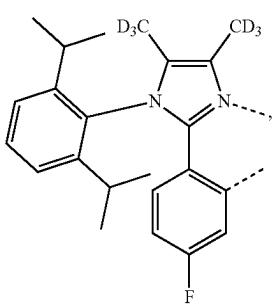
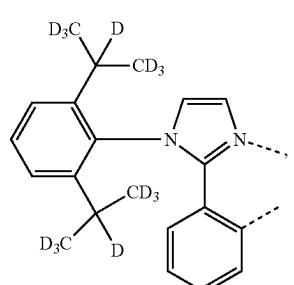
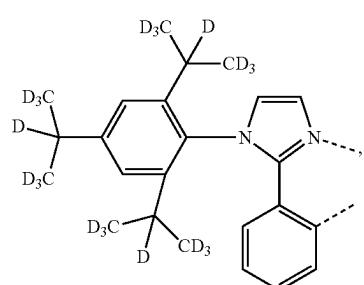
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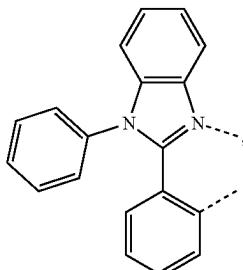
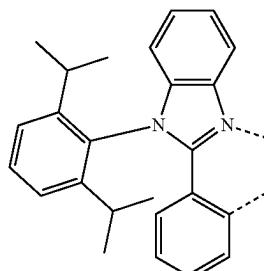
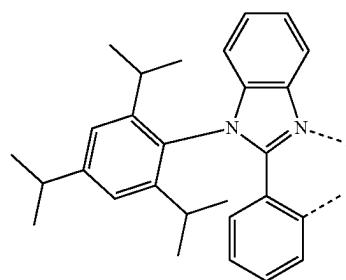
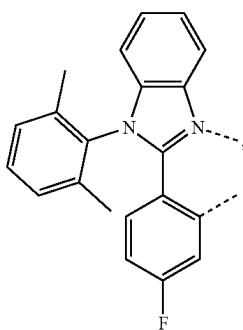
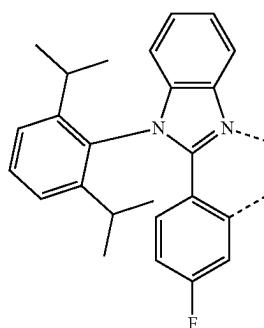
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L_B505L_B502L_B506L_B503L_B507L_B504L_B508

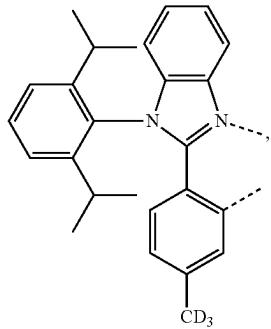
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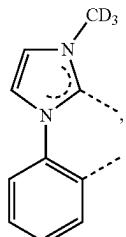
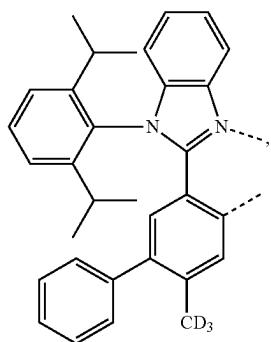
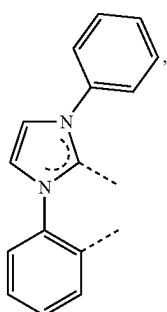
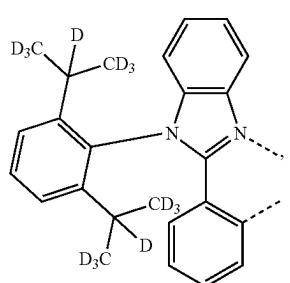
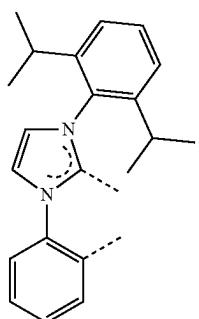
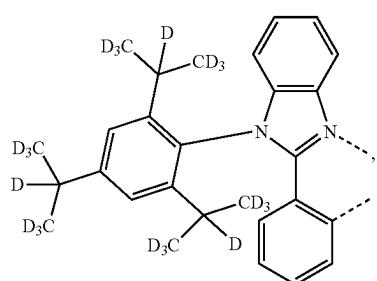
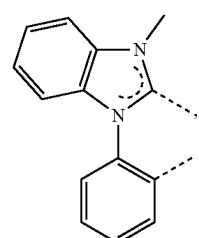
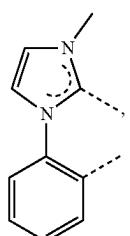
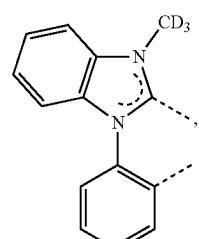
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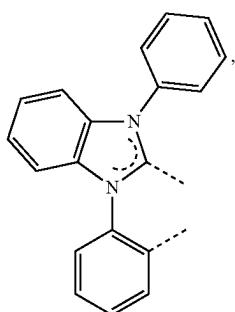
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 L_{B519} 

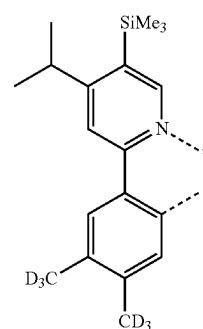
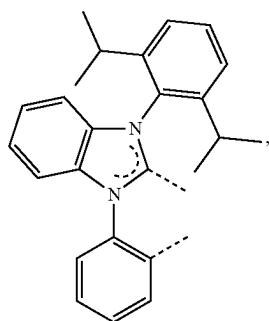
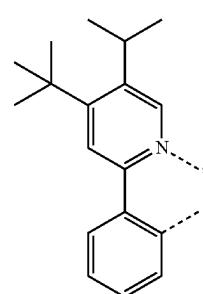
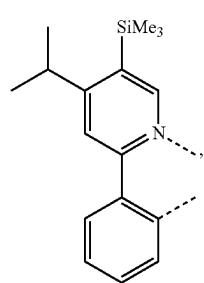
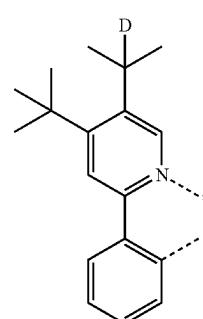
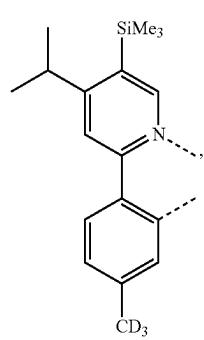
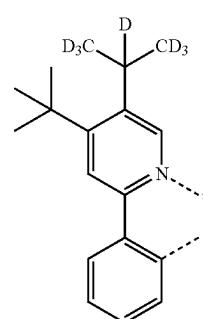
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 L_{B524}  L_{B520}  L_{B525}  L_{B521}  L_{B526}  L_{B522}  L_{B527}  L_{B523}  L_{B528} 

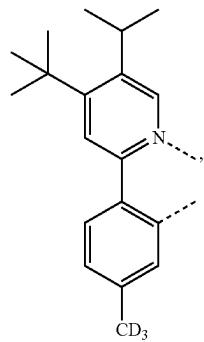
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L_B529

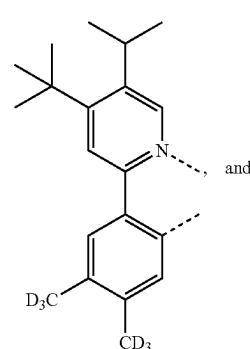
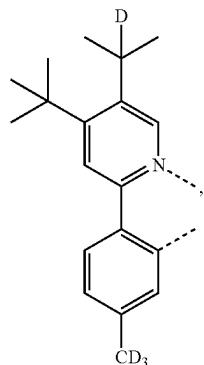
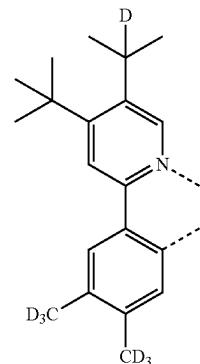
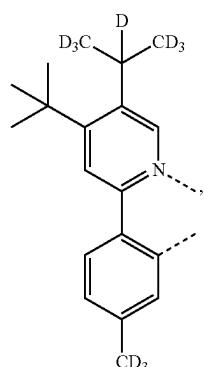
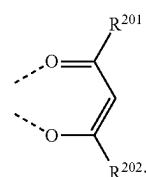
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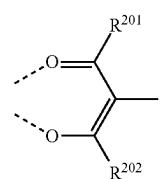
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L_{B537}

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L_{B540}L_{B538}L_{B541}L_{B539}

and

[0217] each L_{cj-II} has a structure based on formulawherein for each L_{ij} in L_{cj-I} and L_{cj-II}, R²⁰¹ and R²⁰² have the structures defined in the following LIST 9:

L _{Cj}	R ²⁰¹	R ²⁰²	L _{Cj}	R ²⁰¹	R ²⁰²	L _{Cj}	R ²⁰¹	R ²⁰²	L _{Cj}	R ²⁰¹	R ²⁰²
L _{C1}	R ^{D1}	R ^{D1}	L _{C193}	R ^{D1}	R ^{D3}	L _{C385}	R ^{D17}	R ^{D40}	L _{C577}	R ^{D143}	R ^{D120}
L _{C2}	R ^{D2}	R ^{D2}	L _{C194}	R ^{D1}	R ^{D4}	L _{C386}	R ^{D17}	R ^{D41}	L _{C578}	R ^{D143}	R ^{D133}
L _{C3}	R ^{D3}	R ^{D3}	L _{C195}	R ^{D1}	R ^{D5}	L _{C387}	R ^{D17}	R ^{D42}	L _{C579}	R ^{D143}	R ^{D134}
L _{C4}	R ^{D4}	R ^{D4}	L _{C196}	R ^{D1}	R ^{D9}	L _{C388}	R ^{D17}	R ^{D43}	L _{C580}	R ^{D143}	R ^{D135}
L _{C5}	R ^{D5}	R ^{D5}	L _{C197}	R ^{D1}	R ^{D10}	L _{C389}	R ^{D17}	R ^{D48}	L _{C581}	R ^{D143}	R ^{D136}
L _{C6}	R ^{D6}	R ^{D6}	L _{C198}	R ^{D1}	R ^{D17}	L _{C390}	R ^{D17}	R ^{D49}	L _{C582}	R ^{D143}	R ^{D144}

-continued

L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}
L_{C7}	R^{D7}	R^{D7}	L_{C199}	R^{D1}	R^{D18}	L_{C391}	R^{D17}	R^{D50}	L_{C583}	R^{D143}	R^{D145}
L_{C8}	R^{D8}	R^{D8}	L_{C200}	R^{D1}	R^{D20}	L_{C392}	R^{D17}	R^{D54}	L_{C584}	R^{D143}	R^{D146}
L_{C9}	R^{D9}	R^{D9}	L_{C201}	R^{D1}	R^{D22}	L_{C393}	R^{D17}	R^{D55}	L_{C585}	R^{D143}	R^{D147}
L_{C10}	R^{D10}	R^{D10}	L_{C202}	R^{D1}	R^{D37}	L_{C394}	R^{D17}	R^{D58}	L_{C586}	R^{D143}	R^{D149}
L_{C11}	R^{D11}	R^{D11}	L_{C203}	R^{D1}	R^{D40}	L_{C395}	R^{D17}	R^{D59}	L_{C587}	R^{D143}	R^{D151}
L_{C12}	R^{D12}	R^{D12}	L_{C204}	R^{D1}	R^{D41}	L_{C396}	R^{D17}	R^{D78}	L_{C588}	R^{D143}	R^{D154}
L_{C13}	R^{D13}	R^{D13}	L_{C205}	R^{D1}	R^{D42}	L_{C397}	R^{D17}	R^{D79}	L_{C589}	R^{D143}	R^{D155}
L_{C14}	R^{D14}	R^{D14}	L_{C206}	R^{D1}	R^{D43}	L_{C398}	R^{D17}	R^{D81}	L_{C590}	R^{D143}	R^{D161}
L_{C15}	R^{D15}	R^{D15}	L_{C207}	R^{D1}	R^{D48}	L_{C399}	R^{D17}	R^{D87}	L_{C591}	R^{D143}	R^{D175}
L_{C16}	R^{D16}	R^{D16}	L_{C208}	R^{D1}	R^{D49}	L_{C400}	R^{D17}	R^{D88}	L_{C592}	R^{D144}	R^{D3}
L_{C17}	R^{D17}	R^{D17}	L_{C209}	R^{D1}	R^{D50}	L_{C401}	R^{D17}	R^{D89}	L_{C593}	R^{D144}	R^{D5}
L_{C18}	R^{D18}	R^{D18}	L_{C210}	R^{D1}	R^{D54}	L_{C402}	R^{D17}	R^{D93}	L_{C594}	R^{D144}	R^{D17}
L_{C19}	R^{D19}	R^{D19}	L_{C211}	R^{D1}	R^{D55}	L_{C403}	R^{D17}	R^{D116}	L_{C595}	R^{D144}	R^{D18}
L_{C20}	R^{D20}	R^{D20}	L_{C212}	R^{D1}	R^{D58}	L_{C404}	R^{D17}	R^{D117}	L_{C596}	R^{D144}	R^{D20}
L_{C21}	R^{D21}	R^{D21}	L_{C213}	R^{D1}	R^{D59}	L_{C405}	R^{D17}	R^{D118}	L_{C597}	R^{D144}	R^{D22}
L_{C22}	R^{D22}	R^{D22}	L_{C214}	R^{D1}	R^{D78}	L_{C406}	R^{D17}	R^{D119}	L_{C598}	R^{D144}	R^{D37}
L_{C23}	R^{D23}	R^{D23}	L_{C215}	R^{D1}	R^{D79}	L_{C407}	R^{D17}	R^{D120}	L_{C599}	R^{D144}	R^{D40}
L_{C24}	R^{D24}	R^{D24}	L_{C216}	R^{D1}	R^{D81}	L_{C408}	R^{D17}	R^{D133}	L_{C600}	R^{D144}	R^{D41}
L_{C25}	R^{D25}	R^{D25}	L_{C217}	R^{D1}	R^{D87}	L_{C409}	R^{D17}	R^{D134}	L_{C601}	R^{D144}	R^{D42}
L_{C26}	R^{D26}	R^{D26}	L_{C218}	R^{D1}	R^{D88}	L_{C410}	R^{D17}	R^{D135}	L_{C602}	R^{D144}	R^{D43}
L_{C27}	R^{D27}	R^{D27}	L_{C219}	R^{D1}	R^{D89}	L_{C411}	R^{D17}	R^{D136}	L_{C603}	R^{D144}	R^{D48}
L_{C28}	R^{D28}	R^{D28}	L_{C220}	R^{D1}	R^{D93}	L_{C412}	R^{D17}	R^{D143}	L_{C604}	R^{D144}	R^{D49}
L_{C29}	R^{D29}	R^{D29}	L_{C221}	R^{D1}	R^{D116}	L_{C413}	R^{D17}	R^{D144}	L_{C605}	R^{D144}	R^{D54}
L_{C30}	R^{D30}	R^{D30}	L_{C222}	R^{D1}	R^{D117}	L_{C414}	R^{D17}	R^{D145}	L_{C606}	R^{D144}	R^{D58}
L_{C31}	R^{D31}	R^{D31}	L_{C223}	R^{D1}	R^{D118}	L_{C415}	R^{D17}	R^{D146}	L_{C607}	R^{D144}	R^{D59}
L_{C32}	R^{D32}	R^{D32}	L_{C224}	R^{D1}	R^{D119}	L_{C416}	R^{D17}	R^{D147}	L_{C608}	R^{D144}	R^{D78}
L_{C33}	R^{D33}	R^{D33}	L_{C225}	R^{D1}	R^{D120}	L_{C417}	R^{D17}	R^{D149}	L_{C609}	R^{D144}	R^{D79}
L_{C34}	R^{D34}	R^{D34}	L_{C226}	R^{D1}	R^{D133}	L_{C418}	R^{D17}	R^{D151}	L_{C610}	R^{D144}	R^{D81}
L_{C35}	R^{D35}	R^{D35}	L_{C227}	R^{D1}	R^{D134}	L_{C419}	R^{D17}	R^{D154}	L_{C611}	R^{D144}	R^{D87}
L_{C36}	R^{D36}	R^{D36}	L_{C228}	R^{D1}	R^{D135}	L_{C420}	R^{D17}	R^{D155}	L_{C612}	R^{D144}	R^{D88}
L_{C37}	R^{D37}	R^{D37}	L_{C229}	R^{D1}	R^{D136}	L_{C421}	R^{D17}	R^{D161}	L_{C613}	R^{D144}	R^{D89}
L_{C38}	R^{D38}	R^{D38}	L_{C230}	R^{D1}	R^{D143}	L_{C422}	R^{D17}	R^{D175}	L_{C614}	R^{D144}	R^{D93}
L_{C39}	R^{D39}	R^{D39}	L_{C231}	R^{D1}	R^{D144}	L_{C423}	R^{D50}	R^{D3}	L_{C615}	R^{D144}	R^{D116}
L_{C40}	R^{D40}	R^{D40}	L_{C232}	R^{D1}	R^{D145}	L_{C424}	R^{D50}	R^{D5}	L_{C616}	R^{D144}	R^{D117}
L_{C41}	R^{D41}	R^{D41}	L_{C233}	R^{D1}	R^{D146}	L_{C425}	R^{D50}	R^{D18}	L_{C617}	R^{D144}	R^{D118}
L_{C42}	R^{D42}	R^{D42}	L_{C234}	R^{D1}	R^{D147}	L_{C426}	R^{D50}	R^{D20}	L_{C618}	R^{D144}	R^{D119}
L_{C43}	R^{D43}	R^{D43}	L_{C235}	R^{D1}	R^{D149}	L_{C427}	R^{D50}	R^{D22}	L_{C619}	R^{D144}	R^{D120}
L_{C44}	R^{D44}	R^{D44}	L_{C236}	R^{D1}	R^{D151}	L_{C428}	R^{D50}	R^{D37}	L_{C620}	R^{D144}	R^{D133}
L_{C45}	R^{D45}	R^{D45}	L_{C237}	R^{D1}	R^{D154}	L_{C429}	R^{D50}	R^{D40}	L_{C621}	R^{D144}	R^{D134}
L_{C46}	R^{D46}	R^{D46}	L_{C238}	R^{D1}	R^{D155}	L_{C430}	R^{D50}	R^{D41}	L_{C622}	R^{D144}	R^{D135}
L_{C47}	R^{D47}	R^{D47}	L_{C239}	R^{D1}	R^{D161}	L_{C431}	R^{D50}	R^{D42}	L_{C623}	R^{D144}	R^{D136}
L_{C48}	R^{D48}	R^{D48}	L_{C240}	R^{D1}	R^{D175}	L_{C432}	R^{D50}	R^{D43}	L_{C624}	R^{D144}	R^{D145}
L_{C49}	R^{D49}	R^{D49}	L_{C241}	R^{D4}	R^{D3}	L_{C433}	R^{D50}	R^{D48}	L_{C625}	R^{D144}	R^{D146}
L_{C50}	R^{D50}	R^{D50}	L_{C242}	R^{D4}	R^{D5}	L_{C434}	R^{D50}	R^{D49}	L_{C626}	R^{D144}	R^{D147}
L_{C51}	R^{D51}	R^{D51}	L_{C243}	R^{D4}	R^{D9}	L_{C435}	R^{D50}	R^{D54}	L_{C627}	R^{D144}	R^{D149}
L_{C52}	R^{D52}	R^{D52}	L_{C244}	R^{D4}	R^{D10}	L_{C436}	R^{D50}	R^{D55}	L_{C628}	R^{D144}	R^{D151}
L_{C53}	R^{D53}	R^{D53}	L_{C245}	R^{D4}	R^{D17}	L_{C437}	R^{D50}	R^{D58}	L_{C629}	R^{D144}	R^{D154}
L_{C54}	R^{D54}	R^{D54}	L_{C246}	R^{D4}	R^{D18}	L_{C438}	R^{D50}	R^{D59}	L_{C630}	R^{D144}	R^{D155}
L_{C55}	R^{D55}	R^{D55}	L_{C247}	R^{D4}	R^{D20}	L_{C439}	R^{D50}	R^{D78}	L_{C631}	R^{D144}	R^{D161}
L_{C56}	R^{D56}	R^{D56}	L_{C248}	R^{D4}	R^{D22}	L_{C440}	R^{D50}	R^{D79}	L_{C632}	R^{D144}	R^{D175}
L_{C57}	R^{D57}	R^{D57}	L_{C249}	R^{D4}	R^{D37}	L_{C441}	R^{D50}	R^{D81}	L_{C633}	R^{D145}	R^{D3}
L_{C58}	R^{D58}	R^{D58}	L_{C250}	R^{D4}	R^{D40}	L_{C442}	R^{D50}	R^{D87}	L_{C634}	R^{D145}	R^{D5}
L_{C59}	R^{D59}	R^{D59}	L_{C251}	R^{D4}	R^{D41}	L_{C443}	R^{D50}	R^{D88}	L_{C635}	R^{D145}	R^{D17}
L_{C60}	R^{D60}	R^{D60}	L_{C252}	R^{D4}	R^{D42}	L_{C444}	R^{D50}	R^{D89}	L_{C636}	R^{D145}	R^{D18}
L_{C61}	R^{D61}	R^{D61}	L_{C253}	R^{D4}	R^{D43}	L_{C445}	R^{D50}	R^{D93}	L_{C637}	R^{D145}	R^{D20}
L_{C62}	R^{D62}	R^{D62}	L_{C254}	R^{D4}	R^{D48}	L_{C446}	R^{D50}	R^{D116}	L_{C638}	R^{D145}	R^{D22}
L_{C63}	R^{D63}	R^{D63}	L_{C255}	R^{D4}	R^{D49}	L_{C447}	R^{D50}	R^{D117}	L_{C639}	R^{D145}	R^{D37}
L_{C64}	R^{D64}	R^{D64}	L_{C256}	R^{D4}	R^{D50}	L_{C448}	R^{D50}	R^{D118}	L_{C640}	R^{D145}	R^{D40}
L_{C65}	R^{D65}	R^{D65}	L_{C257}	R^{D4}	R^{D54}	L_{C449}	R^{D50}	R^{D119}	L_{C641}	R^{D145}	R^{D41}
L_{C66}	R^{D66}	R^{D66}	L_{C258}	R^{D4}	R^{D55}	L_{C450}	R^{D50}	R^{D120}	L_{C642}	R^{D145}	R^{D42}
L_{C67}	R^{D67}	R^{D67}	L_{C259}	R^{D4}	R^{D58}	L_{C451}	R^{D50}	R^{D133}	L_{C643}	R^{D145}	R^{D43}
L_{C68}	R^{D68}	R^{D68}	L_{C260}	R^{D4}	R^{D59}	L_{C452}	R^{D50}	R^{D134}	L_{C644}	R^{D145}	R^{D48}
L_{C69}	R^{D69}	R^{D69}	L_{C261}	R^{D4}	R^{D78}	L_{C453}	R^{D50}	R^{D135}	L_{C645}	R^{D145}	R^{D49}
L_{C70}	R^{D70}	R^{D70}	L_{C262}	R^{D4}	R^{D79}	L_{C454}	R^{D50}	R^{D136}	L_{C646}	R^{D145}	R^{D54}
L_{C71}	R^{D71}	R^{D71}	L_{C263}	R^{D4}	R^{D81}	L_{C455}	R^{D50}	R^{D143}	L_{C647}	R^{D145}	R^{D58}
L_{C72}	R^{D72}	R^{D72}	$L_{$								

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L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}
L_{C81}	R^{D81}	R^{D81}	L_{C273}	R^{D4}	R^{D133}	L_{C465}	R^{D50}	R^{D175}	L_{C657}	R^{D145}	R^{D117}
L_{C82}	R^{D82}	R^{D82}	L_{C274}	R^{D4}	R^{D134}	L_{C466}	R^{D55}	R^{D3}	L_{C658}	R^{D145}	R^{D118}
L_{C83}	R^{D83}	R^{D83}	L_{C275}	R^{D4}	R^{D135}	L_{C467}	R^{D55}	R^{D5}	L_{C659}	R^{D145}	R^{D119}
L_{C84}	R^{D84}	R^{D84}	L_{C276}	R^{D4}	R^{D136}	L_{C468}	R^{D55}	R^{D18}	L_{C660}	R^{D145}	R^{D120}
L_{C85}	R^{D85}	R^{D85}	L_{C277}	R^{D4}	R^{D143}	L_{C469}	R^{D55}	R^{D20}	L_{C661}	R^{D145}	R^{D133}
L_{C86}	R^{D86}	R^{D86}	L_{C278}	R^{D4}	R^{D144}	L_{C470}	R^{D55}	R^{D22}	L_{C662}	R^{D145}	R^{D134}
L_{C87}	R^{D87}	R^{D87}	L_{C279}	R^{D4}	R^{D145}	L_{C471}	R^{D55}	R^{D37}	L_{C663}	R^{D145}	R^{D135}
L_{C88}	R^{D88}	R^{D88}	L_{C280}	R^{D4}	R^{D146}	L_{C472}	R^{D55}	R^{D40}	L_{C664}	R^{D145}	R^{D136}
L_{C89}	R^{D89}	R^{D89}	L_{C281}	R^{D4}	R^{D147}	L_{C473}	R^{D55}	R^{D41}	L_{C665}	R^{D145}	R^{D146}
L_{C90}	R^{D90}	R^{D90}	L_{C282}	R^{D4}	R^{D149}	L_{C474}	R^{D55}	R^{D42}	L_{C666}	R^{D145}	R^{D147}
L_{C91}	R^{D91}	R^{D91}	L_{C283}	R^{D4}	R^{D151}	L_{C475}	R^{D55}	R^{D43}	L_{C667}	R^{D145}	R^{D149}
L_{C92}	R^{D92}	R^{D92}	L_{C284}	R^{D4}	R^{D154}	L_{C476}	R^{D55}	R^{D48}	L_{C668}	R^{D145}	R^{D151}
L_{C93}	R^{D93}	R^{D93}	L_{C285}	R^{D4}	R^{D155}	L_{C477}	R^{D55}	R^{D49}	L_{C669}	R^{D145}	R^{D154}
L_{C94}	R^{D94}	R^{D94}	L_{C286}	R^{D4}	R^{D161}	L_{C478}	R^{D55}	R^{D54}	L_{C670}	R^{D145}	R^{D155}
L_{C95}	R^{D95}	R^{D95}	L_{C287}	R^{D4}	R^{D175}	L_{C479}	R^{D55}	R^{D58}	L_{C671}	R^{D145}	R^{D161}
L_{C96}	R^{D96}	R^{D96}	L_{C288}	R^{D9}	R^{D3}	L_{C480}	R^{D55}	R^{D59}	L_{C672}	R^{D145}	R^{D175}
L_{C97}	R^{D97}	R^{D97}	L_{C289}	R^{D9}	R^{D5}	L_{C481}	R^{D55}	R^{D78}	L_{C673}	R^{D146}	R^{D3}
L_{C98}	R^{D98}	R^{D98}	L_{C290}	R^{D9}	R^{D10}	L_{C482}	R^{D55}	R^{D79}	L_{C674}	R^{D146}	R^{D5}
L_{C99}	R^{D99}	R^{D99}	L_{C291}	R^{D9}	R^{D17}	L_{C483}	R^{D55}	R^{D81}	L_{C675}	R^{D146}	R^{D17}
L_{C100}	R^{D100}	R^{D100}	L_{C292}	R^{D9}	R^{D18}	L_{C484}	R^{D55}	R^{D87}	L_{C676}	R^{D146}	R^{D18}
L_{C101}	R^{D101}	R^{D101}	L_{C293}	R^{D9}	R^{D20}	L_{C485}	R^{D55}	R^{D88}	L_{C677}	R^{D146}	R^{D20}
L_{C102}	R^{D102}	R^{D102}	L_{C294}	R^{D9}	R^{D22}	L_{C486}	R^{D55}	R^{D89}	L_{C678}	R^{D146}	R^{D22}
L_{C103}	R^{D103}	R^{D103}	L_{C295}	R^{D9}	R^{D37}	L_{C487}	R^{D55}	R^{D93}	L_{C679}	R^{D146}	R^{D37}
L_{C104}	R^{D104}	R^{D104}	L_{C296}	R^{D9}	R^{D40}	L_{C488}	R^{D55}	R^{D116}	L_{C680}	R^{D146}	R^{D40}
L_{C105}	R^{D105}	R^{D105}	L_{C297}	R^{D9}	R^{D41}	L_{C489}	R^{D55}	R^{D117}	L_{C681}	R^{D146}	R^{D41}
L_{C106}	R^{D106}	R^{D106}	L_{C298}	R^{D9}	R^{D42}	L_{C490}	R^{D55}	R^{D118}	L_{C682}	R^{D146}	R^{D42}
L_{C107}	R^{D107}	R^{D107}	L_{C299}	R^{D9}	R^{D43}	L_{C491}	R^{D55}	R^{D119}	L_{C683}	R^{D146}	R^{D43}
L_{C108}	R^{D108}	R^{D108}	L_{C300}	R^{D9}	R^{D48}	L_{C492}	R^{D55}	R^{D120}	L_{C684}	R^{D146}	R^{D48}
L_{C109}	R^{D109}	R^{D109}	L_{C301}	R^{D9}	R^{D49}	L_{C493}	R^{D55}	R^{D133}	L_{C685}	R^{D146}	R^{D49}
L_{C110}	R^{D110}	R^{D110}	L_{C302}	R^{D9}	R^{D50}	L_{C494}	R^{D55}	R^{D134}	L_{C686}	R^{D146}	R^{D54}
L_{C111}	R^{D111}	R^{D111}	L_{C303}	R^{D9}	R^{D54}	L_{C495}	R^{D55}	R^{D135}	L_{C687}	R^{D146}	R^{D58}
L_{C112}	R^{D112}	R^{D112}	L_{C304}	R^{D9}	R^{D55}	L_{C496}	R^{D55}	R^{D136}	L_{C688}	R^{D146}	R^{D59}
L_{C113}	R^{D113}	R^{D113}	L_{C305}	R^{D9}	R^{D58}	L_{C497}	R^{D55}	R^{D143}	L_{C689}	R^{D146}	R^{D78}
L_{C114}	R^{D114}	R^{D114}	L_{C306}	R^{D9}	R^{D59}	L_{C498}	R^{D55}	R^{D144}	L_{C690}	R^{D146}	R^{D79}
L_{C115}	R^{D115}	R^{D115}	L_{C307}	R^{D9}	R^{D78}	L_{C499}	R^{D55}	R^{D145}	L_{C691}	R^{D146}	R^{D81}
L_{C116}	R^{D116}	R^{D116}	L_{C308}	R^{D9}	R^{D79}	L_{C500}	R^{D55}	R^{D146}	L_{C692}	R^{D146}	R^{D87}
L_{C117}	R^{D117}	R^{D117}	L_{C309}	R^{D9}	R^{D81}	L_{C501}	R^{D55}	R^{D147}	L_{C693}	R^{D146}	R^{D88}
L_{C118}	R^{D118}	R^{D118}	L_{C310}	R^{D9}	R^{D87}	L_{C502}	R^{D55}	R^{D149}	L_{C694}	R^{D146}	R^{D89}
L_{C119}	R^{D119}	R^{D119}	L_{C311}	R^{D9}	R^{D88}	L_{C503}	R^{D55}	R^{D151}	L_{C695}	R^{D146}	R^{D93}
L_{C120}	R^{D120}	R^{D120}	L_{C312}	R^{D9}	R^{D89}	L_{C504}	R^{D55}	R^{D154}	L_{C696}	R^{D146}	R^{D117}
L_{C121}	R^{D121}	R^{D121}	L_{C313}	R^{D9}	R^{D93}	L_{C505}	R^{D55}	R^{D155}	L_{C697}	R^{D146}	R^{D118}
L_{C122}	R^{D122}	R^{D122}	L_{C314}	R^{D9}	R^{D116}	L_{C506}	R^{D55}	R^{D161}	L_{C698}	R^{D146}	R^{D119}
L_{C123}	R^{D123}	R^{D123}	L_{C315}	R^{D9}	R^{D117}	L_{C507}	R^{D55}	R^{D175}	L_{C699}	R^{D146}	R^{D120}
L_{C124}	R^{D124}	R^{D124}	L_{C316}	R^{D9}	R^{D118}	L_{C508}	R^{D116}	R^{D3}	L_{C700}	R^{D146}	R^{D133}
L_{C125}	R^{D125}	R^{D125}	L_{C317}	R^{D9}	R^{D119}	L_{C509}	R^{D116}	R^{D5}	L_{C701}	R^{D146}	R^{D134}
L_{C126}	R^{D126}	R^{D126}	L_{C318}	R^{D9}	R^{D120}	L_{C510}	R^{D116}	R^{D17}	L_{C702}	R^{D146}	R^{D135}
L_{C127}	R^{D127}	R^{D127}	L_{C319}	R^{D9}	R^{D133}	L_{C511}	R^{D116}	R^{D18}	L_{C703}	R^{D146}	R^{D136}
L_{C128}	R^{D128}	R^{D128}	L_{C320}	R^{D9}	R^{D134}	L_{C512}	R^{D116}	R^{D20}	L_{C704}	R^{D146}	R^{D146}
L_{C129}	R^{D129}	R^{D129}	L_{C321}	R^{D9}	R^{D135}	L_{C513}	R^{D116}	R^{D22}	L_{C705}	R^{D146}	R^{D147}
L_{C130}	R^{D130}	R^{D130}	L_{C322}	R^{D9}	R^{D136}	L_{C514}	R^{D116}	R^{D37}	L_{C706}	R^{D146}	R^{D149}
L_{C131}	R^{D131}	R^{D131}	L_{C323}	R^{D9}	R^{D143}	L_{C515}	R^{D116}	R^{D40}	L_{C707}	R^{D146}	R^{D151}
L_{C132}	R^{D132}	R^{D132}	L_{C324}	R^{D9}	R^{D144}	L_{C516}	R^{D116}	R^{D41}	L_{C708}	R^{D146}	R^{D154}
L_{C133}	R^{D133}	R^{D133}	L_{C325}	R^{D9}	R^{D145}	L_{C517}	R^{D116}	R^{D42}	L_{C709}	R^{D146}	R^{D155}
L_{C134}	R^{D134}	R^{D134}	L_{C326}	R^{D9}	R^{D146}	L_{C518}	R^{D116}	R^{D43}	L_{C710}	R^{D146}	R^{D161}
L_{C135}	R^{D135}	R^{D135}	L_{C327}	R^{D9}	R^{D147}	L_{C519}	R^{D116}	R^{D48}	L_{C711}	R^{D146}	R^{D175}
L_{C136}	R^{D136}	R^{D136}	L_{C328}	R^{D9}	R^{D149}	L_{C520}	R^{D116}	R^{D49}	L_{C712}	R^{D146}	R^{D153}
L_{C137}	R^{D137}	R^{D137}	L_{C329}	R^{D9}	R^{D151}	L_{C521}	R^{D116}	R^{D54}	L_{C713}	R^{D146}	R^{D155}
L_{C138}	R^{D138}	R^{D138}	L_{C330}	R^{D9}	R^{D154}	L_{C522}	R^{D116}	R^{D58}	L_{C714}	R^{D146}	R^{D153}
L_{C139}	R^{D139}	R^{D139}	L_{C331}	R^{D9}	R^{D155}	L_{C523}	R^{D116}	R^{D59}	L_{C715}	R^{D146}	R^{D18}
L_{C140}	R^{D140}	R^{D140}	L_{C332}	R^{D9}	R^{D161}	L_{C524}	R^{D116}	R^{D78}	L_{C716}	R^{D146}	R^{D20}
L_{C141}	R^{D141}	R^{D141}	L_{C333}	R^{D9}	R^{D175}	L_{C525}	R^{D116}	R^{D79}	L_{C717}	R^{D146}	R^{D22}
L_{C142}	R^{D142}	R^{D142}	L_{C334}	R^{D10}	R^{D3}	L_{C526}	R^{D116}	R^{D81}	L_{C718}	R^{D133}	R^{D37}
L_{C143}	R^{D143}	R^{D143}	L_{C335}	R^{D10}	R^{D5}	L_{C527}	R^{D116}	R^{D87}	L_{C719}	R^{D133}	R^{D40}
L_{C144}	R^{D144}	R^{D144}	L_{C336}	R^{D10}	R^{D17}	L_{C528}	R^{D116}	R^{D88}	L_{C720}	R^{D133}	R^{D41}
L_{C145}	R^{D145} </										

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L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}
L_{C155}	R^{D155}	R^{D155}	L_{C347}	R^{D10}	R^{D50}	L_{C539}	R^{D116}	R^{D143}	L_{C731}	R^{D133}	R^{D87}
L_{C156}	R^{D156}	R^{D156}	L_{C348}	R^{D10}	R^{D54}	L_{C540}	R^{D116}	R^{D144}	L_{C732}	R^{D133}	R^{D88}
L_{C157}	R^{D157}	R^{D157}	L_{C349}	R^{D10}	R^{D55}	L_{C541}	R^{D116}	R^{D145}	L_{C733}	R^{D133}	R^{D89}
L_{C158}	R^{D158}	R^{D158}	L_{C350}	R^{D10}	R^{D58}	L_{C542}	R^{D116}	R^{D146}	L_{C734}	R^{D133}	R^{D93}
L_{C159}	R^{D159}	R^{D159}	L_{C351}	R^{D10}	R^{D59}	L_{C543}	R^{D116}	R^{D147}	L_{C735}	R^{D133}	R^{D117}
L_{C160}	R^{D160}	R^{D160}	L_{C352}	R^{D10}	R^{D78}	L_{C544}	R^{D116}	R^{D149}	L_{C736}	R^{D133}	R^{D118}
L_{C161}	R^{D161}	R^{D161}	L_{C353}	R^{D10}	R^{D79}	L_{C545}	R^{D116}	R^{D151}	L_{C737}	R^{D133}	R^{D119}
L_{C162}	R^{D162}	R^{D162}	L_{C354}	R^{D10}	R^{D81}	L_{C546}	R^{D116}	R^{D154}	L_{C738}	R^{D133}	R^{D120}
L_{C163}	R^{D163}	R^{D163}	L_{C355}	R^{D10}	R^{D87}	L_{C547}	R^{D116}	R^{D155}	L_{C739}	R^{D133}	R^{D133}
L_{C164}	R^{D164}	R^{D164}	L_{C356}	R^{D10}	R^{D88}	L_{C548}	R^{D116}	R^{D161}	L_{C740}	R^{D133}	R^{D134}
L_{C165}	R^{D165}	R^{D165}	L_{C357}	R^{D10}	R^{D89}	L_{C549}	R^{D116}	R^{D175}	L_{C741}	R^{D133}	R^{D135}
L_{C166}	R^{D166}	R^{D166}	L_{C358}	R^{D10}	R^{D93}	L_{C550}	R^{D143}	R^{D3}	L_{C742}	R^{D133}	R^{D136}
L_{C167}	R^{D167}	R^{D167}	L_{C359}	R^{D10}	R^{D116}	L_{C551}	R^{D143}	R^{D5}	L_{C743}	R^{D133}	R^{D146}
L_{C168}	R^{D168}	R^{D168}	L_{C360}	R^{D10}	R^{D117}	L_{C552}	R^{D143}	R^{D17}	L_{C744}	R^{D133}	R^{D147}
L_{C169}	R^{D169}	R^{D169}	L_{C361}	R^{D10}	R^{D118}	L_{C553}	R^{D143}	R^{D18}	L_{C745}	R^{D133}	R^{D149}
L_{C170}	R^{D170}	R^{D170}	L_{C362}	R^{D10}	R^{D119}	L_{C554}	R^{D143}	R^{D20}	L_{C746}	R^{D133}	R^{D151}
L_{C171}	R^{D171}	R^{D171}	L_{C363}	R^{D10}	R^{D120}	L_{C555}	R^{D143}	R^{D22}	L_{C747}	R^{D133}	R^{D154}
L_{C172}	R^{D172}	R^{D172}	L_{C364}	R^{D10}	R^{D133}	L_{C556}	R^{D143}	R^{D37}	L_{C748}	R^{D133}	R^{D155}
L_{C173}	R^{D173}	R^{D173}	L_{C365}	R^{D10}	R^{D134}	L_{C557}	R^{D143}	R^{D40}	L_{C749}	R^{D133}	R^{D161}
L_{C174}	R^{D174}	R^{D174}	L_{C366}	R^{D10}	R^{D135}	L_{C558}	R^{D143}	R^{D41}	L_{C750}	R^{D133}	R^{D175}
L_{C175}	R^{D175}	R^{D175}	L_{C367}	R^{D10}	R^{D136}	L_{C559}	R^{D143}	R^{D42}	L_{C751}	R^{D175}	R^{D3}
L_{C176}	R^{D176}	R^{D176}	L_{C368}	R^{D10}	R^{D143}	L_{C560}	R^{D143}	R^{D43}	L_{C752}	R^{D175}	R^{D5}
L_{C177}	R^{D177}	R^{D177}	L_{C369}	R^{D10}	R^{D144}	L_{C561}	R^{D143}	R^{D48}	L_{C753}	R^{D175}	R^{D18}
L_{C178}	R^{D178}	R^{D178}	L_{C370}	R^{D10}	R^{D145}	L_{C562}	R^{D143}	R^{D49}	L_{C754}	R^{D175}	R^{D20}
L_{C179}	R^{D179}	R^{D179}	L_{C371}	R^{D10}	R^{D146}	L_{C563}	R^{D143}	R^{D54}	L_{C755}	R^{D175}	R^{D22}
L_{C180}	R^{D180}	R^{D180}	L_{C372}	R^{D10}	R^{D147}	L_{C564}	R^{D143}	R^{D58}	L_{C756}	R^{D175}	R^{D37}
L_{C181}	R^{D181}	R^{D181}	L_{C373}	R^{D10}	R^{D149}	L_{C565}	R^{D143}	R^{D59}	L_{C757}	R^{D175}	R^{D40}
L_{C182}	R^{D182}	R^{D182}	L_{C374}	R^{D10}	R^{D151}	L_{C566}	R^{D143}	R^{D78}	L_{C758}	R^{D175}	R^{D41}
L_{C183}	R^{D183}	R^{D183}	L_{C375}	R^{D10}	R^{D154}	L_{C567}	R^{D143}	R^{D79}	L_{C759}	R^{D175}	R^{D42}
L_{C184}	R^{D184}	R^{D184}	L_{C376}	R^{D10}	R^{D155}	L_{C568}	R^{D143}	R^{D81}	L_{C760}	R^{D175}	R^{D43}
L_{C185}	R^{D185}	R^{D185}	L_{C377}	R^{D10}	R^{D161}	L_{C569}	R^{D143}	R^{D87}	L_{C761}	R^{D175}	R^{D48}
L_{C186}	R^{D186}	R^{D186}	L_{C378}	R^{D10}	R^{D175}	L_{C570}	R^{D143}	R^{D88}	L_{C762}	R^{D175}	R^{D49}
L_{C187}	R^{D187}	R^{D187}	L_{C379}	R^{D17}	R^{D3}	L_{C571}	R^{D143}	R^{D89}	L_{C763}	R^{D175}	R^{D54}
L_{C188}	R^{D188}	R^{D188}	L_{C380}	R^{D17}	R^{D5}	L_{C572}	R^{D143}	R^{D93}	L_{C764}	R^{D175}	R^{D58}
L_{C189}	R^{D189}	R^{D189}	L_{C381}	R^{D17}	R^{D18}	L_{C573}	R^{D143}	R^{D116}	L_{C765}	R^{D175}	R^{D59}
L_{C190}	R^{D190}	R^{D190}	L_{C382}	R^{D17}	R^{D20}	L_{C574}	R^{D143}	R^{D117}	L_{C766}	R^{D175}	R^{D78}
L_{C191}	R^{D191}	R^{D191}	L_{C383}	R^{D17}	R^{D22}	L_{C575}	R^{D17}	R^{D118}	L_{C767}	R^{D175}	R^{D79}
L_{C192}	R^{D192}	R^{D192}	L_{C384}	R^{D17}	R^{D37}	L_{C576}	R^{D143}	R^{D119}	L_{C768}	R^{D175}	R^{D81}
L_{C769}	R^{D193}	R^{D193}	L_{C877}	R^D	R^{D193}	L_{C983}	R^D	R^{D193}	L_{C1093}	R^{D9}	R^{D193}
L_{C770}	R^{D194}	R^{D194}	L_{C878}	R^D	R^{D194}	L_{C986}	R^D	R^{D194}	L_{C1094}	R^{D9}	R^{D194}
L_{C771}	R^{D195}	R^{D195}	L_{C879}	R^D	R^{D195}	L_{C987}	R^D	R^{D195}	L_{C1095}	R^{D9}	R^{D195}
L_{C772}	R^{D196}	R^{D196}	L_{C880}	R^D	R^{D196}	L_{C988}	R^D	R^{D196}	L_{C1096}	R^{D9}	R^{D196}
L_{C773}	R^{D197}	R^{D197}	L_{C881}	R^D	R^{D197}	L_{C989}	R^D	R^{D197}	L_{C1097}	R^{D9}	R^{D197}
L_{C774}	R^{D198}	R^{D198}	L_{C882}	R^D	R^{D198}	L_{C990}	R^D	R^{D198}	L_{C1098}	R^{D9}	R^{D198}
L_{C775}	R^{D199}	R^{D199}	L_{C883}	R^D	R^{D199}	L_{C991}	R^D	R^{D199}	L_{C1099}	R^{D9}	R^{D199}
L_{C776}	R^{D200}	R^{D200}	L_{C884}	R^D	R^{D200}	L_{C992}	R^D	R^{D200}	L_{C1100}	R^{D9}	R^{D200}
L_{C777}	R^{D201}	R^{D201}	L_{C885}	R^D	R^{D201}	L_{C993}	R^D	R^{D201}	L_{C1101}	R^{D9}	R^{D201}
L_{C778}	R^{D202}	R^{D202}	L_{C886}	R^D	R^{D202}	L_{C994}	R^D	R^{D202}	L_{C1102}	R^{D9}	R^{D202}
L_{C779}	R^{D203}	R^{D203}	L_{C887}	R^D	R^{D203}	L_{C995}	R^D	R^{D203}	L_{C1103}	R^{D9}	R^{D203}
L_{C780}	R^{D204}	R^{D204}	L_{C888}	R^D	R^{D204}	L_{C996}	R^D	R^{D204}	L_{C1104}	R^{D9}	R^{D204}
L_{C781}	R^{D205}	R^{D205}	L_{C889}	R^D	R^{D205}	L_{C997}	R^D	R^{D205}	L_{C1105}	R^{D9}	R^{D205}
L_{C782}	R^{D206}	R^{D206}	L_{C890}	R^D	R^{D206}	L_{C998}	R^D	R^{D206}	L_{C1106}	R^{D9}	R^{D206}
L_{C783}	R^{D207}	R^{D207}	L_{C891}	R^D	R^{D207}	L_{C999}	R^D	R^{D207}	L_{C1107}	R^{D9}	R^{D207}
L_{C784}	R^{D208}	R^{D208}	L_{C892}	R^D	R^{D208}	L_{C1000}	R^D	R^{D208}	L_{C1108}	R^{D9}	R^{D208}
L_{C785}	R^{D209}	R^{D209}	L_{C893}	R^D	R^{D209}	L_{C1001}	R^D	R^{D209}	L_{C1109}	R^{D9}	R^{D209}
L_{C786}	R^{D210}	R^{D210}	L_{C894}	R^D	R^{D210}	L_{C1002}	R^D	R^{D210}	L_{C1110}	R^{D9}	R^{D210}
L_{C787}	R^{D211}	R^{D211}	L_{C895}	R^D	R^{D211}	L_{C1003}	R^D	R^{D211}	L_{C1111}	R^{D9}	R^{D211}
L_{C788}	R^{D212}	R^{D212}	L_{C896}	R^D	R^{D212}	L_{C1004}	R^D	R^{D212}	L_{C1112}	R^{D9}	R^{D212}
L_{C789}	R^{D213}	R^{D213}	L_{C897}	R^D	R^{D213}	L_{C1005}	R^D	R^{D213}	L_{C1113}	R^{D9}	R^{D213}
L_{C790}	R^{D214}	R^{D214}	L_{C898}	R^D	R^{D214}	L_{C1006}	R^D	R^{D214}	L_{C1114}	R^{D9}	R^{D214}
L_{C791}	R^{D215}	R^{D215}	L_{C899}	R^D	R^{D215}	L_{C1007}	R^D	R^{D215}	L_{C1115}	R^{D9}	R^{D215}
L_{C792}	R^{D216}	R^{D216}	L_{C900}	R^D	R^{D216}	L_{C1008}	R^D	R^{D216}	L_{C1116}	R^{D9}	R^{D216}
L_{C793}	R^{D217}	R^{D217}	L_{C901}	R^D	R^{D217}	L_{C1009}	R^D	R^{D217}	L_{C1117}	R^{D9}	R^{D217}
L_{C794}	R^{D218}	R^{D218}	L_{C902}	R^D	R^{D218}	L_{C1010}	R^D	R^{D218}	L_{C1118} </td		

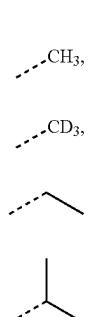
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L_{Cj}	R^{D1}	R^{D2}	L_{Cj}	R^{D1}	R^{D2}	L_{Cj}	R^{D1}	R^{D2}	L_{Cj}	R^{D1}	R^{D2}
L_{C1203}	R^{D10}	R^{D195}	L_{C1257}	R^{D55}	R^{D195}	L_{C1311}	R^{D37}	R^{D195}	L_{C1365}	R^{D143}	R^{D195}
L_{C1204}	R^{D10}	R^{D196}	L_{C1258}	R^{D55}	R^{D196}	L_{C1312}	R^{D37}	R^{D196}	L_{C1366}	R^{D143}	R^{D196}
L_{C1205}	R^{D10}	R^{D197}	L_{C1259}	R^{D55}	R^{D197}	L_{C1313}	R^{D37}	R^{D197}	L_{C1367}	R^{D143}	R^{D197}
L_{C1206}	R^{D10}	R^{D198}	L_{C1260}	R^{D55}	R^{D198}	L_{C1314}	R^{D37}	R^{D198}	L_{C1368}	R^{D143}	R^{D198}
L_{C1207}	R^{D10}	R^{D199}	L_{C1261}	R^{D55}	R^{D199}	L_{C1315}	R^{D37}	R^{D199}	L_{C1369}	R^{D143}	R^{D199}
L_{C1208}	R^{D10}	R^{D200}	L_{C1262}	R^{D55}	R^{D200}	L_{C1316}	R^{D37}	R^{D200}	L_{C1370}	R^{D143}	R^{D200}
L_{C1209}	R^{D10}	R^{D201}	L_{C1263}	R^{D55}	R^{D201}	L_{C1317}	R^{D37}	R^{D201}	L_{C1371}	R^{D143}	R^{D201}
L_{C1210}	R^{D10}	R^{D202}	L_{C1264}	R^{D55}	R^{D202}	L_{C1318}	R^{D37}	R^{D202}	L_{C1372}	R^{D143}	R^{D202}
L_{C1211}	R^{D10}	R^{D203}	L_{C1265}	R^{D55}	R^{D203}	L_{C1319}	R^{D37}	R^{D203}	L_{C1373}	R^{D143}	R^{D203}
L_{C1212}	R^{D10}	R^{D204}	L_{C1266}	R^{D55}	R^{D204}	L_{C1320}	R^{D37}	R^{D204}	L_{C1374}	R^{D143}	R^{D204}
L_{C1213}	R^{D10}	R^{D205}	L_{C1267}	R^{D55}	R^{D205}	L_{C1321}	R^{D37}	R^{D205}	L_{C1375}	R^{D143}	R^{D205}
L_{C1214}	R^{D10}	R^{D206}	L_{C1268}	R^{D55}	R^{D206}	L_{C1322}	R^{D37}	R^{D206}	L_{C1376}	R^{D143}	R^{D206}
L_{C1215}	R^{D10}	R^{D207}	L_{C1269}	R^{D55}	R^{D207}	L_{C1323}	R^{D37}	R^{D207}	L_{C1377}	R^{D143}	R^{D207}
L_{C1216}	R^{D10}	R^{D208}	L_{C1270}	R^{D55}	R^{D208}	L_{C1324}	R^{D37}	R^{D208}	L_{C1378}	R^{D143}	R^{D208}
L_{C1217}	R^{D10}	R^{D209}	L_{C1271}	R^{D55}	R^{D209}	L_{C1325}	R^{D37}	R^{D209}	L_{C1379}	R^{D143}	R^{D209}
L_{C1218}	R^{D10}	R^{D210}	L_{C1272}	R^{D55}	R^{D210}	L_{C1326}	R^{D37}	R^{D210}	L_{C1380}	R^{D143}	R^{D210}
L_{C1219}	R^{D10}	R^{D211}	L_{C1273}	R^{D55}	R^{D211}	L_{C1327}	R^{D37}	R^{D211}	L_{C1381}	R^{D143}	R^{D211}
L_{C1220}	R^{D10}	R^{D212}	L_{C1274}	R^{D55}	R^{D212}	L_{C1328}	R^{D37}	R^{D212}	L_{C1382}	R^{D143}	R^{D212}
L_{C1221}	R^{D10}	R^{D213}	L_{C1275}	R^{D55}	R^{D213}	L_{C1329}	R^{D37}	R^{D213}	L_{C1383}	R^{D143}	R^{D213}
L_{C1222}	R^{D10}	R^{D214}	L_{C1276}	R^{D55}	R^{D214}	L_{C1330}	R^{D37}	R^{D214}	L_{C1384}	R^{D143}	R^{D214}
L_{C1223}	R^{D10}	R^{D215}	L_{C1277}	R^{D55}	R^{D215}	L_{C1331}	R^{D37}	R^{D215}	L_{C1385}	R^{D143}	R^{D215}
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L_{C1225}	R^{D10}	R^{D217}	L_{C1279}	R^{D55}	R^{D217}	L_{C1333}	R^{D37}	R^{D217}	L_{C1387}	R^{D143}	R^{D217}
L_{C1226}	R^{D10}	R^{D218}	L_{C1280}	R^{D55}	R^{D218}	L_{C1334}	R^{D37}	R^{D218}	L_{C1388}	R^{D143}	R^{D218}
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L_{C1229}	R^{D10}	R^{D221}	L_{C1283}	R^{D55}	R^{D221}	L_{C1337}	R^{D37}	R^{D221}	L_{C1391}	R^{D143}	R^{D221}
L_{C1230}	R^{D10}	R^{D222}	L_{C1284}	R^{D55}	R^{D222}	L_{C1338}	R^{D37}	R^{D222}	L_{C1392}	R^{D143}	R^{D222}
L_{C1231}	R^{D10}	R^{D223}	L_{C1285}	R^{D55}	R^{D223}	L_{C1339}	R^{D37}	R^{D223}	L_{C1393}	R^{D143}	R^{D223}
L_{C1232}	R^{D10}	R^{D224}	L_{C1286}	R^{D55}	R^{D224}	L_{C1340}	R^{D37}	R^{D224}	L_{C1394}	R^{D143}	R^{D224}
L_{C1233}	R^{D10}	R^{D225}	L_{C1287}	R^{D55}	R^{D225}	L_{C1341}	R^{D37}	R^{D225}	L_{C1395}	R^{D143}	R^{D225}
L_{C1234}	R^{D10}	R^{D226}	L_{C1288}	R^{D55}	R^{D226}	L_{C1342}	R^{D37}	R^{D226}	L_{C1396}	R^{D143}	R^{D226}
L_{C1235}	R^{D10}	R^{D227}	L_{C1289}	R^{D55}	R^{D227}	L_{C1343}	R^{D37}	R^{D227}	L_{C1397}	R^{D143}	R^{D227}
L_{C1236}	R^{D10}	R^{D228}	L_{C1290}	R^{D55}	R^{D228}	L_{C1344}	R^{D37}	R^{D228}	L_{C1398}	R^{D143}	R^{D228}
L_{C1237}	R^{D10}	R^{D229}	L_{C1291}	R^{D55}	R^{D229}	L_{C1345}	R^{D37}	R^{D229}	L_{C1399}	R^{D143}	R^{D229}
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L_{C1239}	R^{D10}	R^{D231}	L_{C1293}	R^{D55}	R^{D231}	L_{C1347}	R^{D37}	R^{D231}	L_{C1401}	R^{D143}	R^{D231}
L_{C1240}	R^{D10}	R^{D232}	L_{C1294}	R^{D55}	R^{D232}	L_{C1348}	R^{D37}	R^{D232}	L_{C1402}	R^{D143}	R^{D232}
L_{C1241}	R^{D10}	R^{D233}	L_{C1295}	R^{D55}	R^{D233}	L_{C1349}	R^{D37}	R^{D233}	L_{C1403}	R^{D143}	R^{D233}
L_{C1242}	R^{D10}	R^{D234}	L_{C1296}	R^{D55}	R^{D234}	L_{C1350}	R^{D37}	R^{D234}	L_{C1404}	R^{D143}	R^{D234}
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L_{C1244}	R^{D10}	R^{D236}	L_{C1298}	R^{D55}	R^{D236}	L_{C1352}	R^{D37}	R^{D236}	L_{C1406}	R^{D143}	R^{D236}
L_{C1245}	R^{D10}	R^{D237}	L_{C1299}	R^{D55}	R^{D237}	L_{C1353}	R^{D37}	R^{D237}	L_{C1407}	R^{D143}	R^{D237}
L_{C1246}	R^{D10}	R^{D238}	L_{C1300}	R^{D55}	R^{D238}	L_{C1354}	R^{D37}	R^{D238}	L_{C1408}	R^{D143}	R^{D238}
L_{C1247}	R^{D10}	R^{D239}	L_{C1301}	R^{D55}	R^{D239}	L_{C1355}	R^{D37}	R^{D239}	L_{C1409}	R^{D143}	R^{D239}
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L_{C1251}	R^{D10}	R^{D243}	L_{C1305}	R^{D55}	R^{D243}	L_{C1359}	R^{D37}	R^{D243}	L_{C1413}	R^{D143}	R^{D243}
L_{C1252}	R^{D10}	R^{D244}	L_{C1306}	R^{D55}	R^{D244}	L_{C1360}	R^{D37}	R^{D244}	L_{C1414}	R^{D143}	R^{D244}
L_{C1253}	R^{D10}	R^{D245}	L_{C1307}	R^{D55}	R^{D245}	L_{C1361}	R^{D37}	R^{D245}	L_{C1415}	R^{D143}	R^{D245}
L_{C1254}	R^{D10}	R^{D246}	L_{C1308}	R^{D55}	R^{D246}	L_{C1362}	R^{D37}	R^{D246}	L_{C1416}	R^{D143}	R^{D246}

wherein R^{D1} to R^{D246} have the structures defined in the

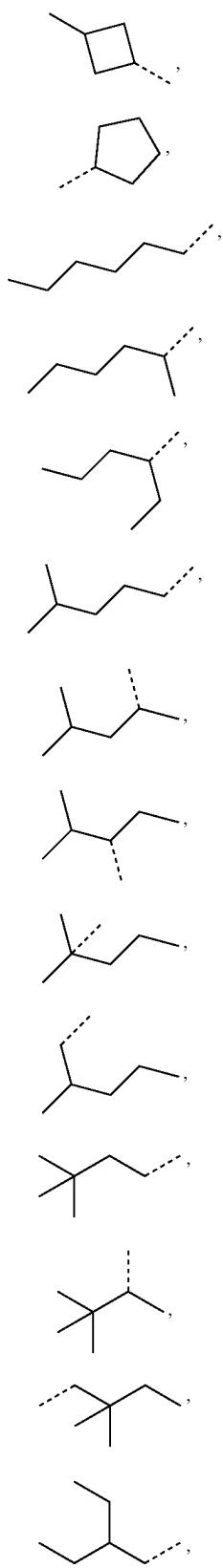
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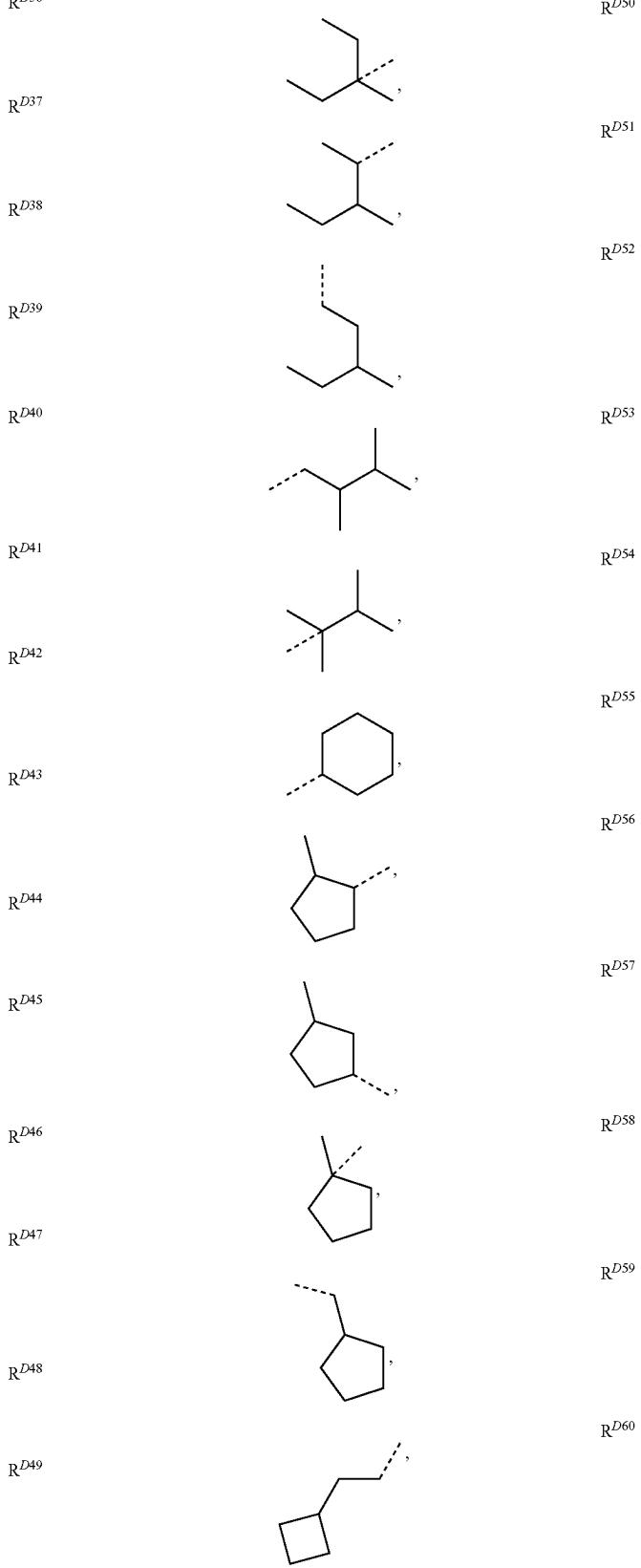
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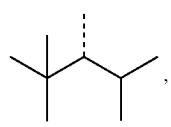
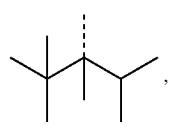
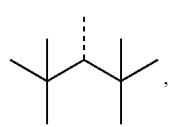
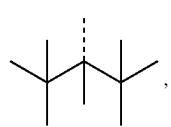
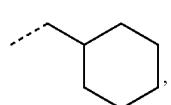
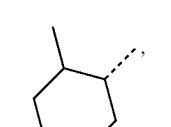
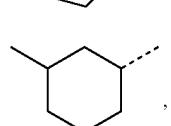
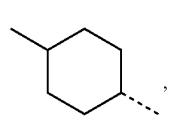
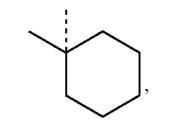
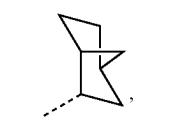
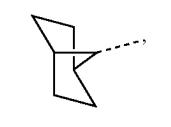
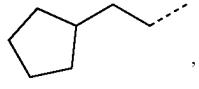
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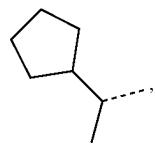
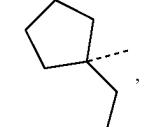
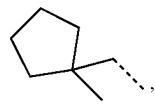
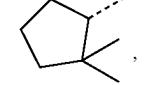
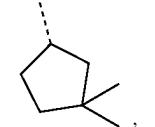
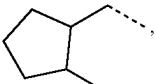
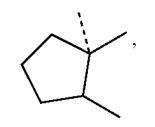
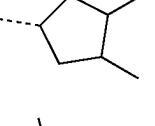
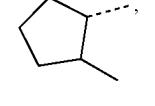
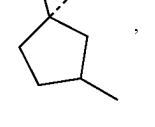
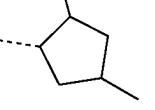
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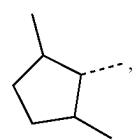
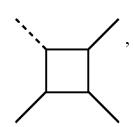
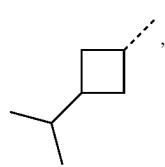
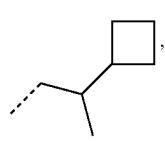
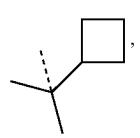
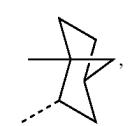
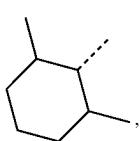
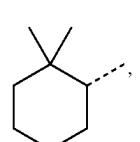
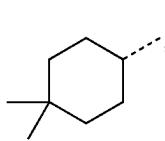
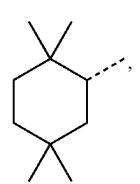
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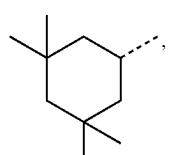
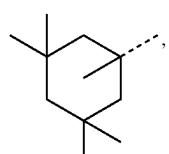
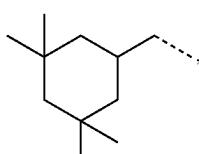
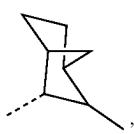
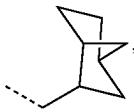
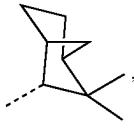
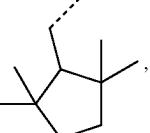
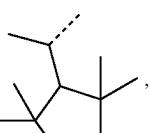
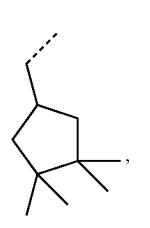
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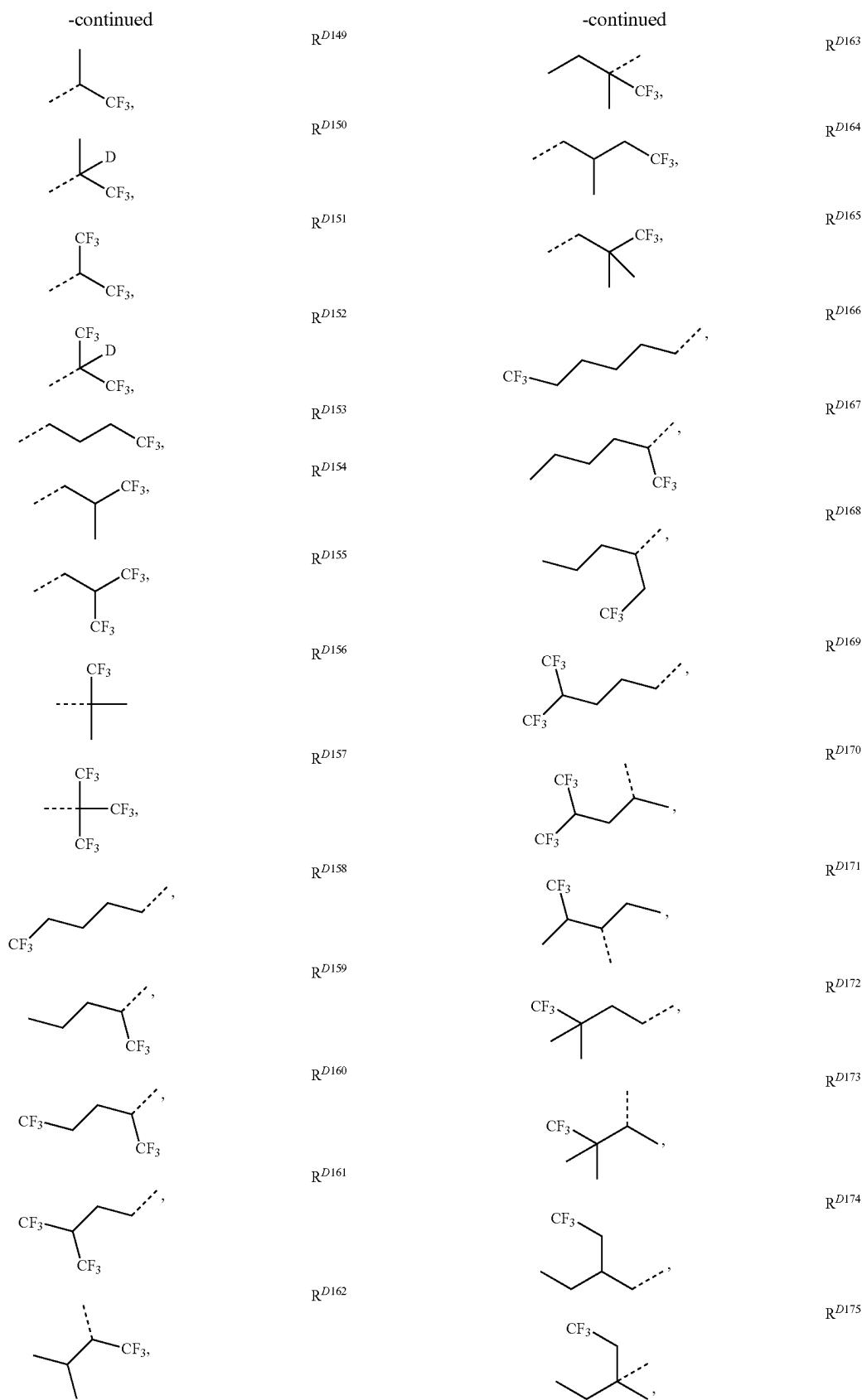
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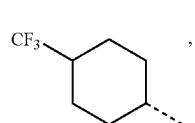
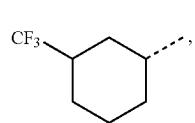
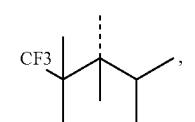
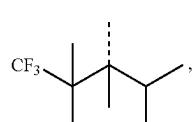
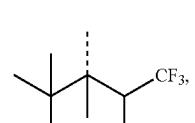
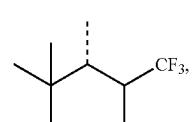
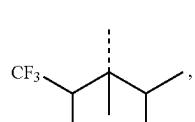
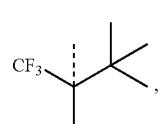
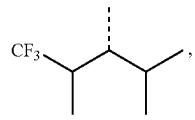
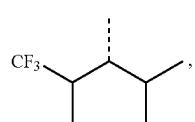
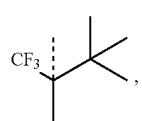
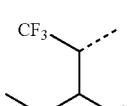
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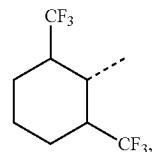
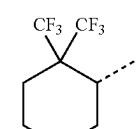
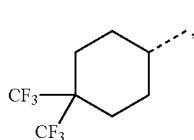
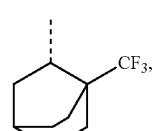
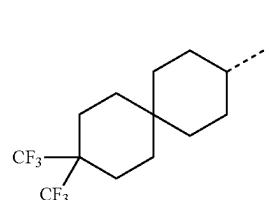
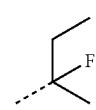
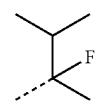
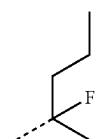
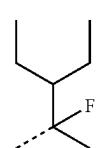
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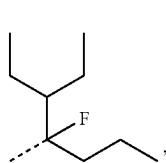
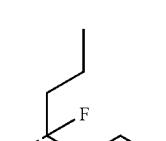
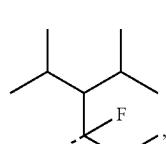
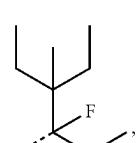
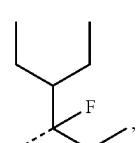
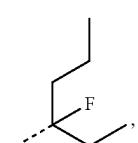
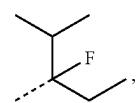
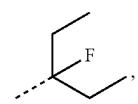
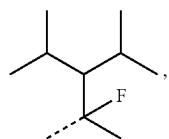
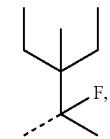
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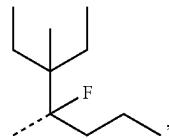
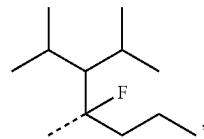
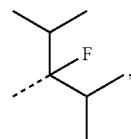
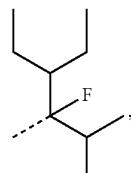
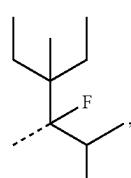
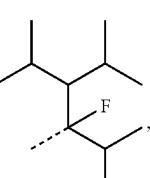
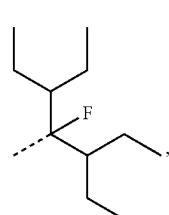
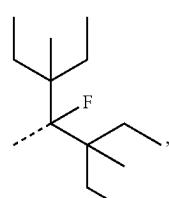
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R^{D176}R^{D177}R^{D178}R^{D179}R^{D180}R^{D181}R^{D193}R^{D194}R^{D195}R^{D196}R^{D197}R^{D186}R^{D187}

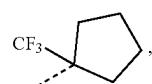
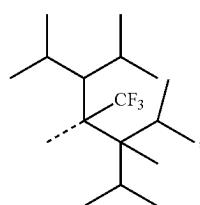
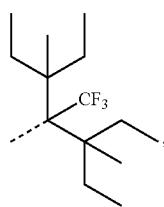
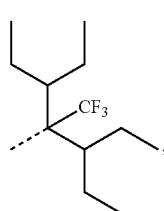
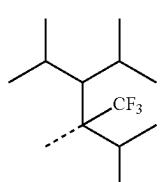
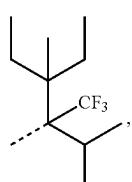
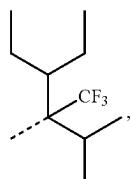
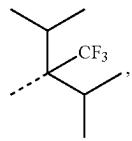
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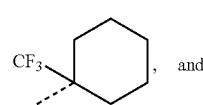
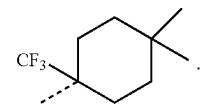
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 R^{D208}  R^{D209}  R^{D210}  R^{D211}  R^{D212}  R^{D213}  R^{D214}  R^{D215} 

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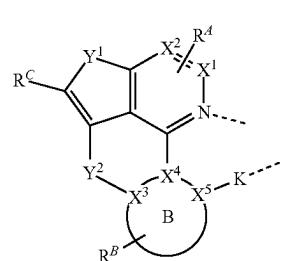


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 R^{D237}  R^{D238}  R^{D245} R^{D246}

What is claimed is:

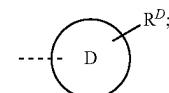
1. A compound having a first ligand L_A comprising a structure of Formula I:



wherein:

at least one of the following statements is true:

- (1) R^C comprises at least one silyl or germyl group;
- (2) R^C is Formula II:

 R^{D241} 

each of moiety B and moiety D is independently a monocyclic ring or a polycyclic fused ring system, wherein the monocyclic ring or each ring of the polycyclic fused ring system is independently a 5-membered to 10-membered carbocyclic or heterocyclic ring;

each of X^1 to X^5 is independently C or N; Y^1 and Y^2 are each independently selected from the group consisting of BR , BRR' , NR , PR , $P(O)R$, O , S , Se , $C=O$, $C=S$, $C=Se$, $C=NR'$, $C=CRR'$, $S=O$, SO_2 , CR , CRR' , $SiRR'$, and $GeRR'$; K is selected from the group consisting of a direct bond, O , S , $N(R^\alpha)$, $P(R^\alpha)$, $B(R^\alpha)$, $C(R^\alpha)$ (R^B), and $Si(R^\alpha)(R^B)$;each of R^A , R^B , and R^D each independently represents mono to the maximum allowable substitution, or no substitution;each R , R' , R^α , RP , R^A , R^B , and R^D is independently hydrogen or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, boryl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, and combinations thereof;

R^C is a substituent selected from the group consisting of alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, boryl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, alk-enyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, partially or fully deuterated variants thereof, partially or fully halogenated variants thereof, and combinations thereof;

L_A is coordinated to a metal M through the indicated dashed lines;

M has an atomic mass of at least 40;

M can be coordinated to other ligands;

L_A can be joined with other ligands to comprise a tridentate, tetradeятate, pentadentate, or hexadentate ligand; any two substituents may be joined or fused to form a ring;

with the proviso that Y^2 and R^B are not joined to form a ring; and

with the proviso that if moiety D is phenyl, then at least one R^D comprises one chemical group selected from the group consisting of: deuterium, halogen, alkyl having five or more carbon atoms, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germynyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, boryl, selenyl, and combinations thereof.

2. The compound of claim 1, wherein each of R, R', R^a, RP, R⁴, R^B, and R^D is independently hydrogen or a substituent selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, and combinations thereof; and

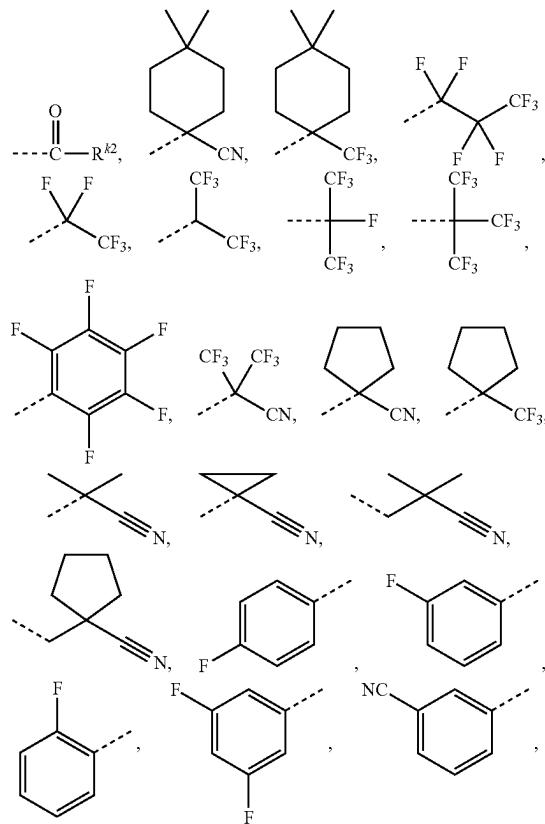
R^C is a substituent selected from the group consisting of alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, partially or fully deuterated variants thereof, partially or fully fluorinated variants thereof, and combinations thereof.

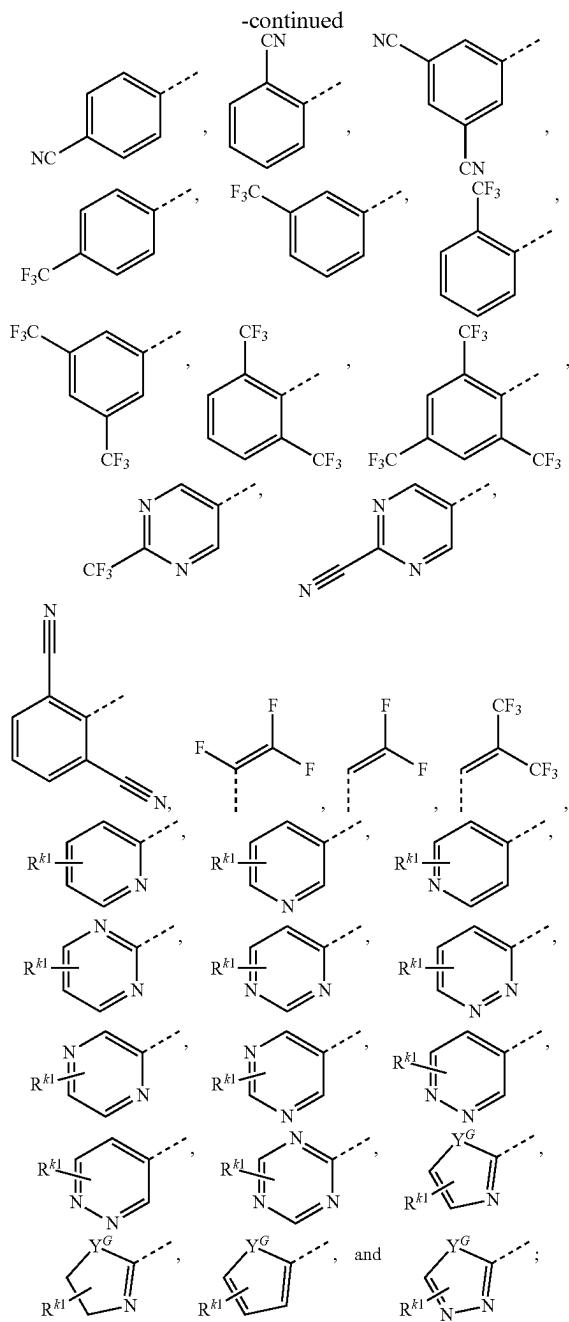
3. The compound of claim 1, wherein moiety B is selected from the group consisting of the following Cyclic Moiety List: benzene, pyridine, pyrimidine, pyridazine, pyrazine, triazine, imidazole, pyrazole, pyrrole, oxazole, furan, thiophene, thiazole, triazole, naphthalene, quinoline, isoquinoline, quinazoline, quinoxaline, benzofuran, aza-benzofuran, phenanthro[3,2-b]benzofuran, benzoxazole, aza-benzoxazole, benzothiophene, aza-benzothiophene, benzothiazole, aza-benzothiazole, benzoselenophene, aza-benzoselenophene, indene, aza-indene, indole, aza-indole, benzimidazole, aza-benzimidazole, benzobenzimidazole, aza-benzobenzimidazole, carbazole, aza-carbazole, dibenzofuran, aza-dibenzofuran, dibenzothiophene, aza-dibenzothiophene, phthalazine, phenanthrene, aza-phenanthrene, anthracene, aza-anthracene, phenanthridine, fluorene, and aza-fluorene; and/or wherein two R^A are joined or fused to form a Moiety A1; and/or wherein two R^B are joined or fused to form a ring; and/or wherein two R^D are joined or fused to form a ring.

4. The compound of claim 1, wherein X^1 and X^2 are both C or wherein one of X^1 and X^2 is C and the other of X^1 and X^2 is N; and/or wherein each of X^3 to X^5 is C or wherein at

least one of X³ to X⁵ is N; and/or wherein Y¹ is selected from the group consisting of O, S, NR, CRR', SiRR', and Se; and/or wherein Y² is selected from the group consisting of O, S, NR, CRR', SiRR', C=O, and Se; and/or wherein K is selected from the group consisting of a direct bond, O, and S.

5. The compound of claim 1, wherein at least one R^4 comprises a substituent selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof; and/or wherein at least one R^4 comprises an electron-withdrawing group selected from the group consisting of the structures in the following EWG1 LIST: F, CF_3 , CN, $COCH_3$, CHO, $COCF_3$, COOME, $COOCF_3$, NO_2 , SF_3 , SiF_3 , PF_4 , SF_5 , OCF_3 , SCF_3 , $SeCF_3$, $SOCF_3$, $SeOCF_3$, SO_2F , SO_2CF_3 , SeO_2CF_3 , $OSeO_2CF_3$, OCN, SCN, SeCN, NC, $^+N(R^{k2})_3$, $(R^{k2})_2CCN$, $(R^{k2})_2CCF_3$, CNC($CF_3)_2$, $BR^{k3}R^{k2}$, substituted or unsubstituted dibenzoborole, 1-substituted carbazole, 1,9-substituted carbazole, substituted or unsubstituted carbazole, substituted or unsubstituted pyridine, substituted or unsubstituted pyrimidine, substituted or unsubstituted pyrazine, substituted or unsubstituted pyridoxine, substituted or unsubstituted triazine, substituted or unsubstituted oxazole, substituted or unsubstituted benzoxazole, substituted or unsubstituted thiazole, substituted or unsubstituted benzothiazole, substituted or unsubstituted imidazole, substituted or unsubstituted benzimidazole, ketone, carboxylic acid, ester, nitrile, isonitrile, sulfinyl, sulfonyl, partially and fully fluorinated alkyl, partially and fully fluorinated aryl, partially and fully fluorinated heteroaryl, cyano-containing alkyl, cyano-containing aryl, cyano-containing heteroaryl, isocyanate,





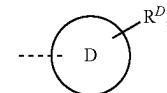
wherein at least one R^B comprises a substituent selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof; and/or
 wherein at least one R^B comprises an electron-withdrawing group selected from the group consisting of the structures of the EWG1 LIST; and/or
 wherein at least one R^D comprises a substituent selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof; and/or
 wherein at least one R^D comprises an electron-withdrawing group selected from the group consisting of the structures of the EWG1 LIST; and/or

wherein the metal M is selected from the group consisting of Ir, Rh, Re, Ru, Os, Pt, Pd, Ag, Au, and Cu;

wherein in the structures in the EWG1 LIST, each R^{k1} represents mono to the maximum allowable substitution, or no substitutions; Y^G is selected from the group consisting of BR_e , NR_e , PR_e , O, S, Se, $C=O$, $S=O$, SO_2 , CR_eR_f , SiR_eR_f and GeR_eR_f ; and each of R^{k1} , R^{k2} , R^{k3} , R_e , and R_f is independently a hydrogen, or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germinal, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, selenyl, sulfinyl, sulfonyl, phosphino, and combinations thereof.

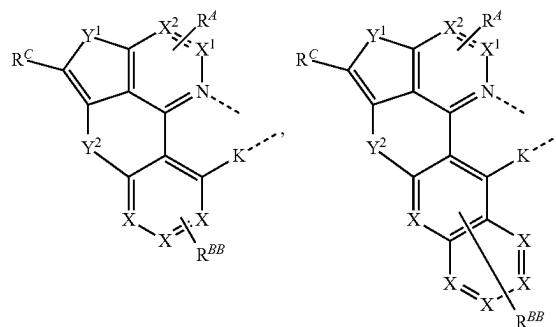
6. The compound of claim 1, wherein R^C comprises at least one silyl or germinal group; and/or wherein R^C is or comprises $-L-Q(R^{1A})(R^{1B})(R^{1C})$, wherein L is an organic linker or a direct bond, Q is Si or Ge, and wherein RIA , R^{1B} , and R^{1C} are each independently hydrogen or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germinal, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, selenyl, sulfinyl, sulfonyl, phosphino, and combinations thereof.

7. The compound of claim 1, wherein R^C has the structure of Formula II:

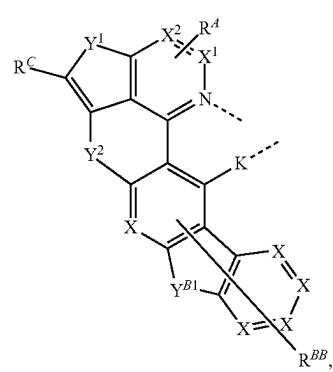
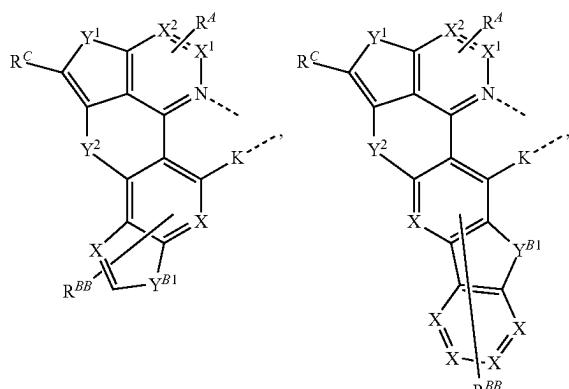
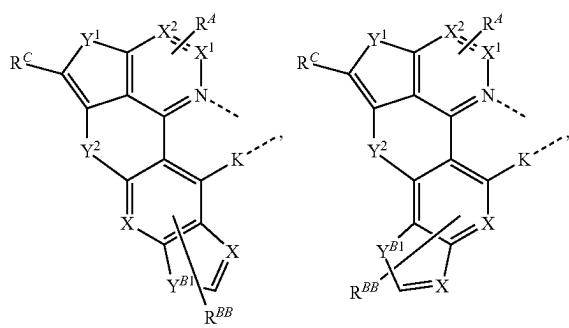
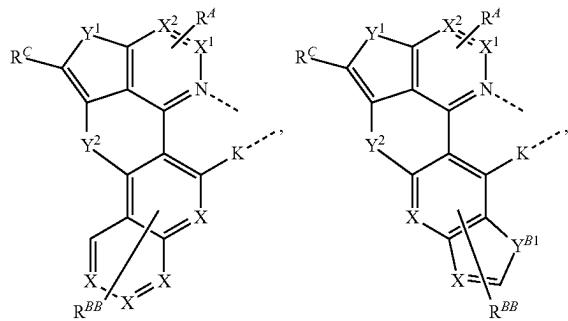


and/or wherein moiety D is selected from the group consisting of Cyclic Moiety List defined herein; and/or wherein two R^D are joined to form a ring, where the portion formed by the two R^D is saturated.

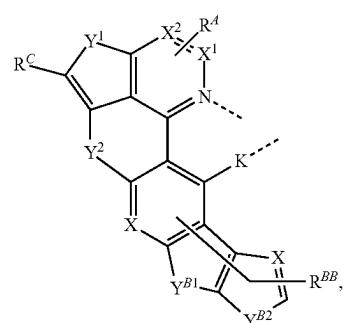
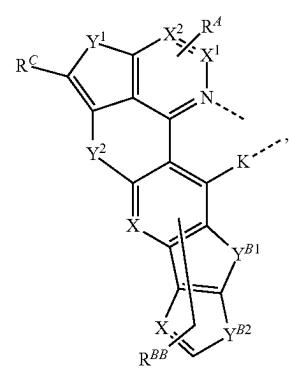
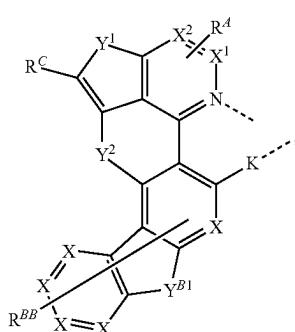
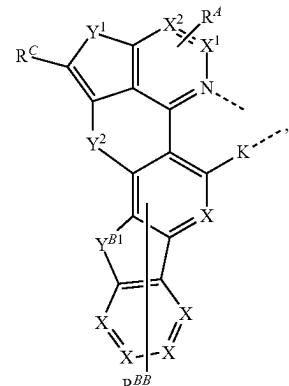
8. The compound of claim 1, wherein the ligand L_A is selected from the group consisting of:



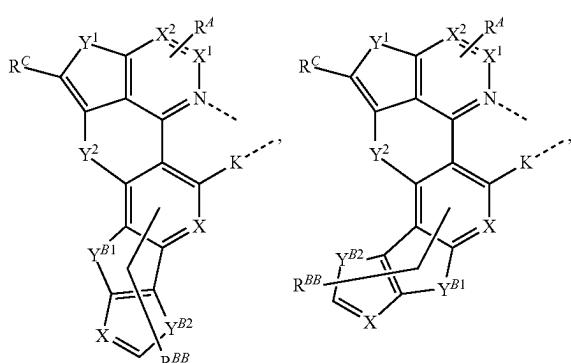
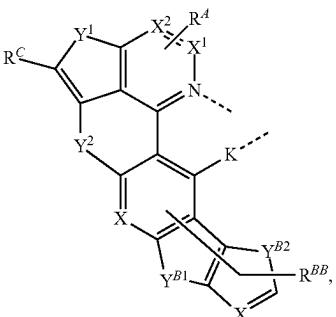
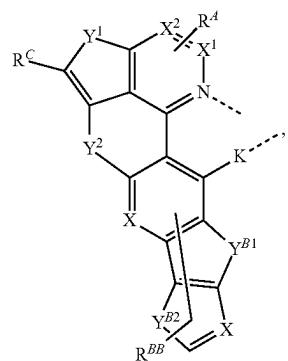
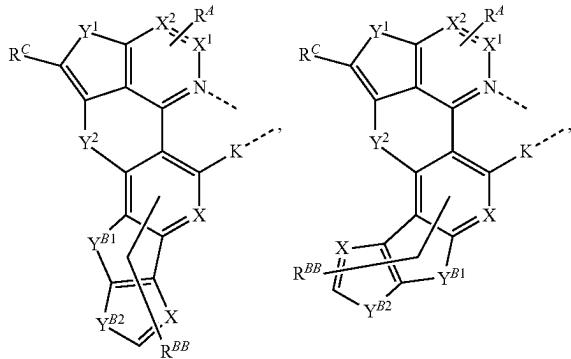
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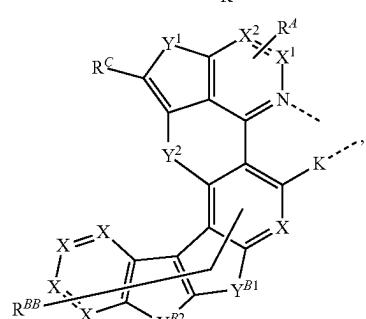
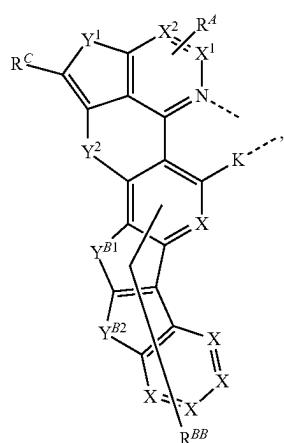
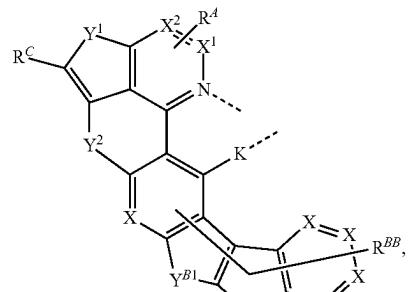
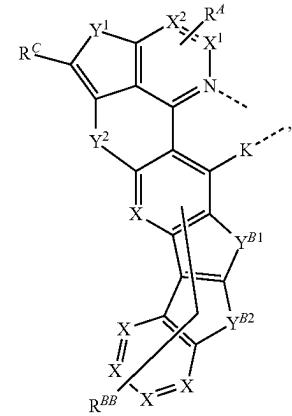
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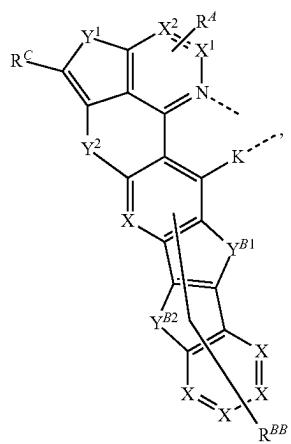
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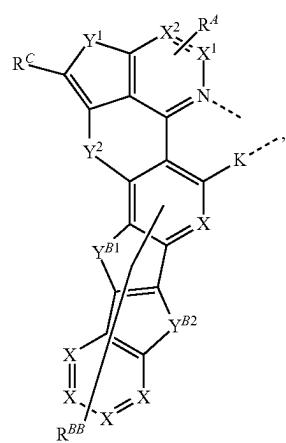
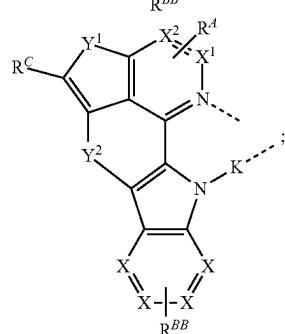
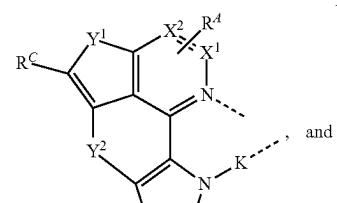
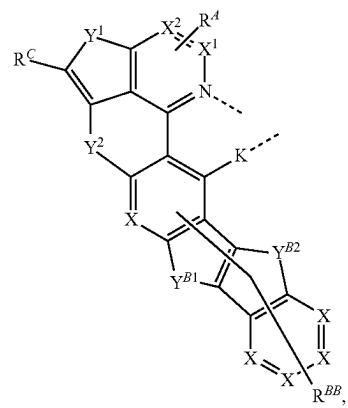
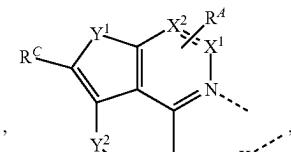
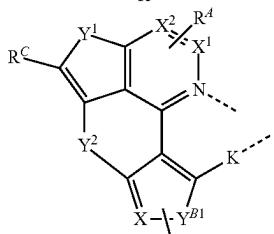
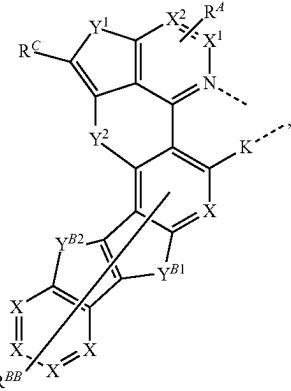
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wherein X for each occurrence is independently C or N;
 Y^{B1} and Y^{B2} are each independently selected from the group consisting of a direct bond, BR, BRR', NR, PR,

P(O)R, O, S, Se, C=O, C=S, C=Se, C=NR, C=CRR', S=O, SO₂, CR, CRR', SiRR', and GeRR';

R^{BB} represents mono to the maximum allowable substitution, or no substitution;

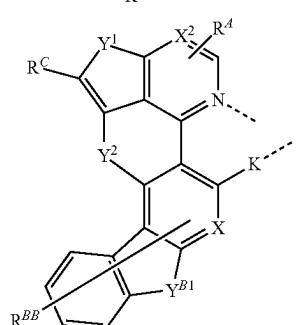
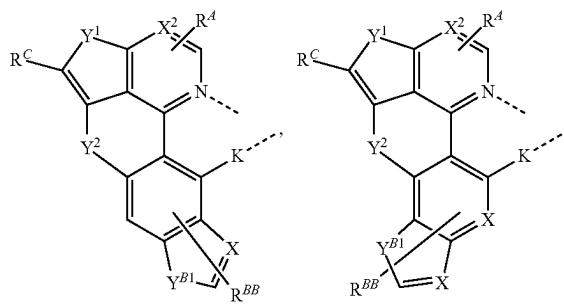
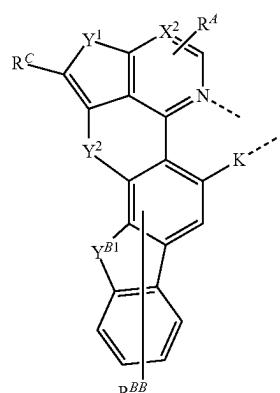
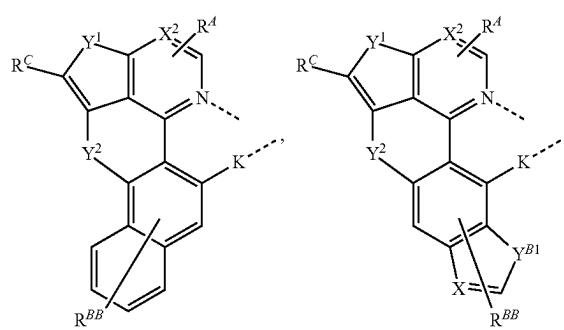
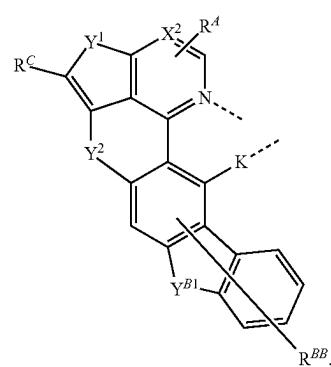
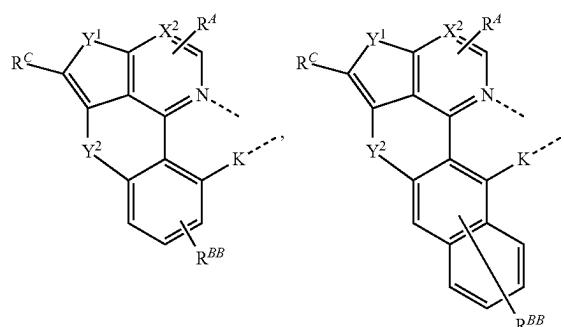
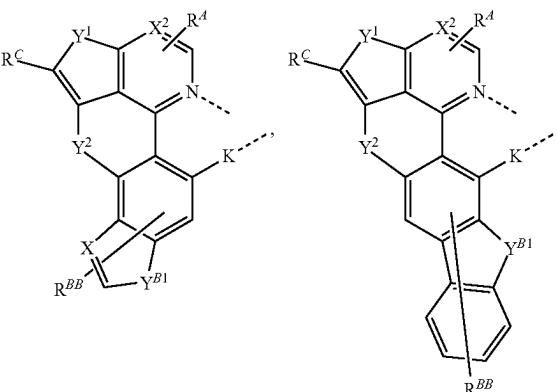
each R^{BB} is independently hydrogen, or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, and combinations thereof;

the remaining variables are the same as previously defined; and

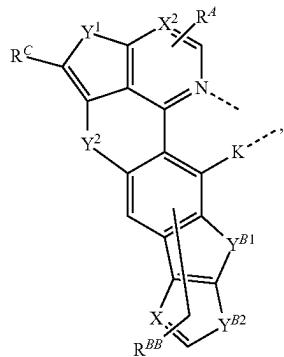
any two substituents can be joined or fused to form a ring.

9. The compound of claim 1, wherein the ligand L_A is selected from the group consisting of:

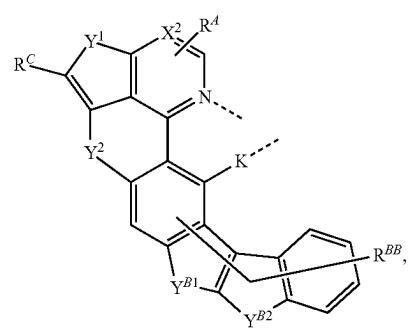
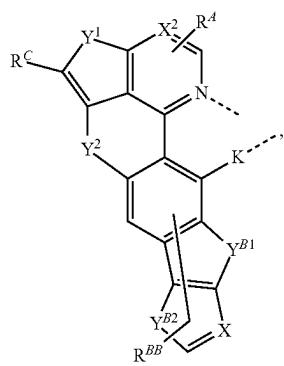
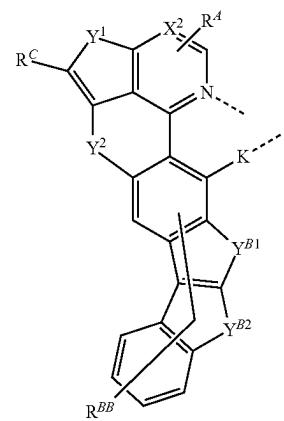
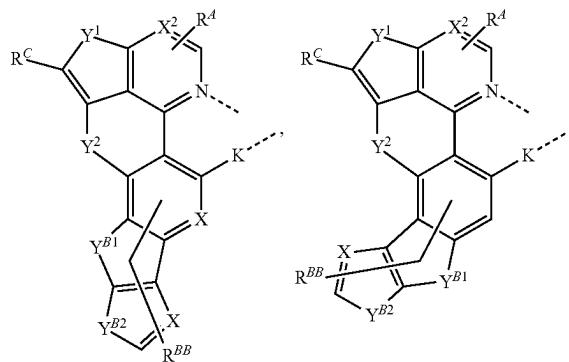
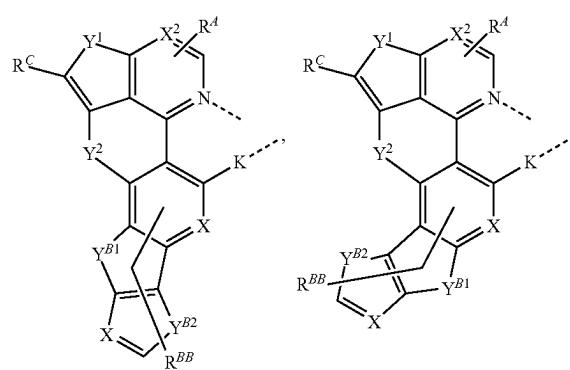
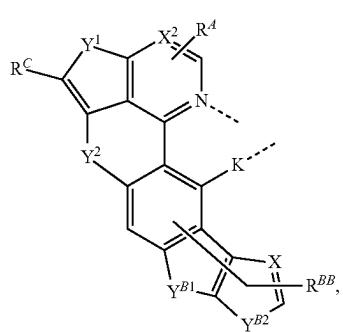
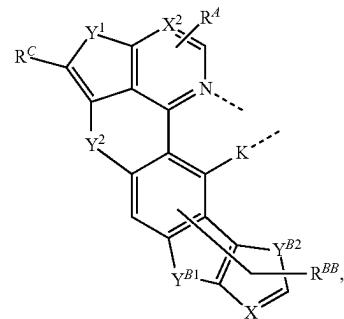
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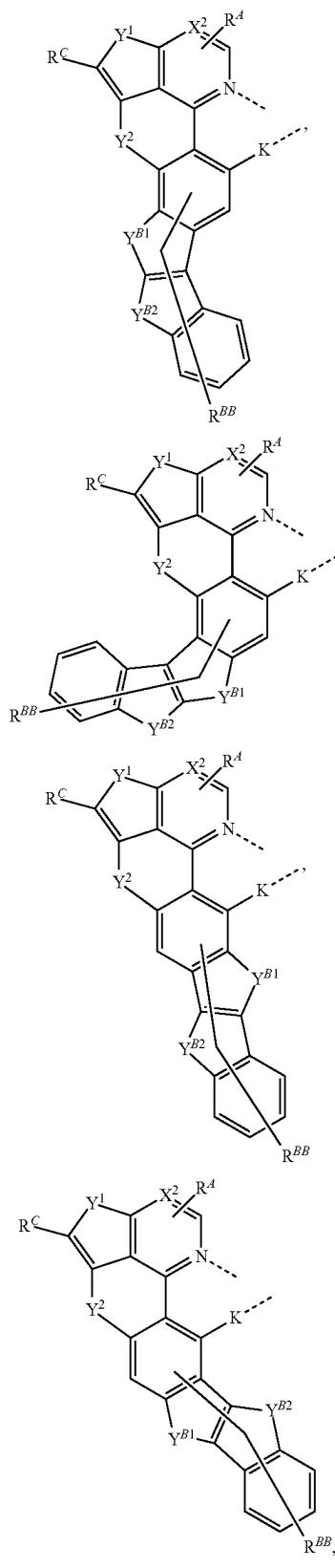
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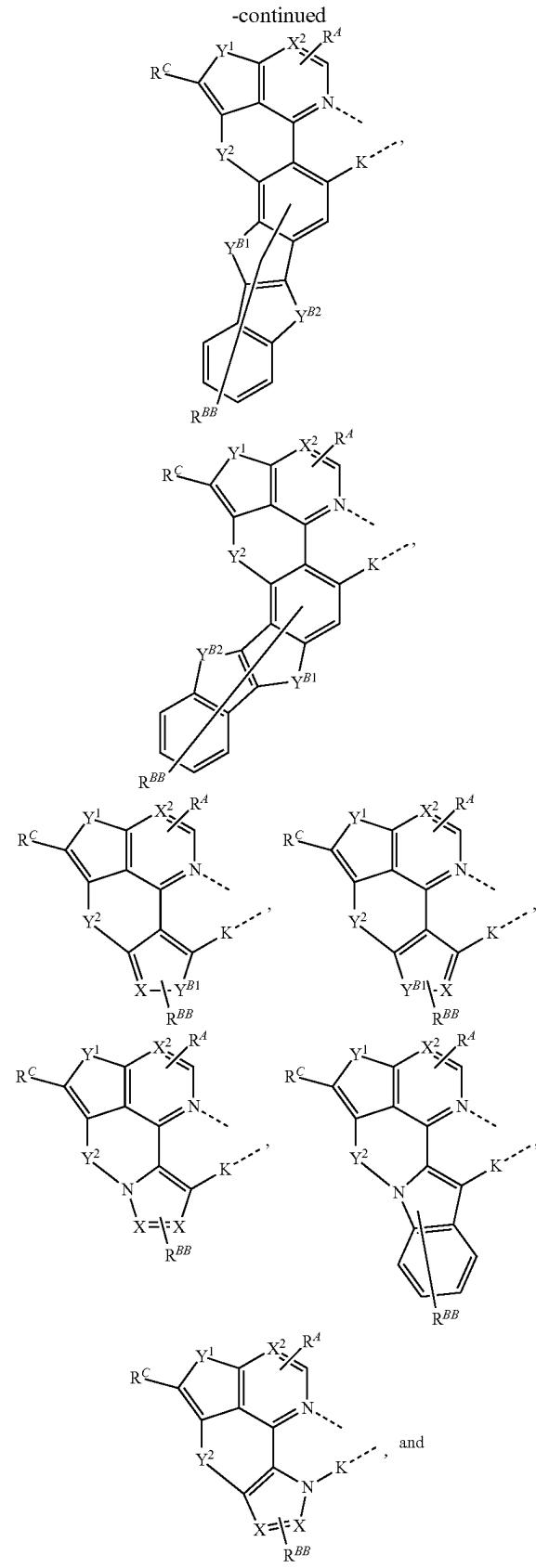
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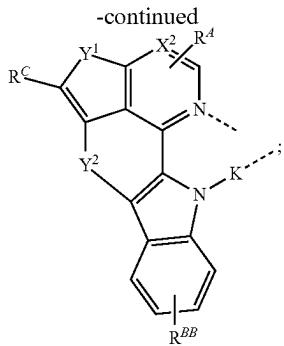


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wherein X for each occurrence is independently C or N; Y^{B1} and Y^{B2} are each independently selected from the group consisting of a direct bond, BR, BRR', NR, PR, P(O)R, O, S, Se, C=O, C=S, C=Se, C=NR, C=CRR', S=O, SO₂, CR, CRR', SiRR', and GeRR';

R^{BB} represents mono to the maximum allowable substitution, or no substitution; each R^{BB} is independently hydrogen, or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, selenyl, and combinations thereof;

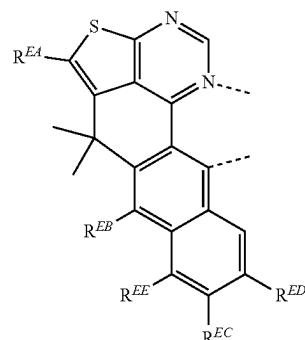
the remaining variables are the same as previously defined; and

any two substituents can be joined or fused to form a ring.

10. The compound of claim 1, wherein the ligand L_A is selected from L_{A1}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE}); wherein i is an integer from 1 to 152, each of R^{EB}, R^{EC}, R^{ED}, and R^{EE} is independently selected from the group consisting of R₁ to R₂₉₅; R^{EA} is selected from the group consisting of R₆₆ to R₂₉₅, wherein each of L_{A1}(R₆₆)(R₁)(R₁)(R₁)(R₁) to L_{A152}(R₂₉₅)(R₂₉₅)(R₂₉₅)(R₂₉₅)(R₂₉₅) is defined as follows:

L _A	Structure of L _A
L _{A1} (R ^{EA})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L _{A1} (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L _{A1} (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) have the structure	

L_{A2}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE}),
wherein L_{A2}(R₆₆)(R₁)(R₁)(R₁)(R₁)
to L_{A2}(R₂₉₅)(R₂₉₅)(R₂₉₅)(R₂₉₅)(R₂₉₅)
have the structure



-continued

L_A	Structure of L_A
$L_{A3}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A3}(R_{66})(R_1)(R_1)(R_1)$ to $L_{A3}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A4}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A4}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A4}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A5}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A5}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A5}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A6}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A6}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A6}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

L_A	Structure of L_A
$L_{A7}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A7}(R_{66})(R_1)(R_1)(R_1)$ to $L_{A7}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A8}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A8}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A8}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A9}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A9}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A9}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A10}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A10}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A10}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

L_A	Structure of L_A
$L_{A11}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A11}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A11}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A12}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A12}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A12}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A13}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A13}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A13}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A14}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A14}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A14}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

L_A	Structure of L_A
$L_{A15}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A15}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A15}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A16}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A16}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A16}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A17}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A17}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A17}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A18}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A18}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A18}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

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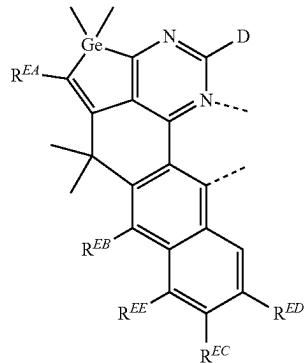
L_A	Structure of L_A
$L_{A19}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A19}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A19}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A20}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A20}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A20}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A21}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A21}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A21}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A22}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A22}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A22}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

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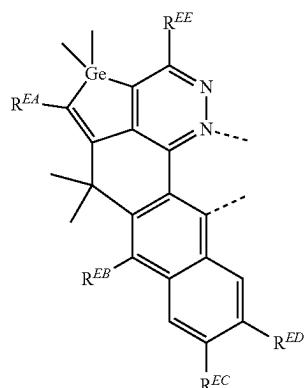
L_A

Structure of L_A

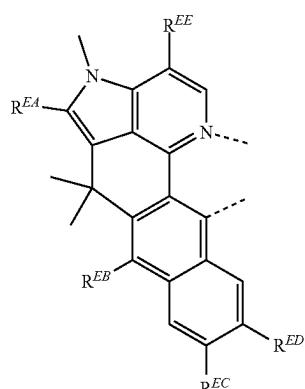
$L_{A23}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A23}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A23}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



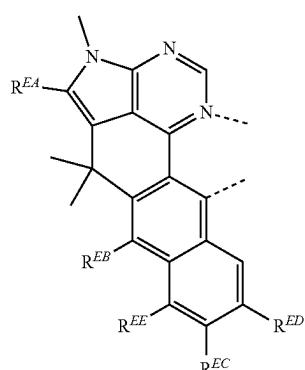
$L_{A24}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A24}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A24}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A25}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A25}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A25}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



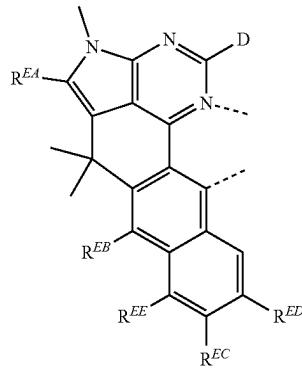
$L_{A26}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A26}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A26}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



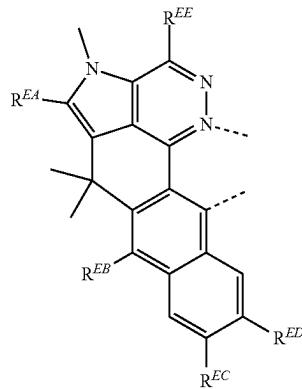
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 L_A Structure of L_A

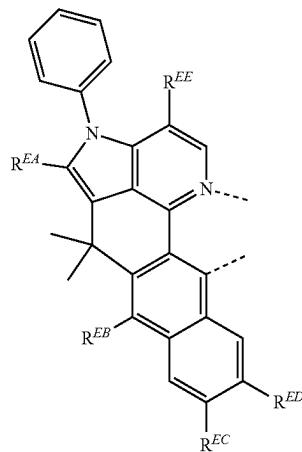
$L_{A27}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A27}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A27}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A28}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A28}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A28}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



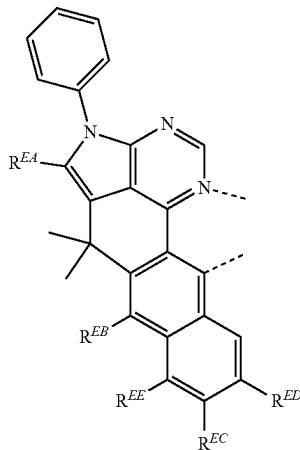
$L_{A29}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A29}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A29}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



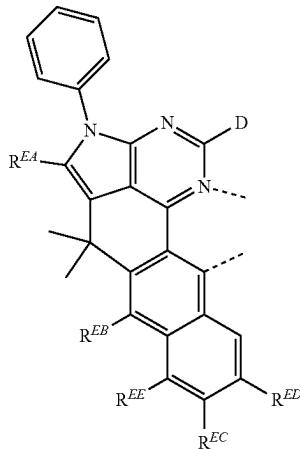
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 L_A Structure of L_A

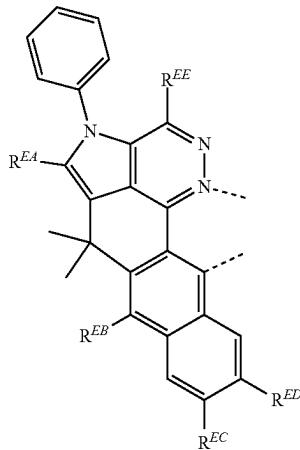
$L_{A30}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A30}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A30}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A31}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A31}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A31}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



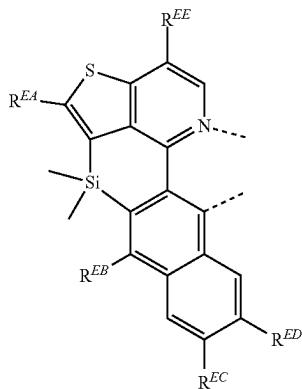
$L_{A32}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A32}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A32}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



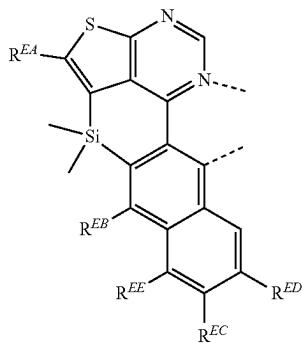
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 L_A Structure of L_A

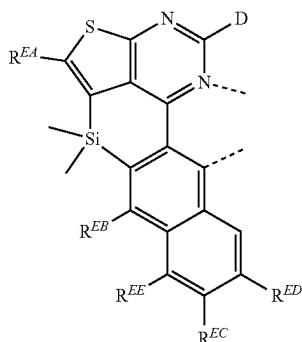
$L_{433}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{433}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{433}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



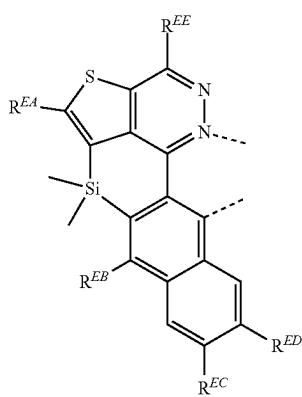
$L_{434}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{434}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{434}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



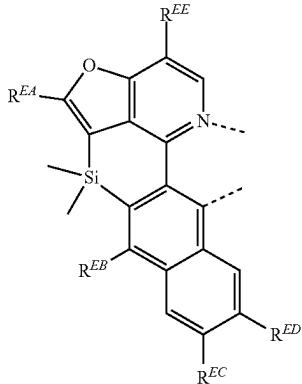
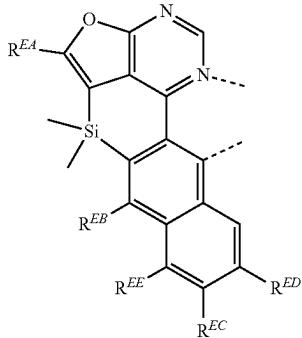
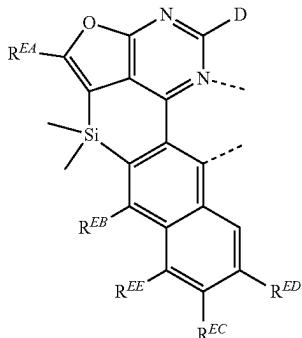
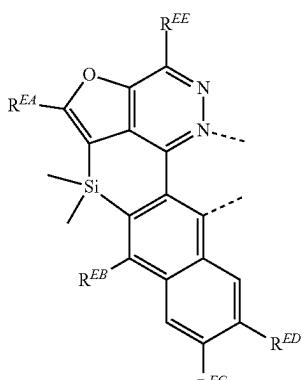
$L_{435}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{435}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{435}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{436}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{436}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{436}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



-continued

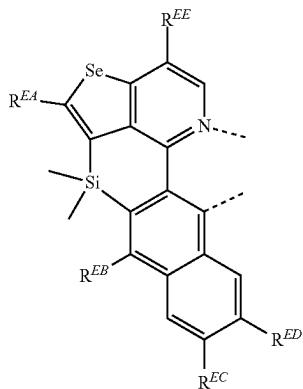
L_A	Structure of L_A
$L_{A37}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A37}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A37}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A38}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A38}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A38}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A39}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A39}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A39}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A40}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A40}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A40}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

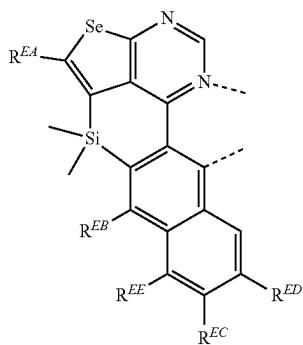
L_A

Structure of L_A

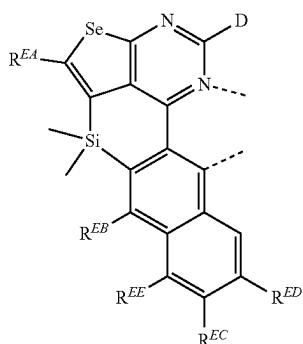
$L_{441}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{441}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{441}(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



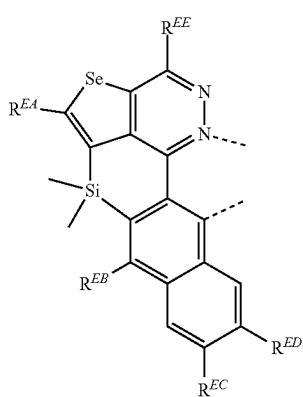
$L_{442}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{442}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{442}(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{443}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{443}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{443}(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{444}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{444}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{444}(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



-continued

L_A	Structure of L_A
$L_{A45}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A45}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A45}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A46}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A46}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A46}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A47}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A47}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A47}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A48}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A48}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A48}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

L_A	Structure of L_A
$L_{A49}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A49}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A49}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A50}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A50}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A50}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A51}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A51}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A51}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A52}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A52}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A52}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

L_A	Structure of L_A
$L_{453}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{453}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{453}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{454}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{454}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{454}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{455}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{455}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{455}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{456}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{456}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{456}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

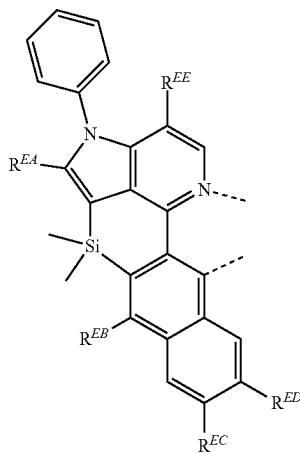
-continued

L_A	Structure of L_A
$L_{A57}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A57}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A57}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A58}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A58}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A58}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A59}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A59}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A59}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A60}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A60}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A60}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

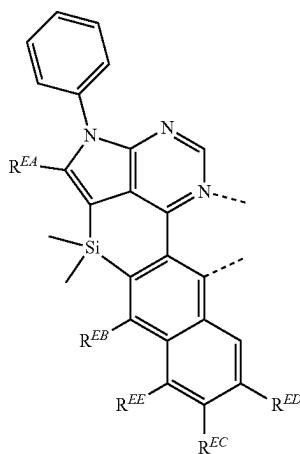
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 L_A Structure of L_A

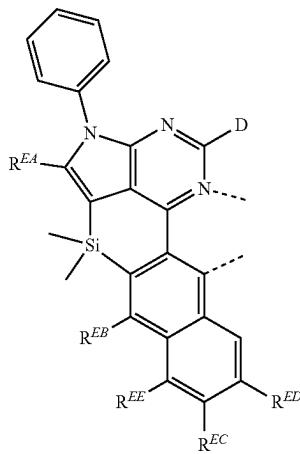
$L_{A61}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A61}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A61}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



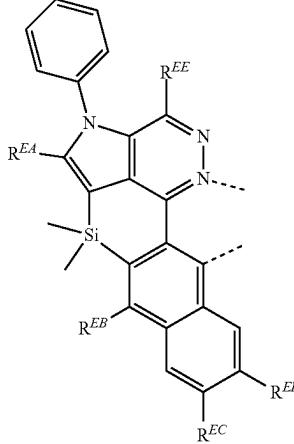
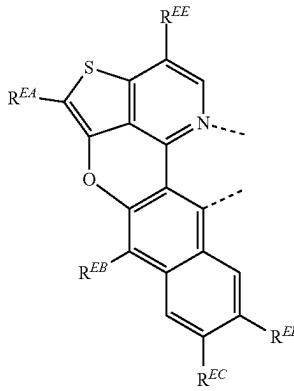
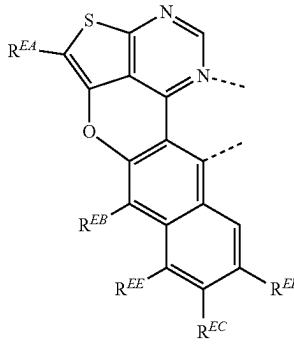
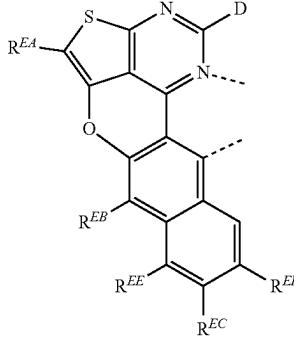
$L_{A62}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A62}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A62}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A63}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A63}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A63}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



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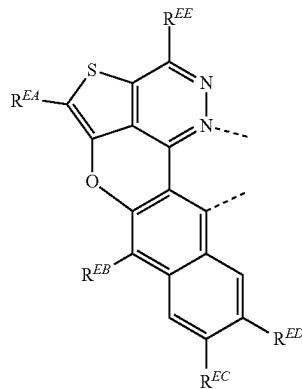
L _A	Structure of L _A
L _{A64} (R ^{EA})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L _{A64} (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L _{A64} (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) have the structure	
L _{A65} (R ^{EA})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L _{A65} (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L _{A65} (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) have the structure	
L _{A66} (R ^{EA})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L _{A66} (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L _{A66} (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) have the structure	
L _{A67} (R ^{EA})(R ^{EB})(R ^{EC})(R ^{ED})(R ^{EE}), wherein L _{A67} (R ₆₆)(R ₁)(R ₁)(R ₁)(R ₁) to L _{A67} (R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅)(R ₂₉₅) have the structure	

-continued

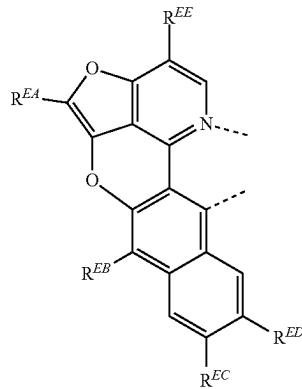
L_A

Structure of L_A

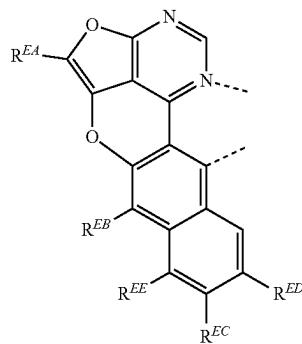
$L_{A68}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A68}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A68}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



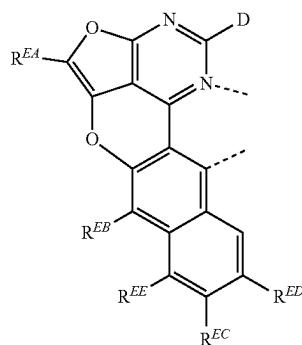
$L_{A69}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A69}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A69}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A70}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A70}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A70}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A71}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A71}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A71}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



-continued

L_A	Structure of L_A
$L_{A72}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A72}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A72}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A73}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A73}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A73}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A74}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A74}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A74}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A75}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A75}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A75}(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

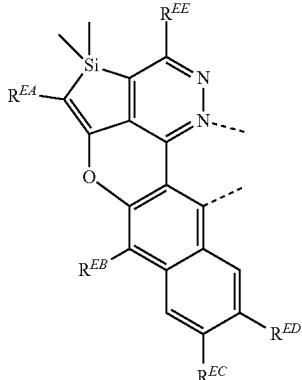
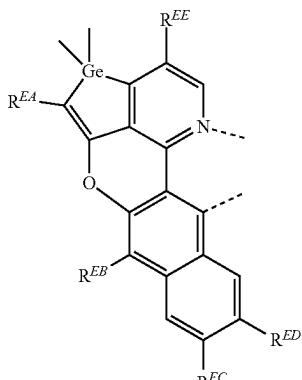
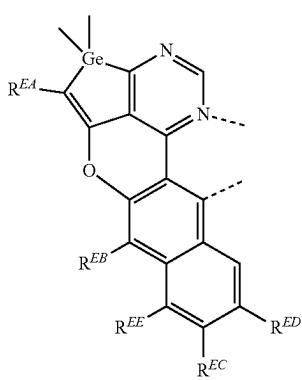
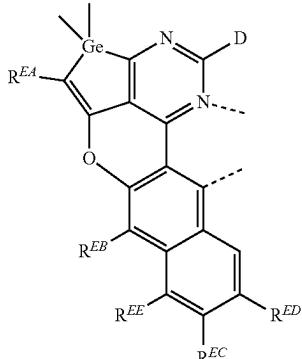
-continued

L_A	Structure of L_A
$L_{A76}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A76}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A76}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A77}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A77}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A77}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A78}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A78}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A78}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A79}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A79}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A79}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

L_A	Structure of L_A
$L_{480}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{480}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{480}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{481}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{481}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{481}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{482}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{482}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{482}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{483}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{483}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{483}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

L_A	Structure of L_A
$L_{484}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{484}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{484}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{485}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{485}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{485}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{486}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{486}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{486}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{487}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{487}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{487}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

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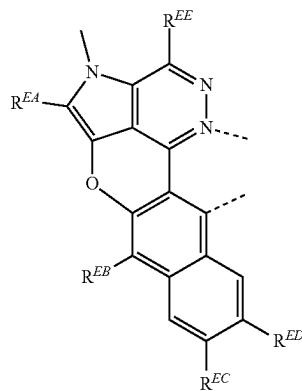
L_A	Structure of L_A
$L_{488}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{488}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{488}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{489}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{489}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{489}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{490}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{490}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{490}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{491}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{491}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{491}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

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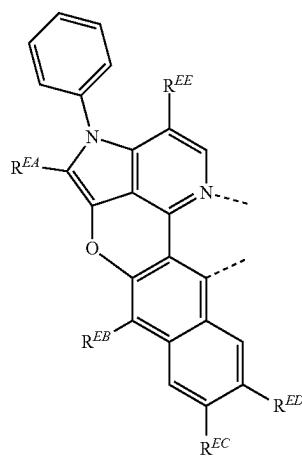
L_A

Structure of L_A

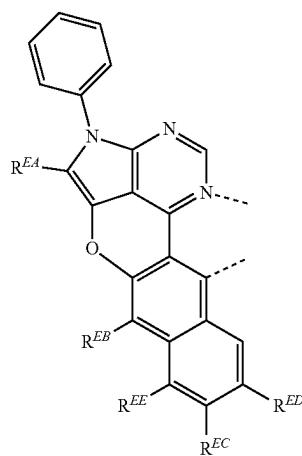
$L_{A92}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A92}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A92}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A93}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A93}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A93}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A94}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A94}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A94}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure

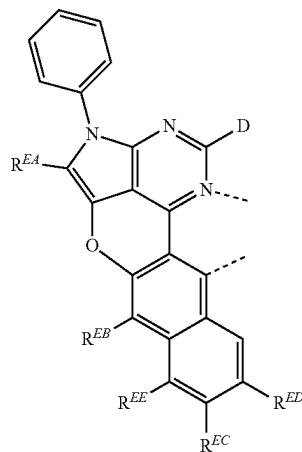


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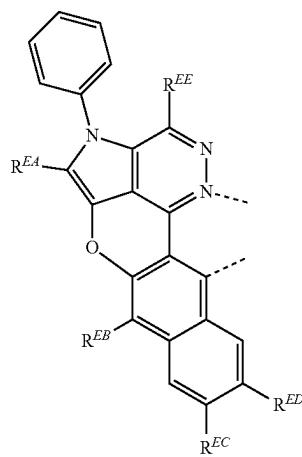
L_A

Structure of L_A

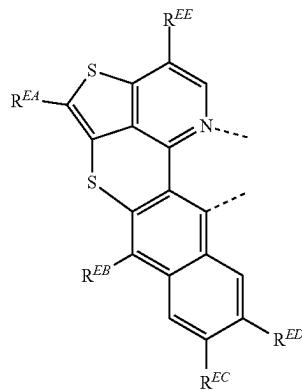
$L_{495}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{495}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{495}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{496}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{496}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{496}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



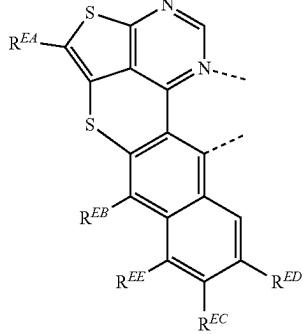
$L_{497}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{497}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{497}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



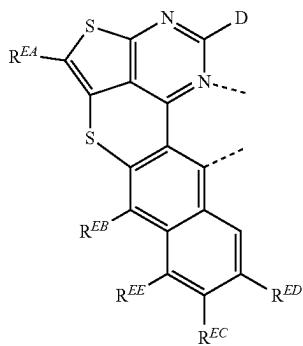
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 L_A Structure of L_A

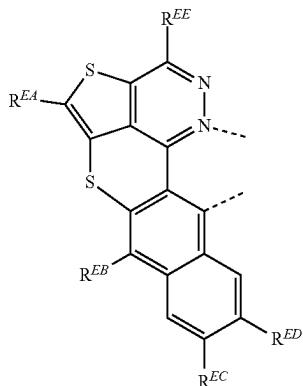
$L_{498}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{498}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{498}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



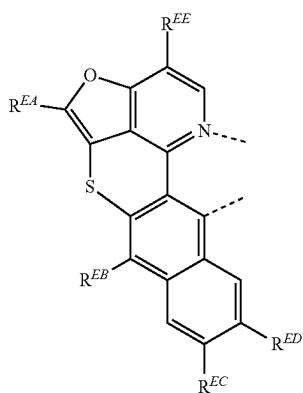
$L_{499}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{499}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{499}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A100}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A100}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A100}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A101}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A101}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A101}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure

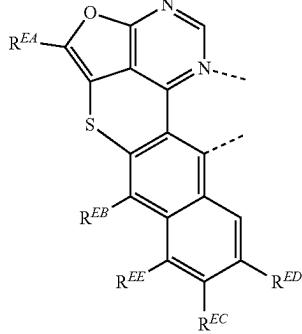


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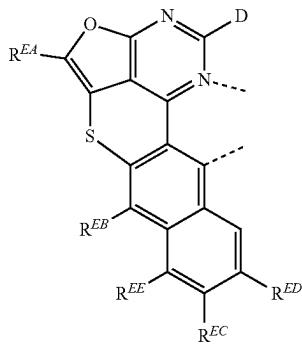
L_A

Structure of L_A

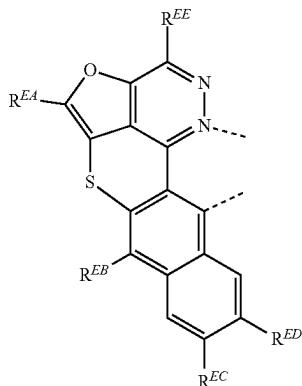
$L_{A102}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A102}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A102}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



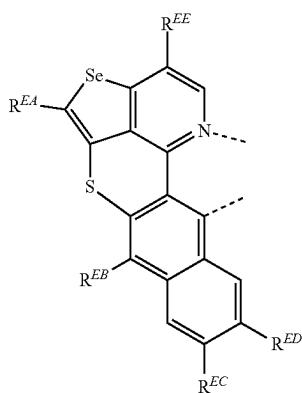
$L_{A103}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A103}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A103}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A104}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A104}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A104}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



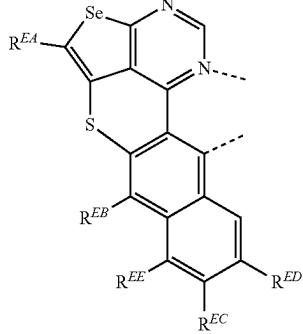
$L_{A105}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A105}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A105}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



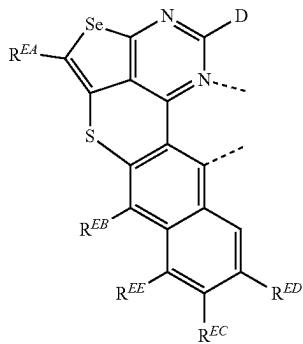
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 L_A Structure of L_A

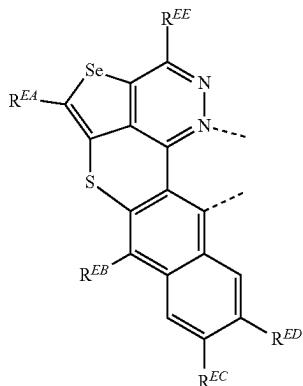
$L_{A106}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A106}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A106}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



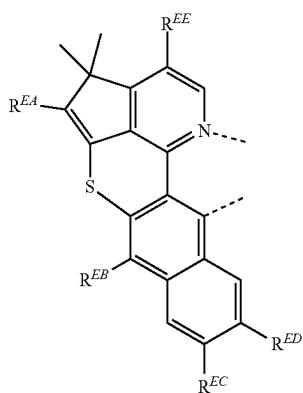
$L_{A107}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A107}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A107}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A108}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A108}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A108}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A109}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A109}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A109}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



-continued

L_A	Structure of L_A
$L_{A110}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A110}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A110}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A111}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A111}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A111}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A112}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A112}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A112}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A113}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A113}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A113}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

L_A	Structure of L_A
$L_{A114}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A114}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A114}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A115}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A115}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A115}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A116}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A116}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A116}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A117}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A117}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A117}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

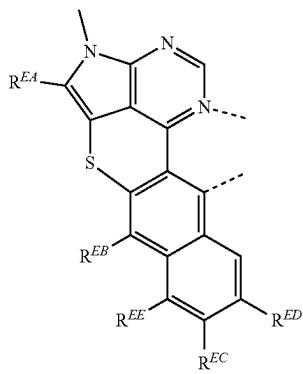
L_A	Structure of L_A
$L_{A118}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A118}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A118}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A119}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A119}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A119}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A120}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A120}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A120}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A121}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A121}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A121}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

-continued

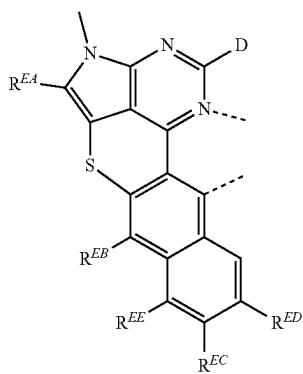
L_A

Structure of L_A

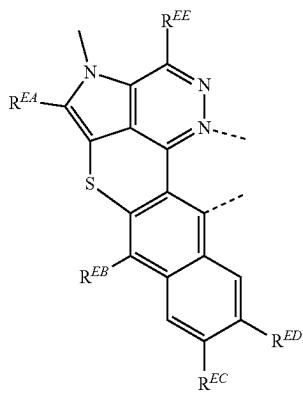
$L_{A122}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A122}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A122}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A123}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A123}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A123}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



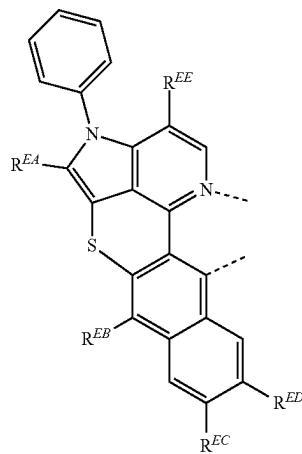
$L_{A124}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A124}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A124}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



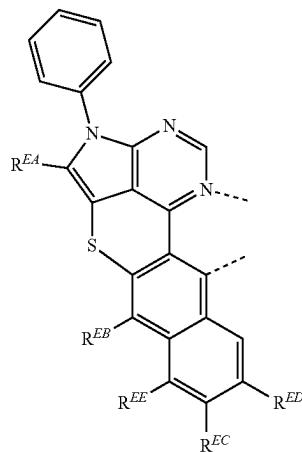
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 L_A Structure of L_A

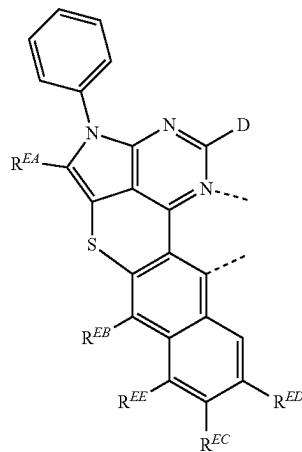
$L_{A125}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A125}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A125}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A126}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A126}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A126}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A127}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A127}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A127}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



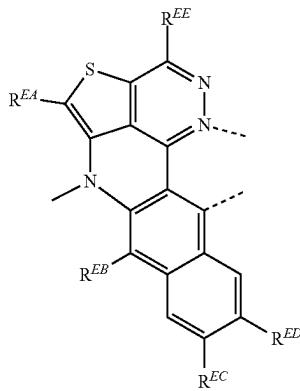
-continued

L_A	Structure of L_A
$L_{A128}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A128}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A128}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A129}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A129}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A129}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A130}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A130}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A130}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A131}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A131}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A131}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

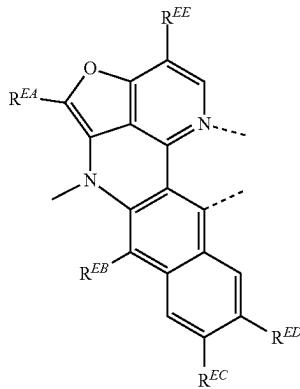
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 L_A Structure of L_A

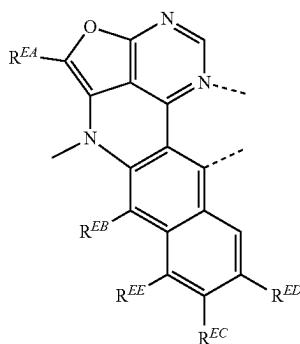
$L_{A132}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A132}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A132}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



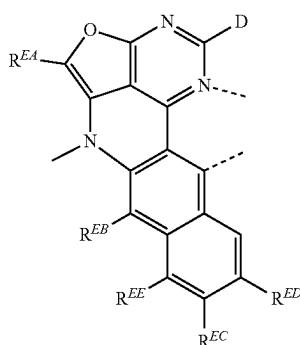
$L_{A133}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A133}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A133}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A134}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A134}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A134}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A135}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A135}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A135}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



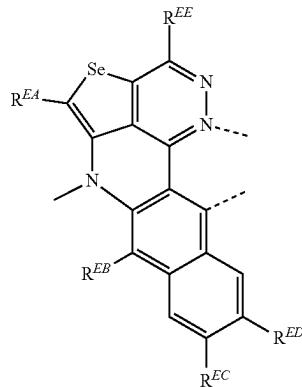
-continued

L_A	Structure of L_A
$L_{A136}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A136}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A136}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A137}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A137}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A137}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A138}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A138}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A138}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	
$L_{A139}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$, wherein $L_{A139}(R_{66})(R_1)(R_1)(R_1)(R_1)$ to $L_{A139}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$ have the structure	

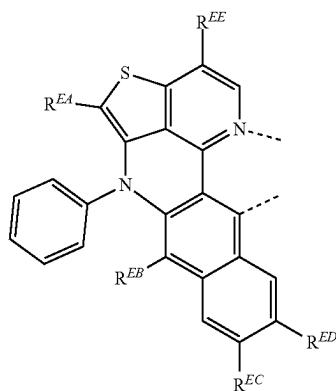
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 L_A Structure of L_A

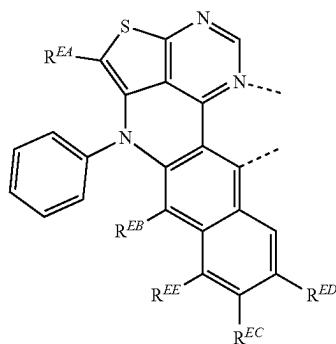
$L_{A140}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A140}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A140}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



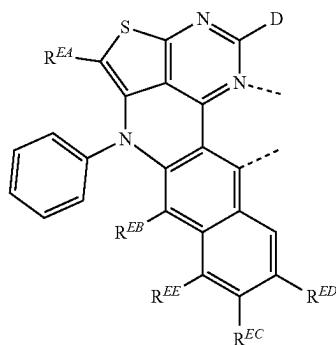
$L_{A141}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A141}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A141}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A142}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A142}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A142}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



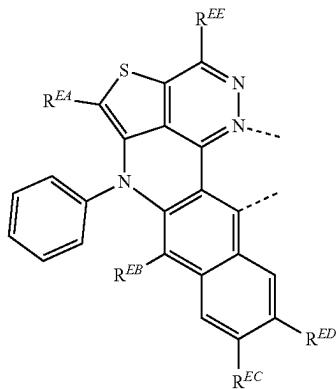
$L_{A143}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A143}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A143}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



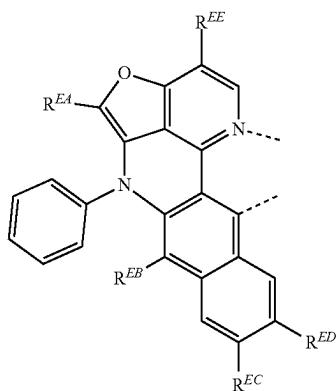
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 L_A Structure of L_A

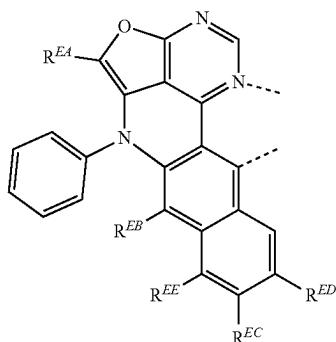
$L_{A144}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A144}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A144}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



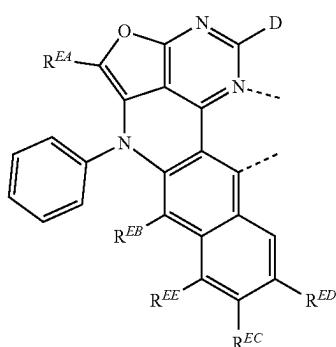
$L_{A145}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A145}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A145}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



$L_{A146}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A146}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A146}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



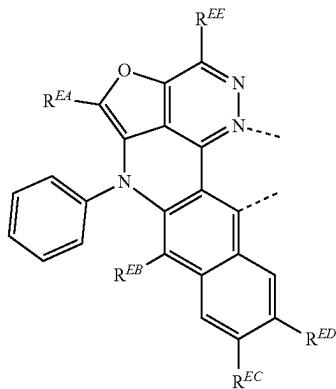
$L_{A147}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A147}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A147}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



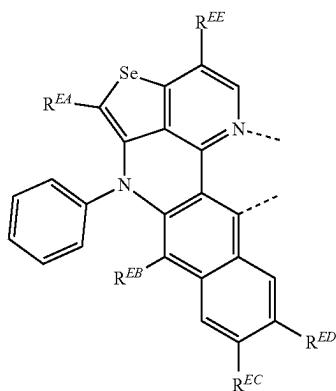
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 L_A Structure of L_A

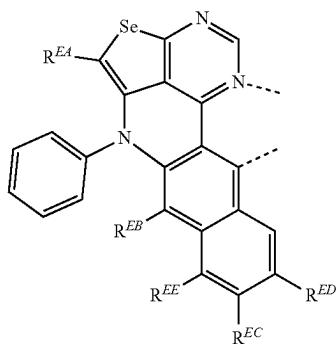
$L_{A148}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A148}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A148}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



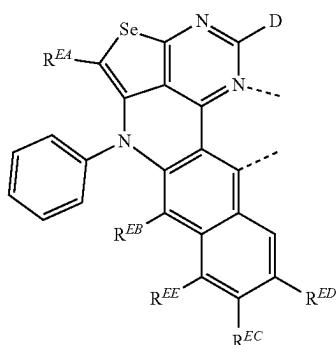
$L_{A149}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A149}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A149}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



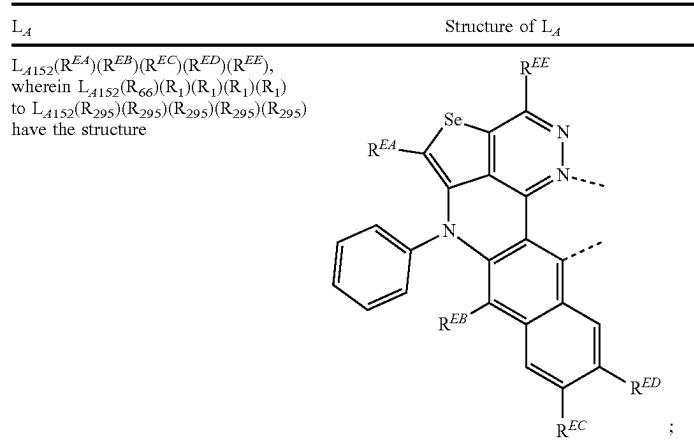
$L_{A150}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A150}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A150}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



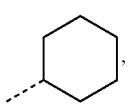
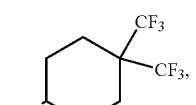
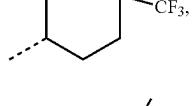
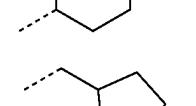
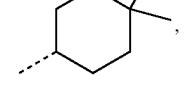
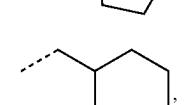
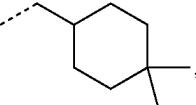
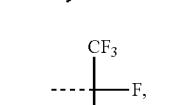
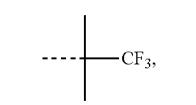
$L_{A151}(R^{EA})(R^{EB})(R^{EC})(R^{ED})(R^{EE})$,
wherein $L_{A151}(R_{66})(R_1)(R_1)(R_1)(R_1)$
to $L_{A151}(R_{295})(R_{295})(R_{295})(R_{295})(R_{295})$
have the structure



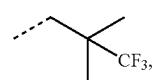
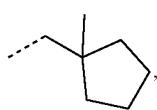
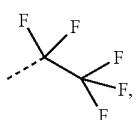
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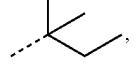
	R ₁		R ₁₃
	R ₂		R ₁₄
	R ₃		R ₁₅
	R ₄		R ₁₆
	R ₅		R ₁₇
	R ₆		R ₁₈
	R ₇		R ₁₉
	R ₈		R ₂₀
	R ₉		R ₂₁
	R ₁₀		
	R ₁₁		
	R ₁₂		

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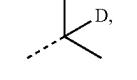
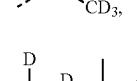
R₂₂R₂₃R₂₄

CN,

D,

R₂₅CD₃,R₂₆

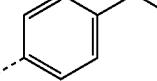
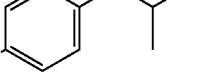
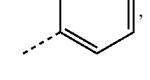
D,

R₂₇CD₃,R₂₈

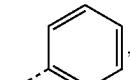
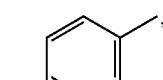
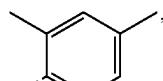
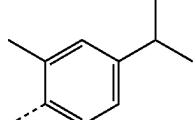
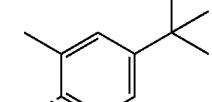
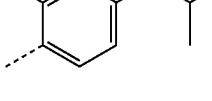
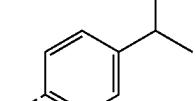
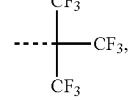
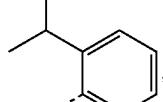
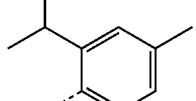
D

R₂₉

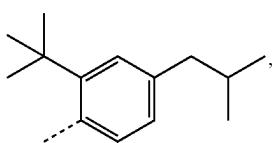
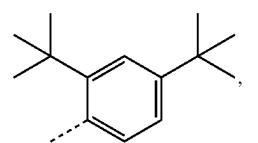
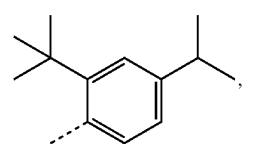
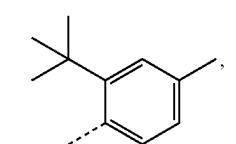
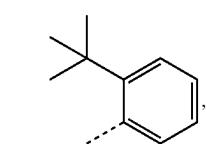
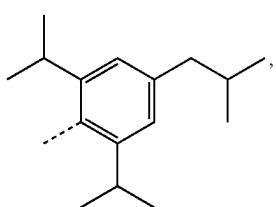
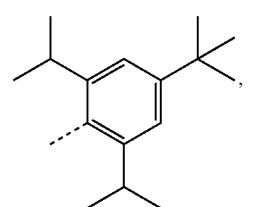
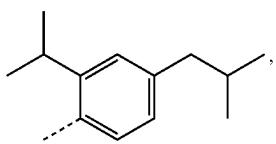
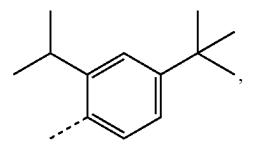
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R₃₀CD₃R₃₁CD₃R₃₂CD₃R₃₃CD₃R₃₄CD₃R₃₅CD₃R₃₆CD₃

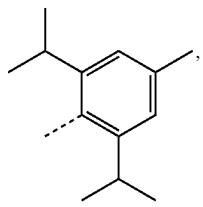
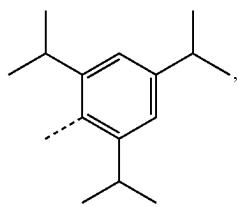
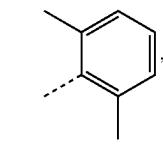
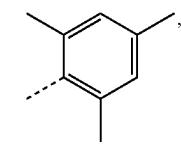
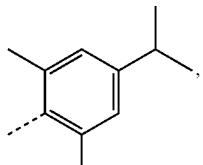
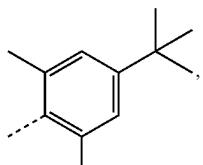
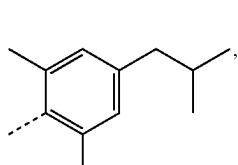
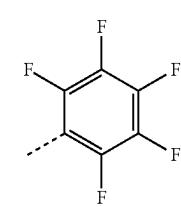
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R₃₇R₃₈R₃₉R₄₀R₄₁R₄₂R₄₃R₄₄R₄₅R₄₆R₄₇

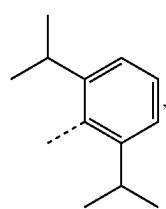
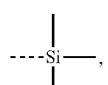
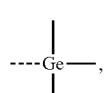
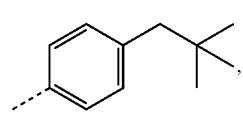
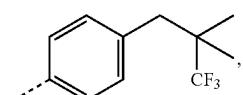
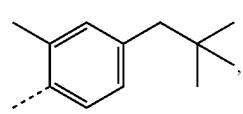
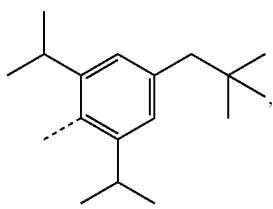
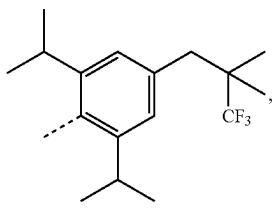
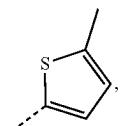
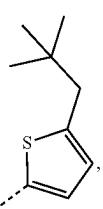
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R₄₈

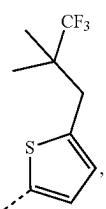
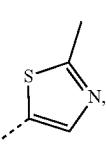
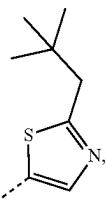
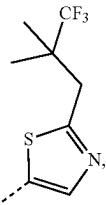
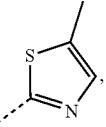
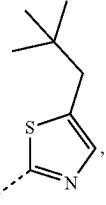
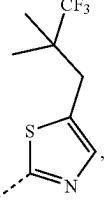
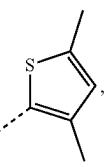
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R₅₇R₄₉R₅₈R₅₀R₅₉R₅₁R₆₀R₅₂R₆₁R₅₃R₆₂R₅₄R₆₃R₅₅R₆₄R₅₆

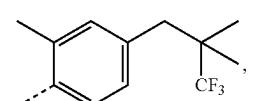
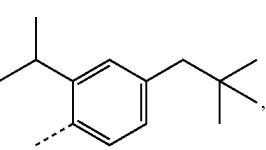
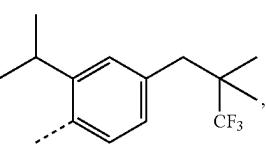
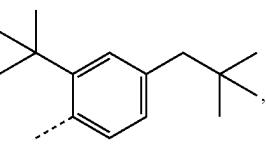
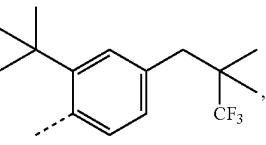
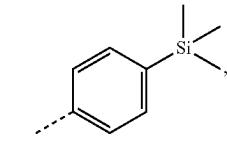
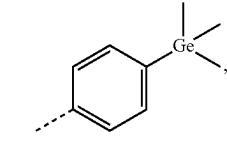
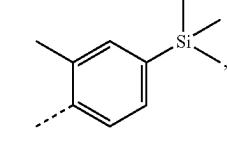
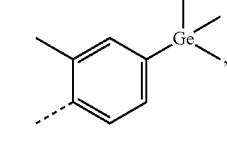
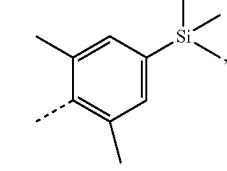
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R₆₅R₆₆R₆₇R₆₈R₆₉R₇₀R₇₁R₇₂R₇₃R₇₄

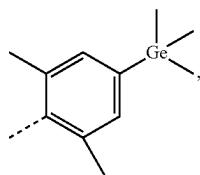
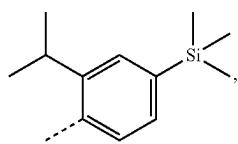
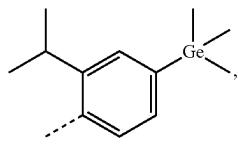
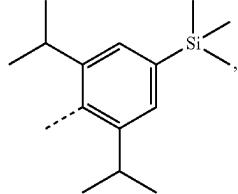
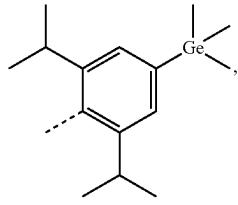
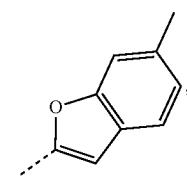
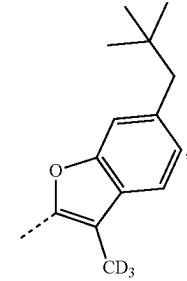
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R₇₅R₇₆R₇₇R₇₈R₇₉R₈₀R₈₁R₈₂

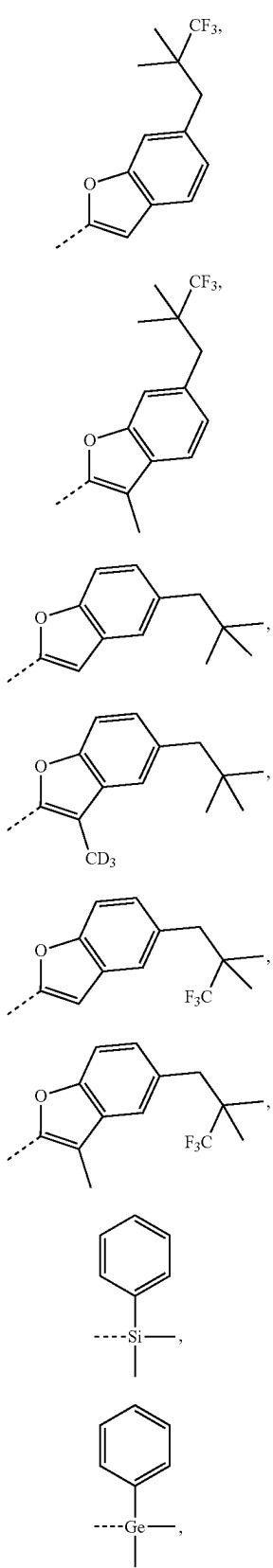
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R₈₄R₈₃R₈₅R₈₆R₈₇R₈₈R₈₉R₉₀R₉₁R₉₂

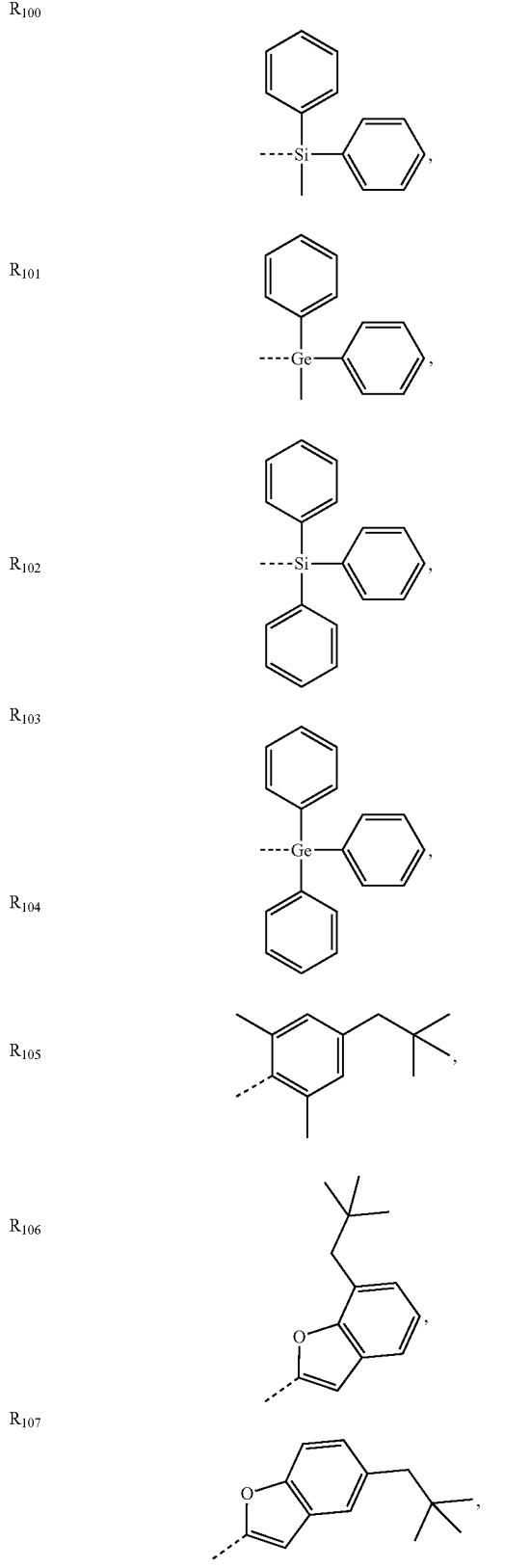
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R₉₃R₉₄R₉₅R₉₆R₉₇R₉₈R₉₉

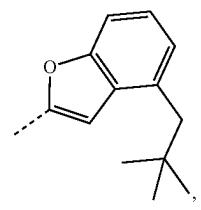
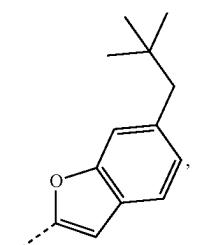
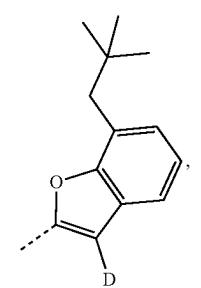
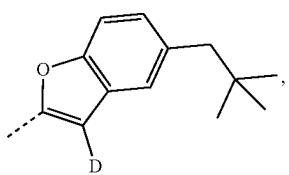
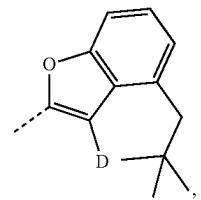
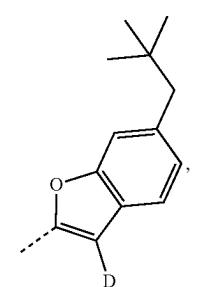
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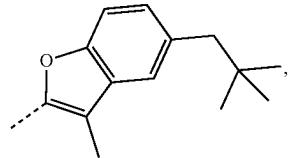
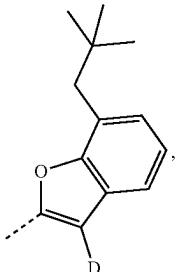
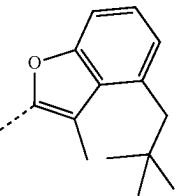
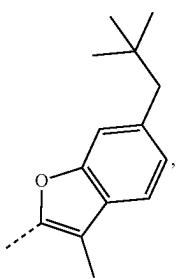
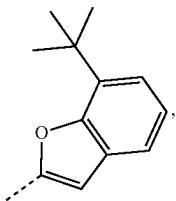
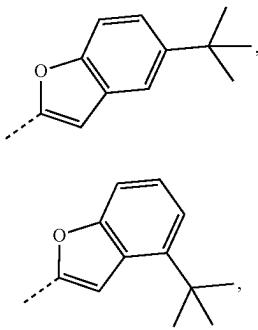
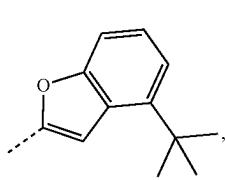
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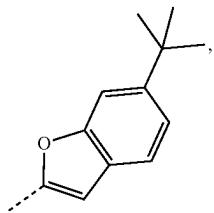
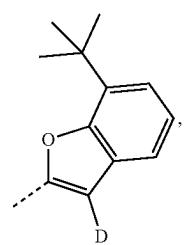
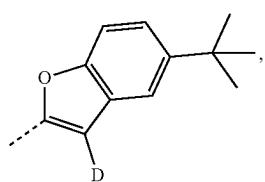
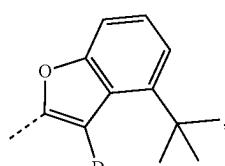
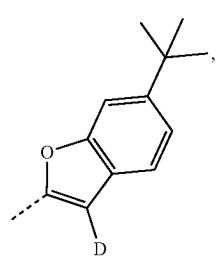
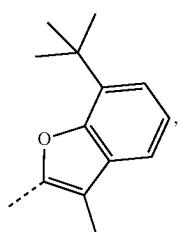
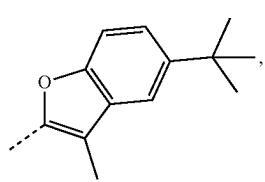
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R₁₁₅R₁₁₆R₁₁₇R₁₁₈R₁₁₉R₁₂₀

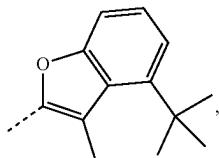
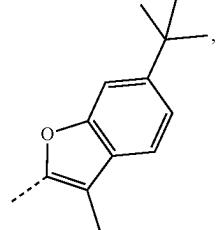
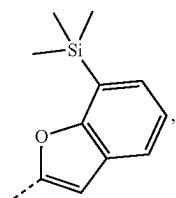
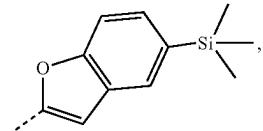
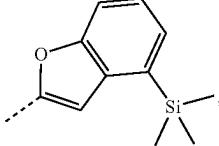
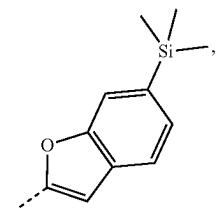
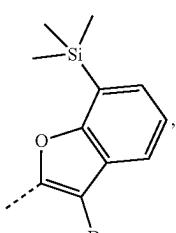
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R₁₂₁R₁₂₂R₁₂₃R₁₂₄R₁₂₅R₁₂₆R₁₂₇

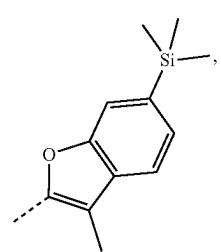
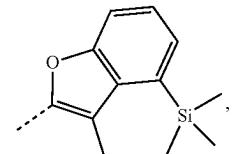
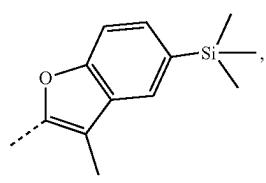
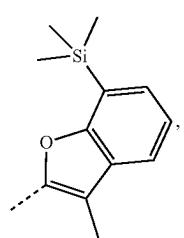
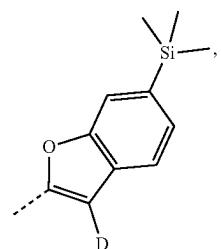
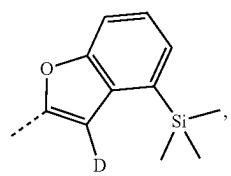
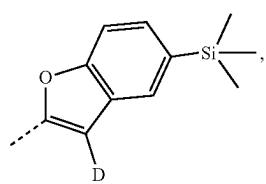
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R₁₂₈R₁₂₉R₁₃₀R₁₃₁R₁₃₂R₁₃₃R₁₃₄

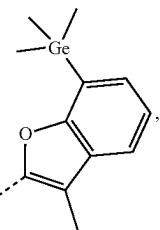
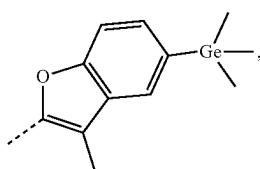
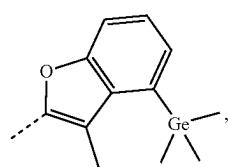
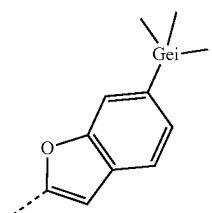
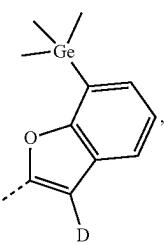
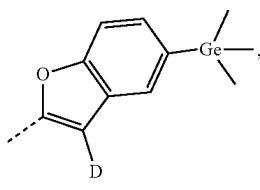
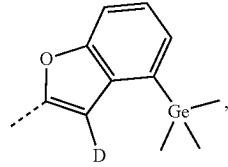
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R₁₃₅R₁₃₆R₁₃₇R₁₃₈R₁₃₉R₁₄₀R₁₄₁

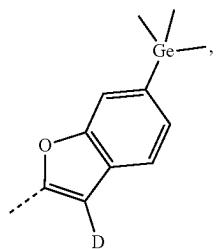
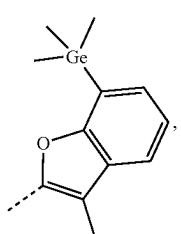
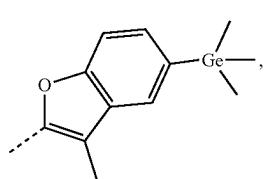
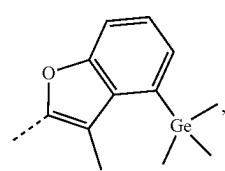
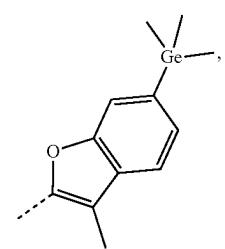
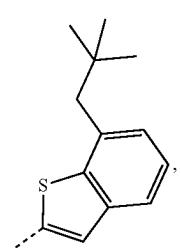
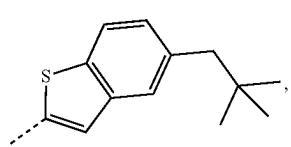
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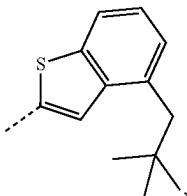
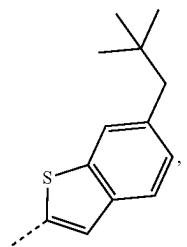
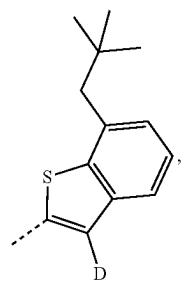
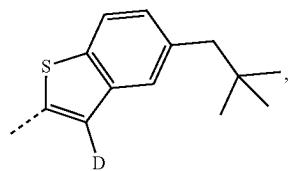
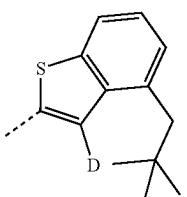
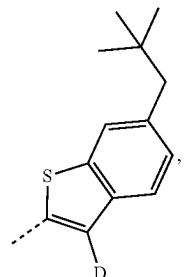
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R₁₄₂R₁₄₃R₁₄₄R₁₅₂R₁₄₅R₁₄₆R₁₄₇R₁₅₅

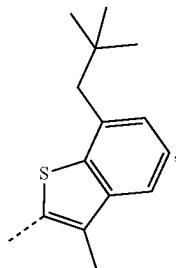
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R₁₅₆R₁₅₇R₁₅₈R₁₅₉R₁₆₀R₁₆₁R₁₆₂

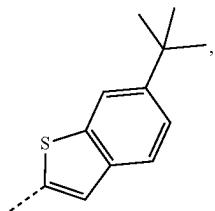
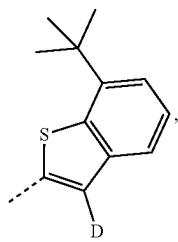
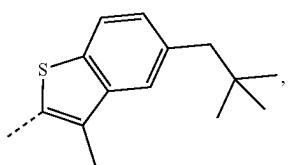
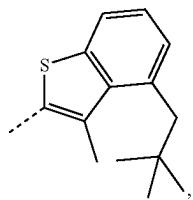
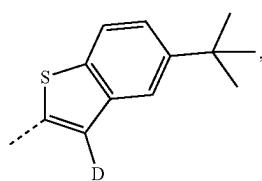
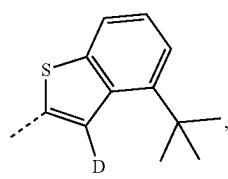
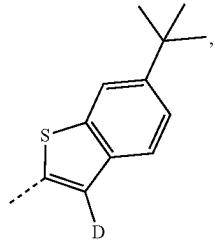
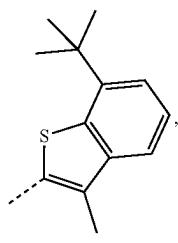
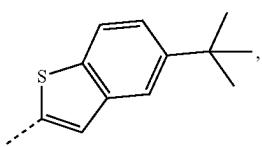
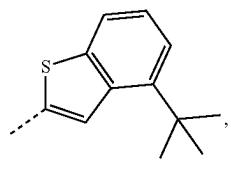
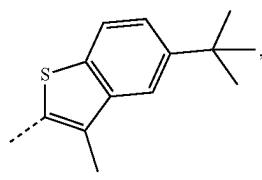
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R₁₆₃R₁₆₄R₁₆₅R₁₆₆R₁₆₇R₁₆₈

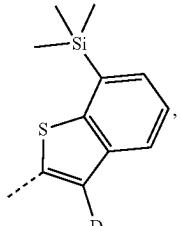
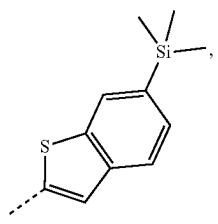
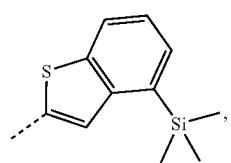
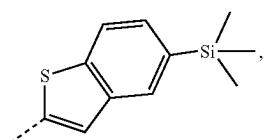
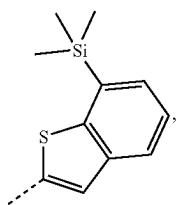
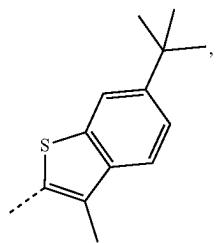
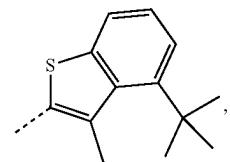
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R₁₆₉

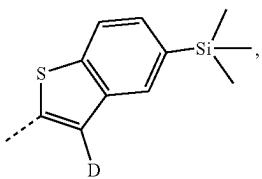
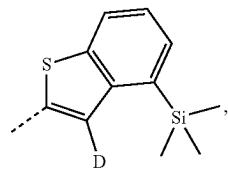
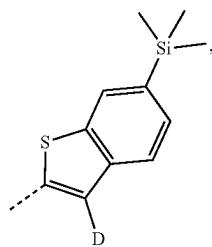
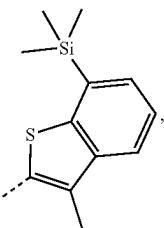
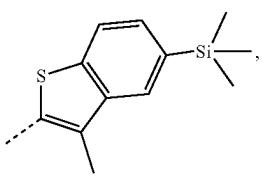
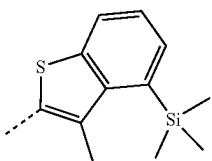
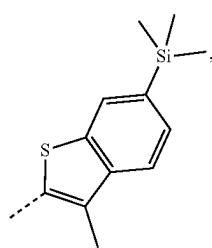
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R₁₇₆R₁₇₇R₁₇₀R₁₇₁R₁₇₈R₁₇₉R₁₈₀R₁₈₁R₁₇₄R₁₇₅R₁₈₂

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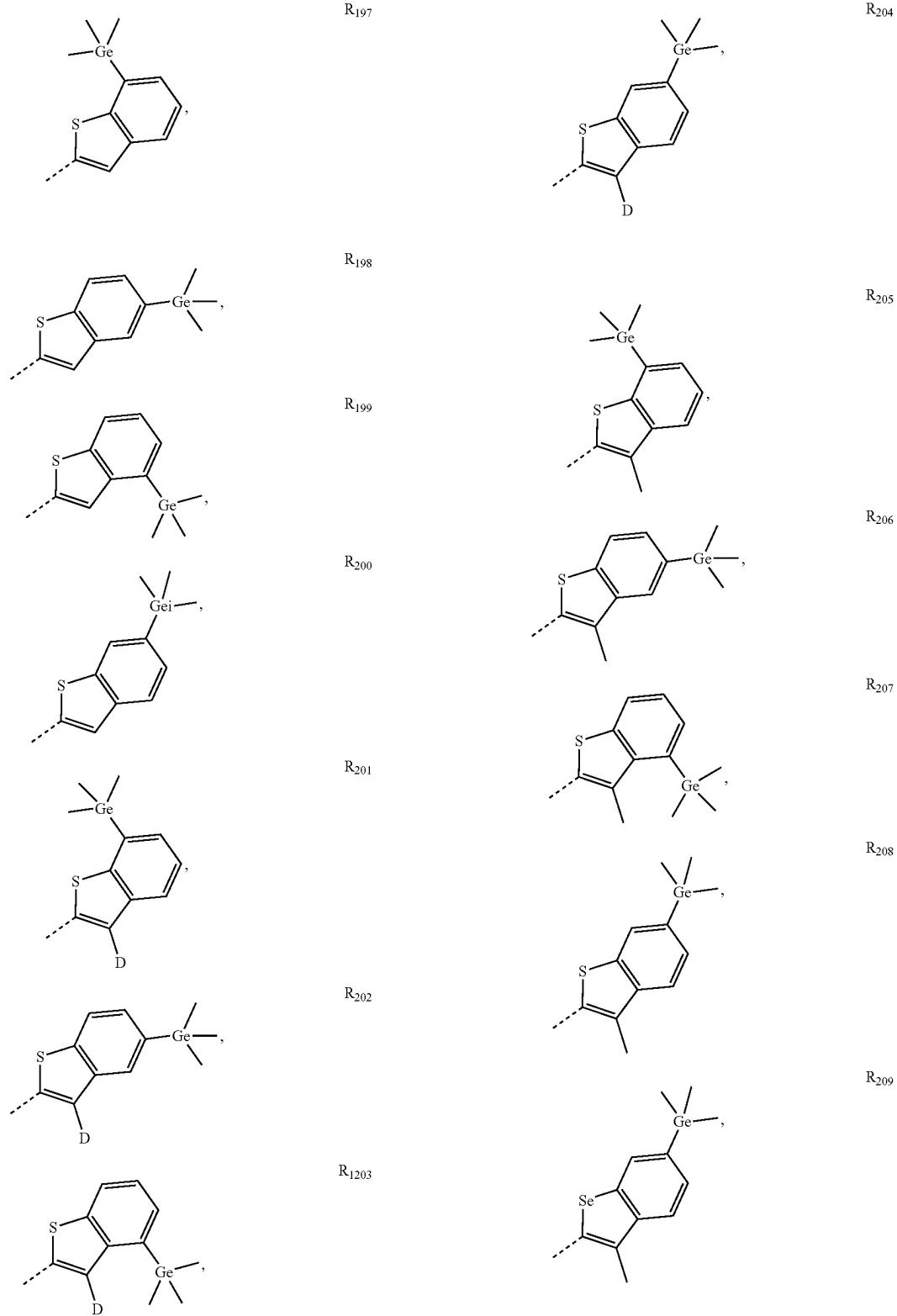


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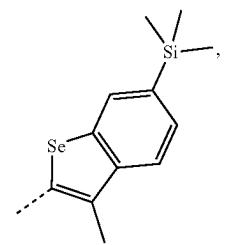
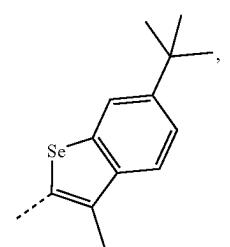
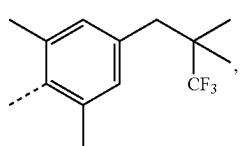
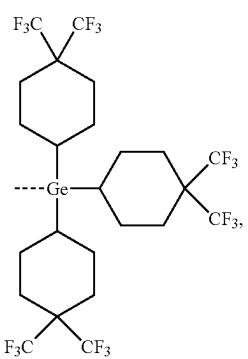
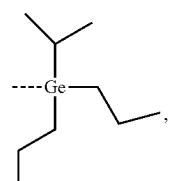
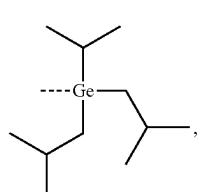
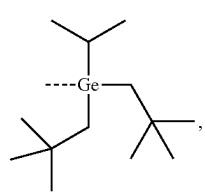
R₁₈₃R₁₈₄R₁₈₅R₁₈₆R₁₈₇R₁₈₈R₁₈₉

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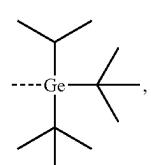
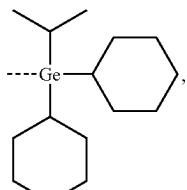
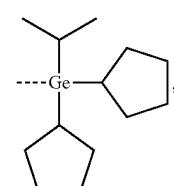
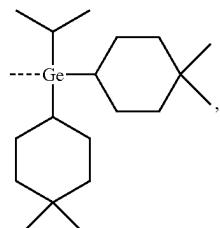
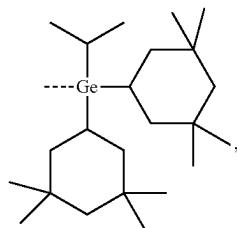
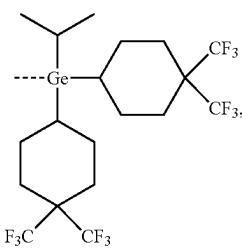
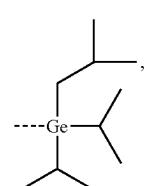
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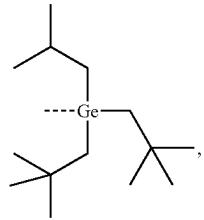
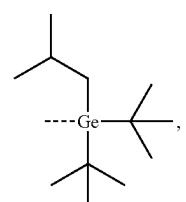
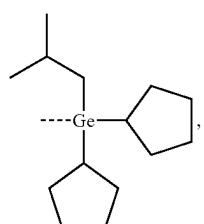
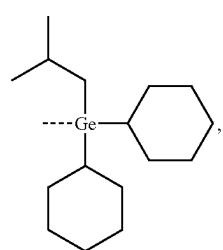
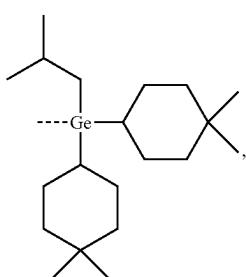
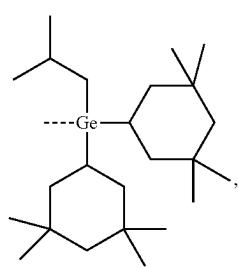
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R₂₁₀R₂₁₁R₂₁₂R₂₁₃R₂₁₄R₂₁₅R₂₁₆

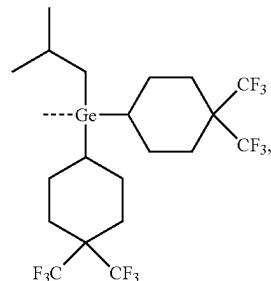
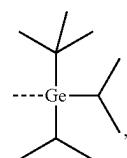
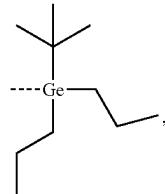
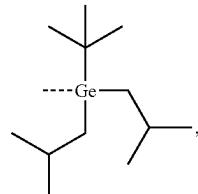
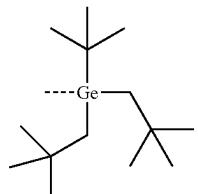
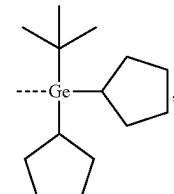
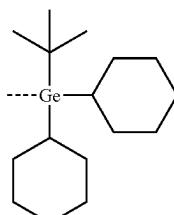
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R₂₁₇R₂₁₈R₂₁₉R₂₂₀R₂₂₁R₂₂₂R₂₂₃

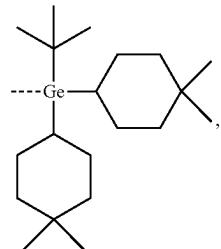
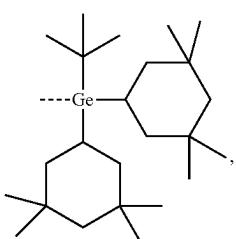
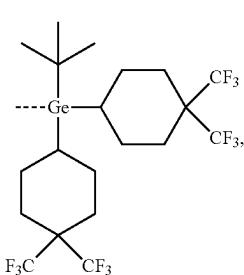
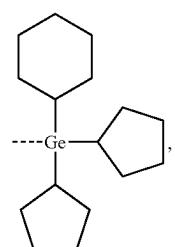
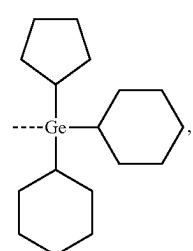
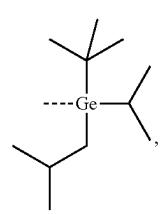
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R₂₂₄R₂₂₅R₂₂₆R₂₂₇R₂₂₈

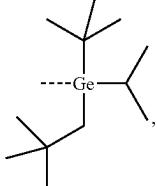
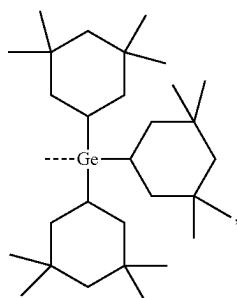
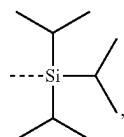
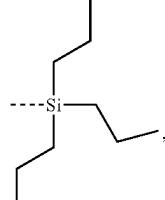
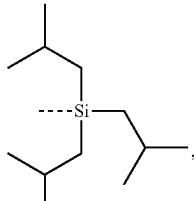
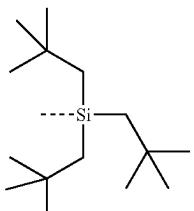
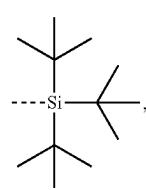
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R₂₃₀R₂₃₁R₂₃₂R₂₃₃R₂₃₄R₂₃₅R₂₃₆

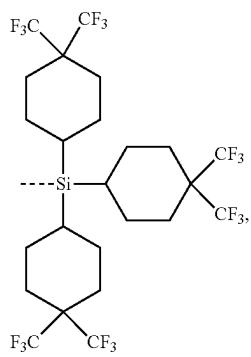
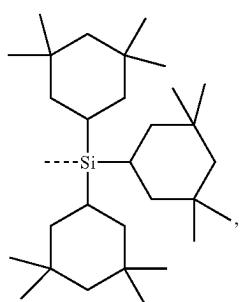
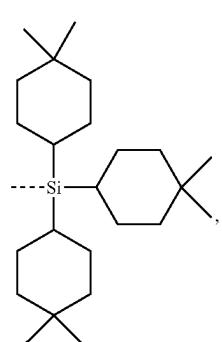
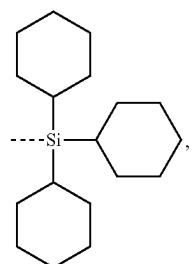
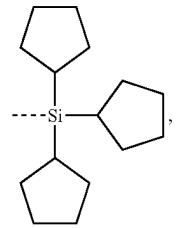
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 R_{237}  R_{238}  R_{239}  R_{240}  R_{241}  R_{242}

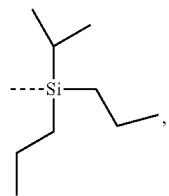
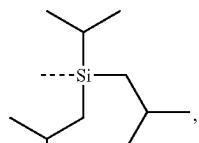
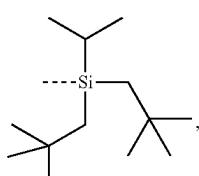
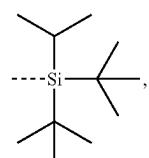
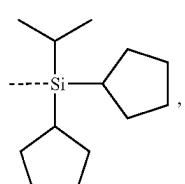
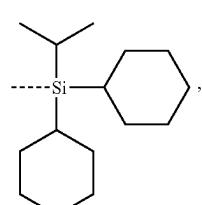
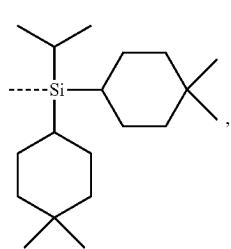
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 R_{243}  R_{244}  R_{245}  R_{246}  R_{247}  R_{248}  R_{249} 

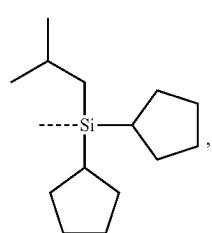
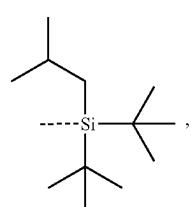
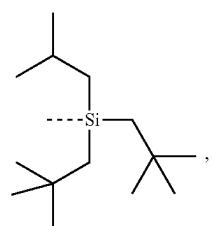
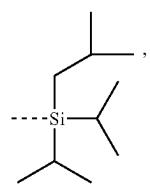
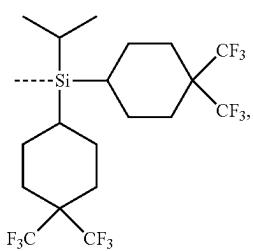
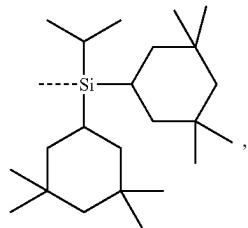
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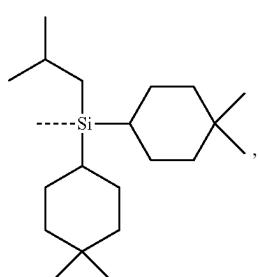
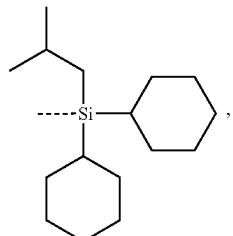
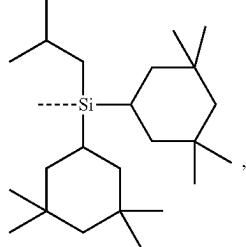
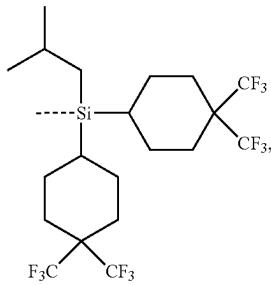
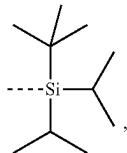
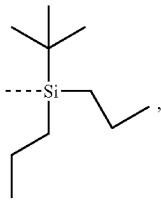
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R₂₅₅R₂₅₆R₂₅₇R₂₅₈wherein R₁ to R₂₉₅ have the following structures:R₂₅₉R₂₆₀R₂₆₁

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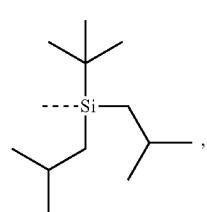
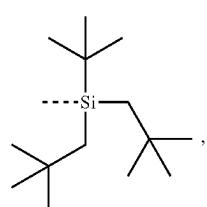
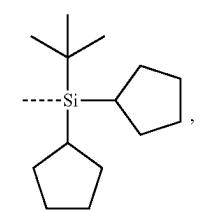
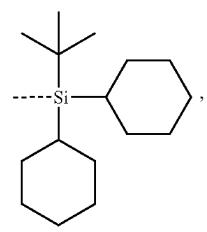
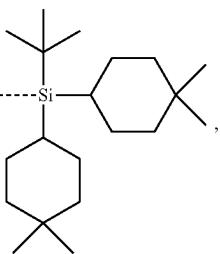
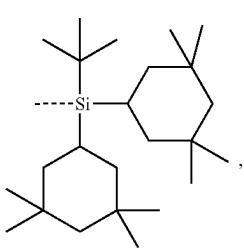
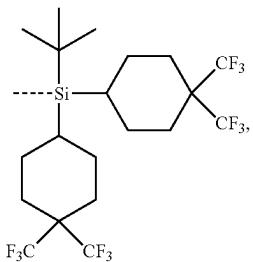
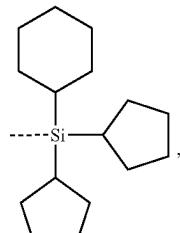
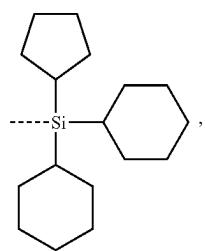
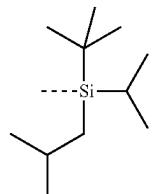
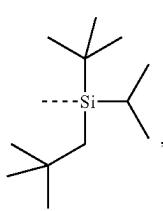
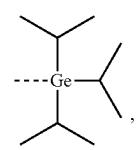


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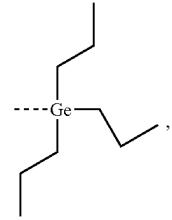
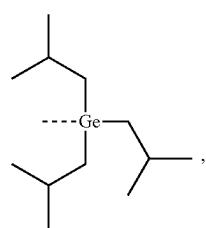
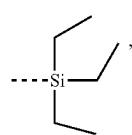
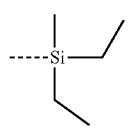
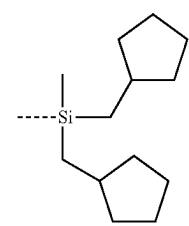
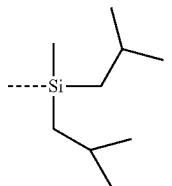
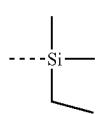
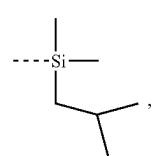
R₂₆₈R₂₇₀R₂₇₁R₂₇₂R₂₇₃

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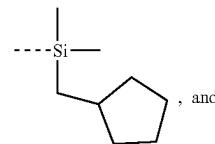
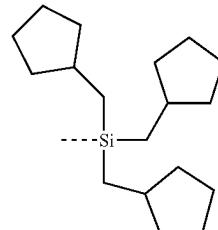
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R₂₇₄R₂₇₅R₂₇₆R₂₇₇R₂₇₈R₂₇₉R₂₈₀R₂₈₁R₂₈₂R₂₈₃R₂₈₄R₂₈₅

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R₂₈₆R₂₈₇R₂₈₈R₂₈₉R₂₉₁R₂₉₂R₂₉₃

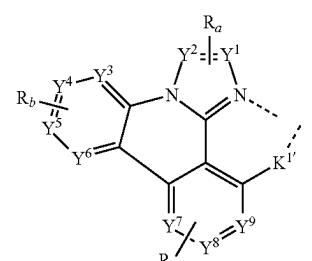
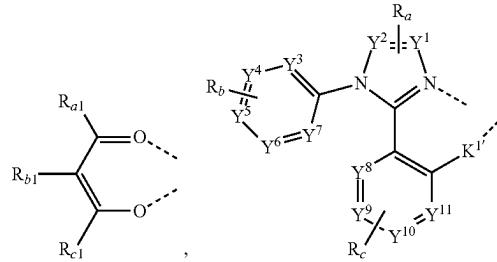
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R₂₉₄R₂₉₅

11. The compound of claim 1, wherein the compound has a formula of $M(L_A)_p(L_B)_q(L_c)$, wherein L_B and L_c are each a bidentate ligand; and wherein p is 1, 2, or 3; q is 0, 1, or 2; r is 0, 1, or 2; and $p+q+r$ is the oxidation state of the metal M .

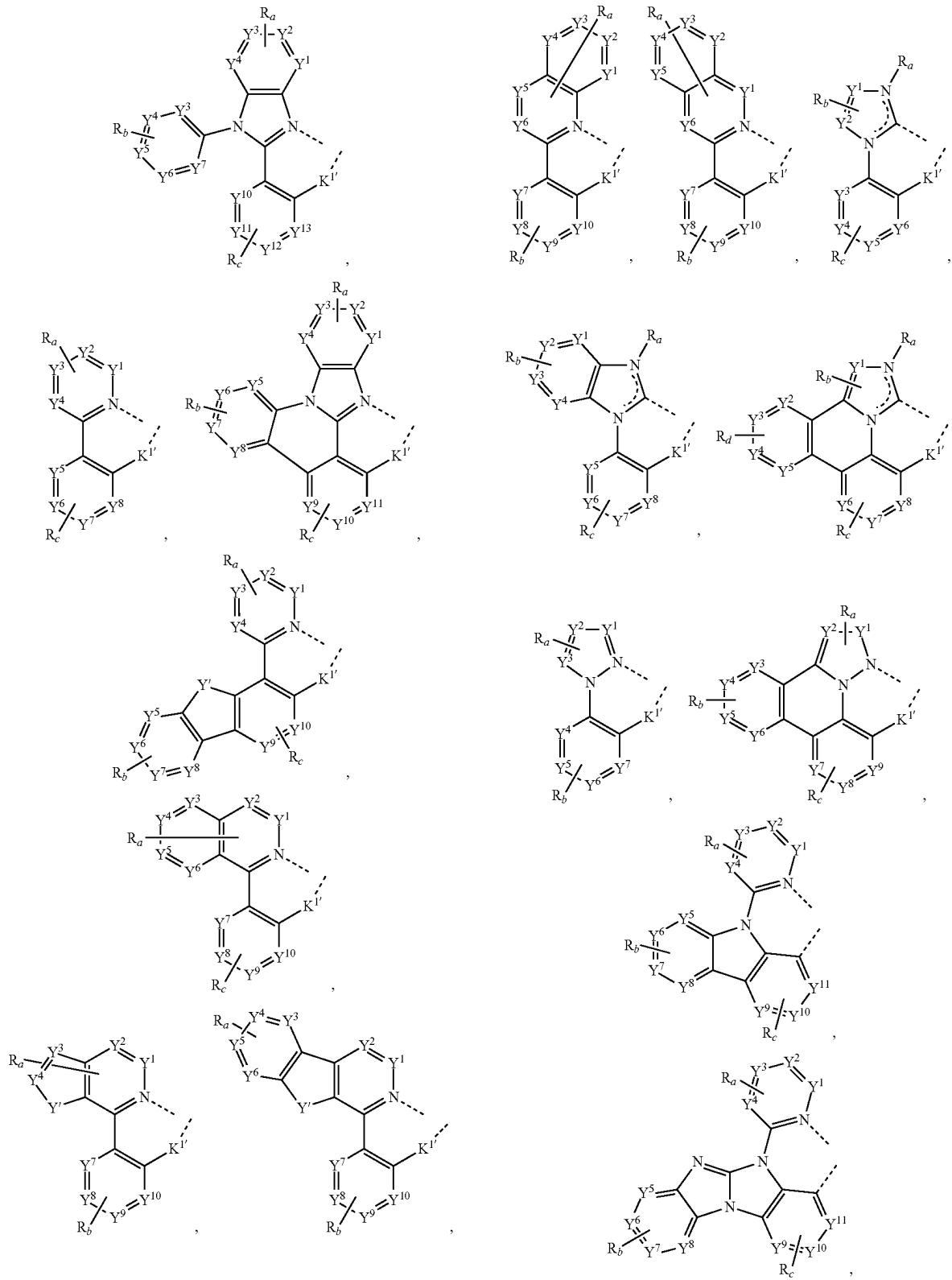
12. The compound of claim 11, wherein the compound has a formula selected from the group consisting of $Ir(L_A)_3$, $Ir(L_A)(L_B)_2$, $Ir(L_A)_2(L_B)$, $Ir(L_A)_2(L_c)$, and $Ir(L_A)(L_B)(L_c)$; and wherein L_A , L_B , and L_c are different from each other; or a formula of $Pt(L_A)(L_B)$, wherein L_A and L_B can be same or different.

13. The compound of claim 11, wherein L_B and L_c are each independently selected from the group consisting of:

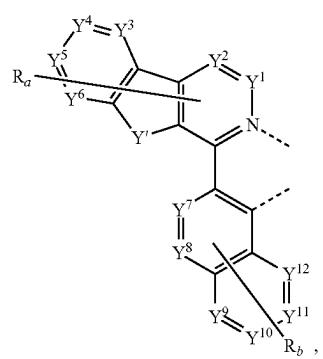
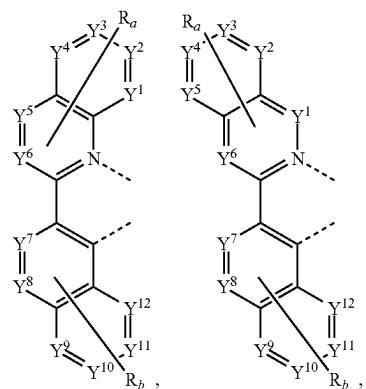
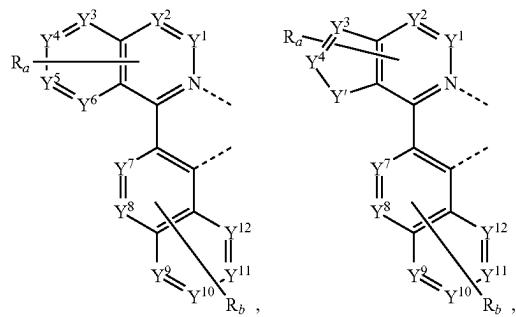
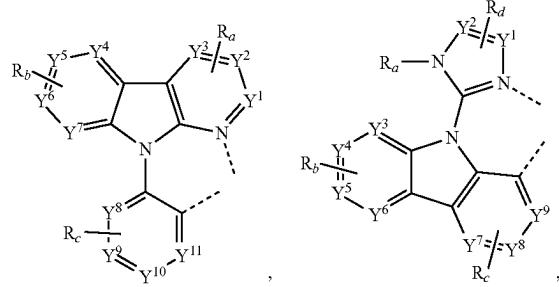


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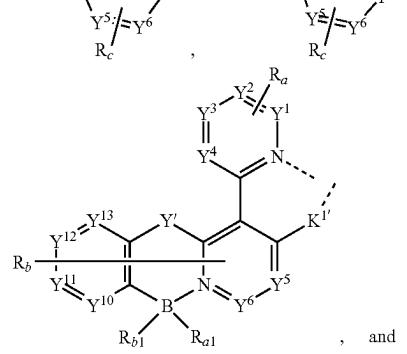
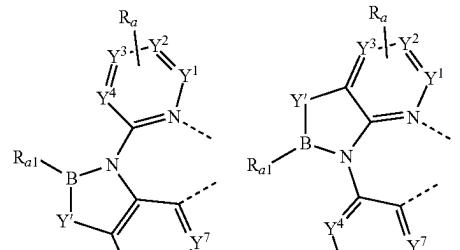
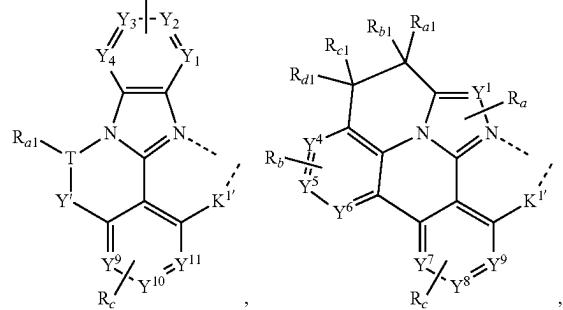
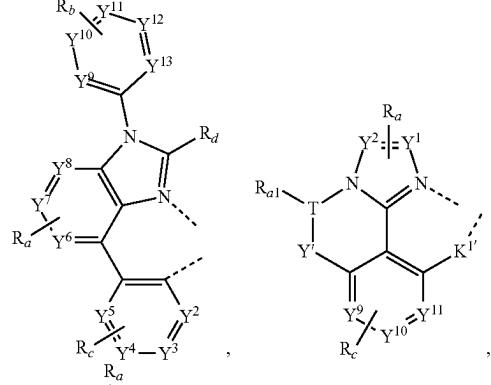
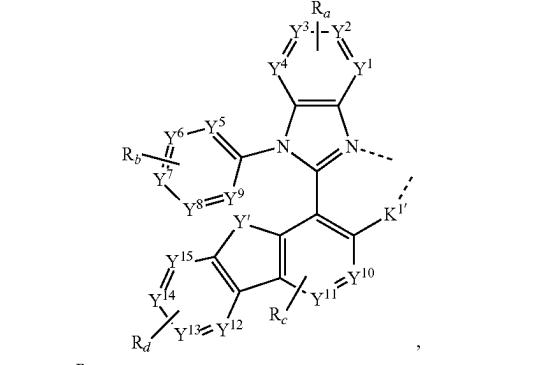
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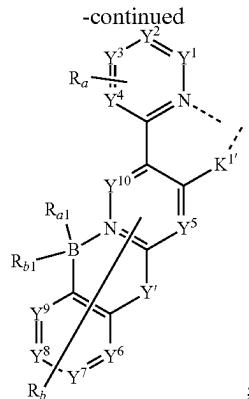
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, and



wherein:

T is selected from the group consisting of B, Al, Ga, and In;

K^{1+} is selected from the group consisting of a single bond, O, S, NR_e , PR_e , BR_e , CR_eR_f , and SiR_eR_f ; each of Y^1 to Y^{13} is independently selected from the group consisting of C and N;

Y' is selected from the group consisting of BR_e , BR_eR_f , NR_e , PR_e , $P(O)R_e$, O, S, Se, $C=O$, $C=S$, $C=Se$, $C=NR_e$, $C=CR_eR_f$, $S=O$, SO_2 , CR_eR_f , SiR_eR_f , and GeR_eR_f .

R_e and R_f can be fused or joined to form a ring;

each R_a , R_b , R_c , and R_d independently represents from mono to the maximum allowed number of substitutions, or no substitution;

each of R_{a1} , R_{b1} , R_{c1} , R_{d1} , R_a , R_b , R_c , R_d , R_e , and R_f is independently a hydrogen or a substituent selected from the group consisting of deuterium, halide, alkyl, cycloalkyl, heteroalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germinal, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carbonyl, carboxylic acid, ester, nitrile, isonitrile, sulfanyl, selenyl, sulfinyl, sulfonyl, phosphino, and combinations thereof; and

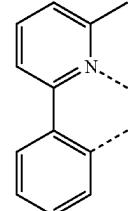
any two substituents of R_{a1} , R_{b1} , R_{c1} , R_{d1} , R_a , R_b , R_c , R_d , R_e , and R_f can be fused or joined to form a ring or form a multidentate ligand.

14. The compound of claim 11, wherein the compound has formula $Ir(L_A)_3$, formula $Ir(L_A)(L_{Bk})_2$, formula $Ir(L_A)_2(L_{Bk})$, formula $Ir(L_A)_2(L_{Cj-I})$, or $Ir(L_A)_2(L_{Cj-II})$, wherein L_A is according to Formula I;

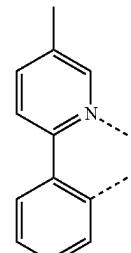
wherein k is an integer from 1 to 541, and each L_{Bk} has the structure defined as follows:

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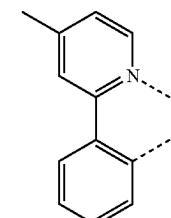
L_{B2}



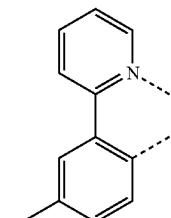
L_{B3}



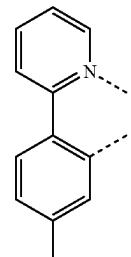
L_{B4}



L_{B5}

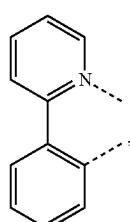


L_{B6}

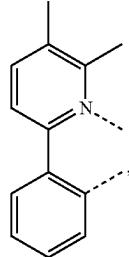


L_{B7}

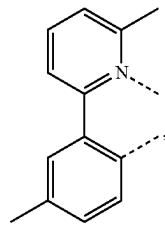
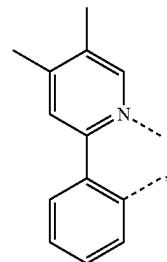
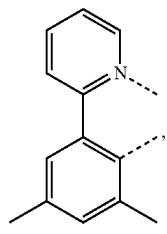
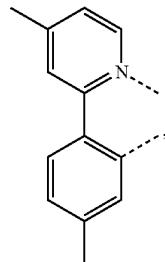
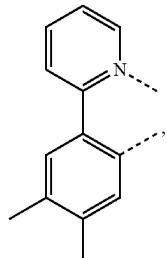
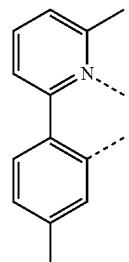
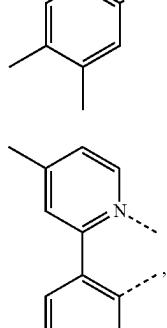
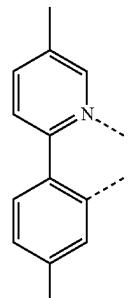
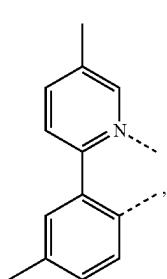
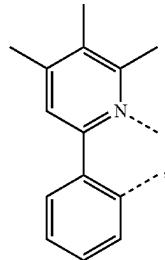
L_{B1}



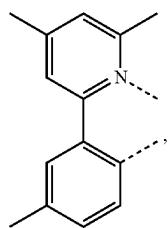
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 L_{B8} 

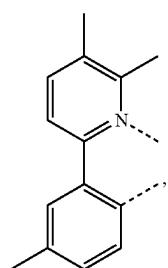
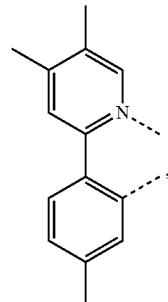
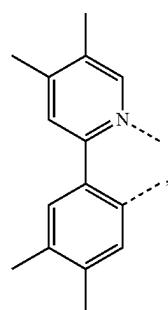
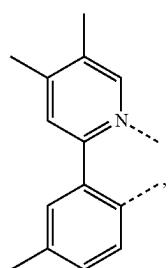
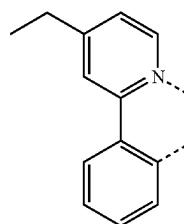
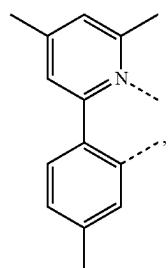
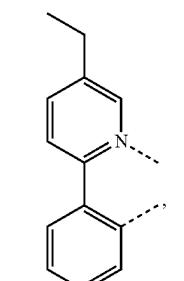
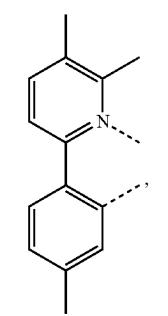
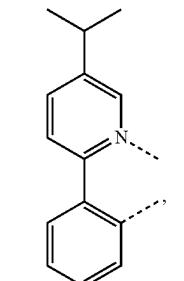
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 L_{B14}  L_{B9}  L_{B10}  L_{B15}  L_{B11}  L_{B16}  L_{B12}  L_{B17}  L_{B13}  L_{B18} 

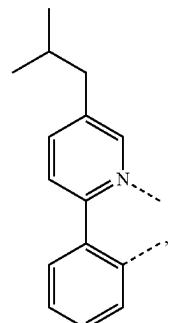
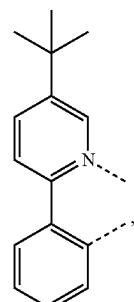
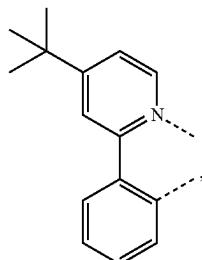
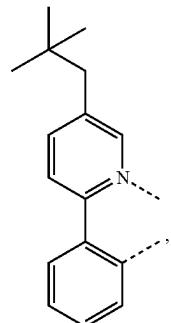
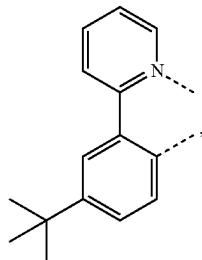
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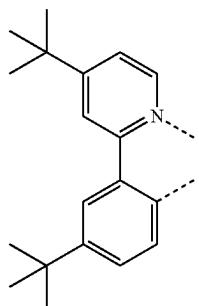
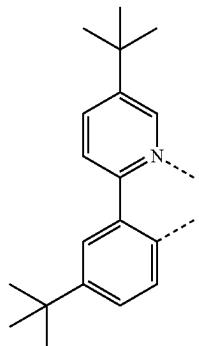
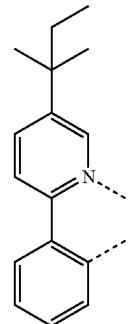
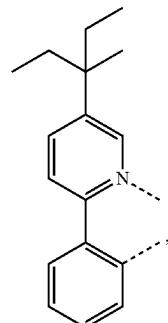
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L_{B24}L_{B20}L_{B25}L_{B21}L_{B26}L_{B22}L_{B27}L_{B23}L_{B28}

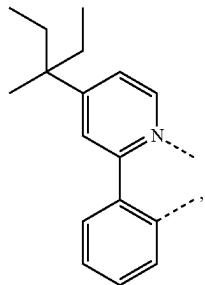
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 L_{B29}  L_{B30}  L_{B31}  L_{B32}  L_{B33} 

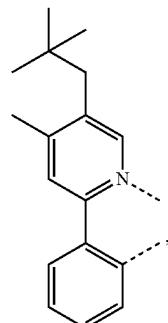
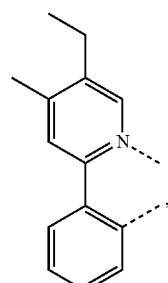
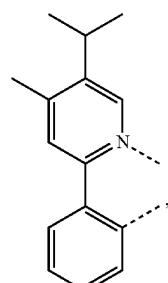
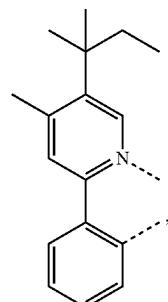
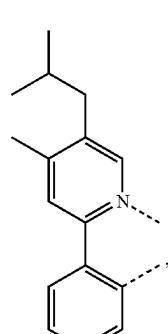
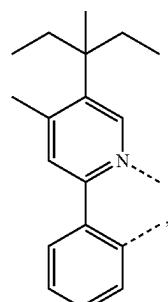
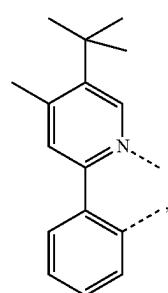
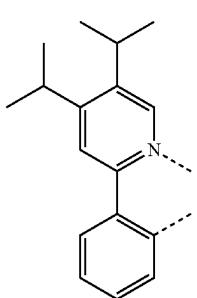
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 L_{B34}  L_{B35}  L_{B36}  L_{B37} 

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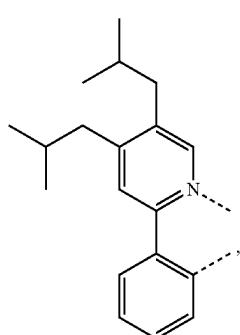
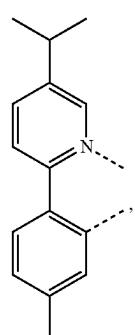
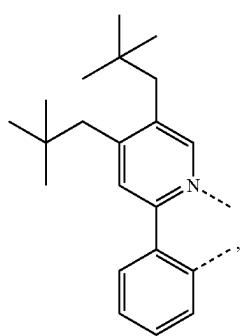
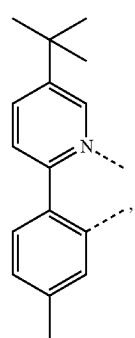
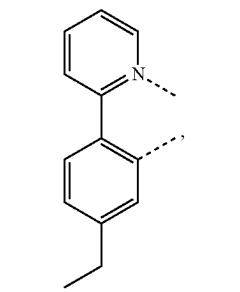
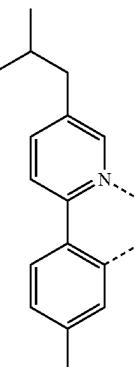
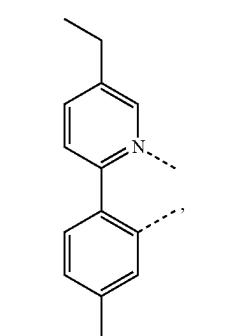
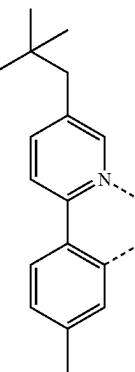
 L_{B38} 

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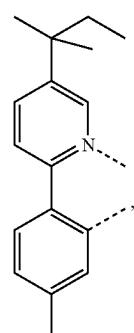
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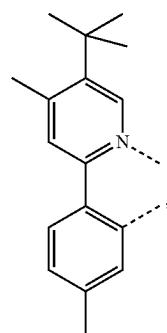
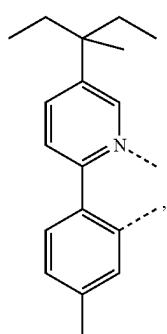
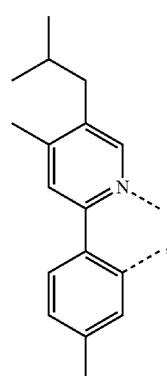
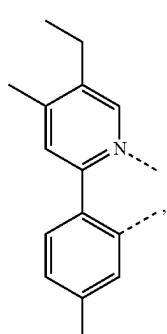
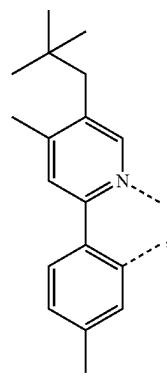
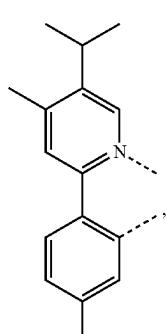
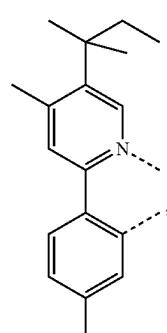
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L_B47L_B51L_B48L_B52L_B49L_B53L_B50L_B54

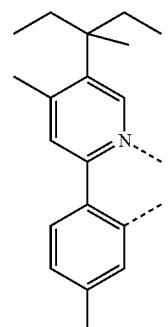
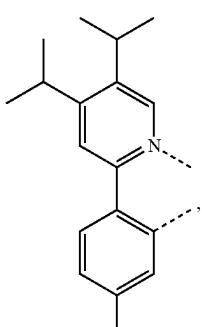
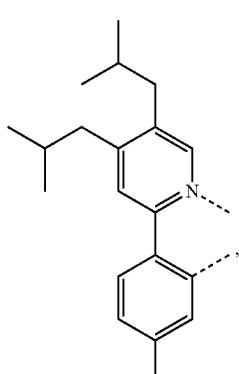
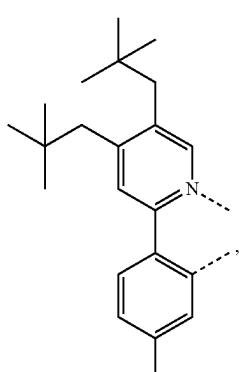
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L_B55

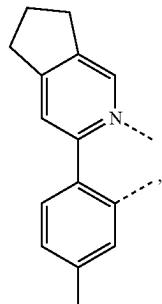
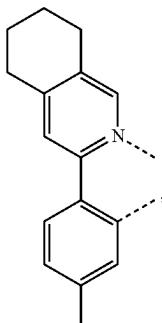
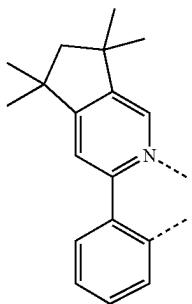
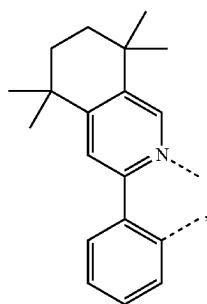
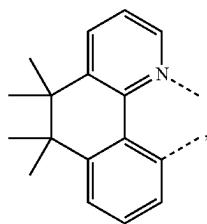
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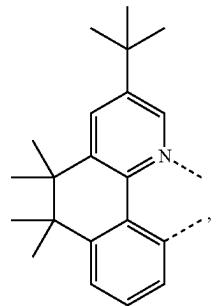
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L_B63L_B64L_B65L_B66

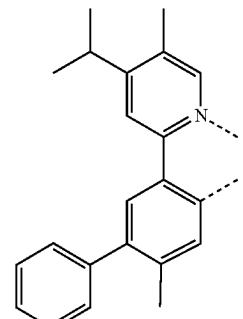
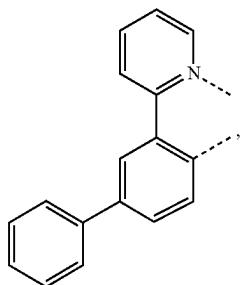
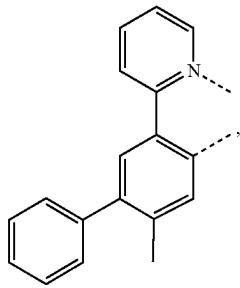
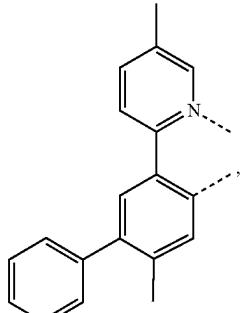
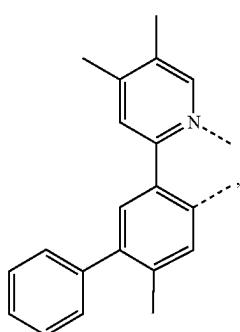
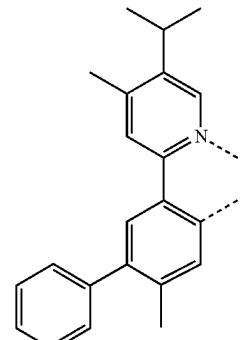
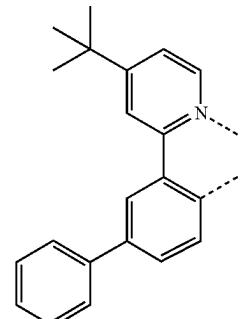
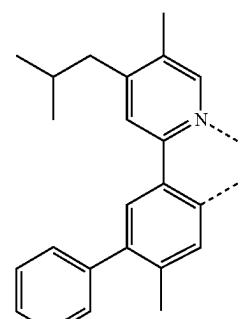
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L_B67L_B68L_B69L_B70L_B71

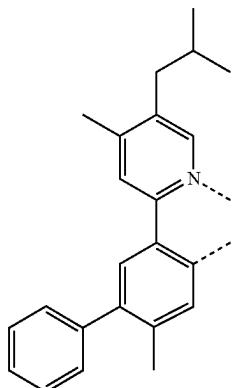
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 L_{B72} 

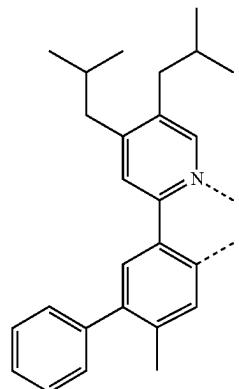
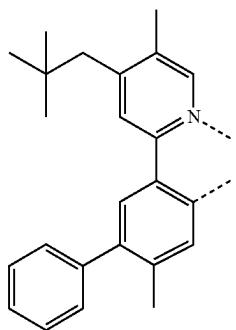
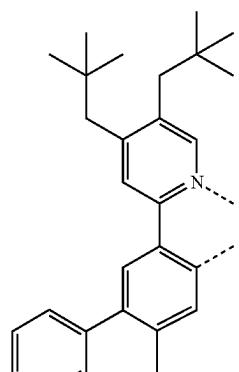
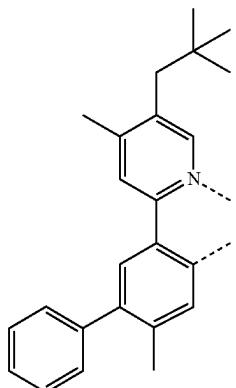
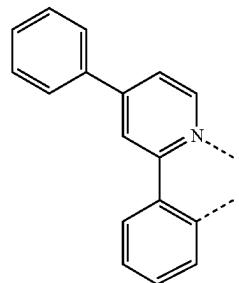
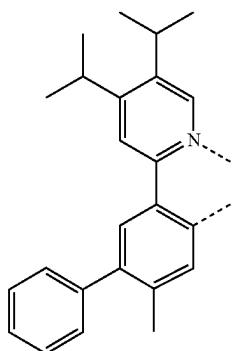
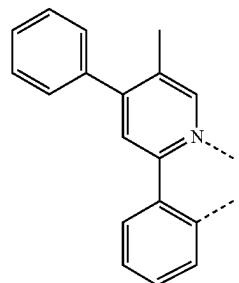
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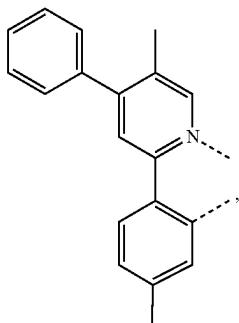
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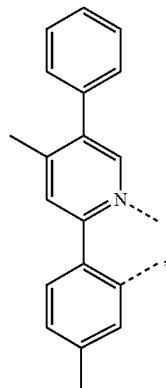
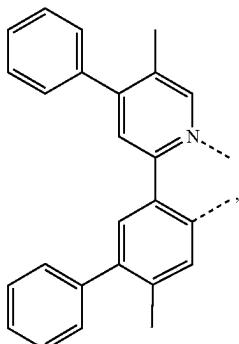
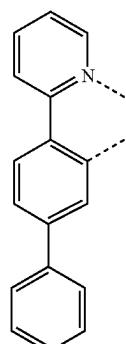
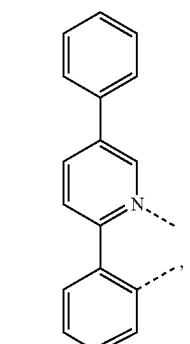
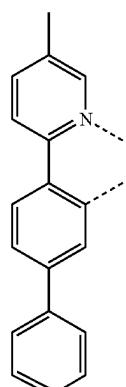
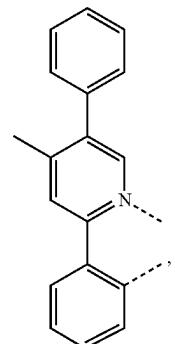
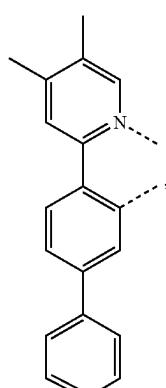
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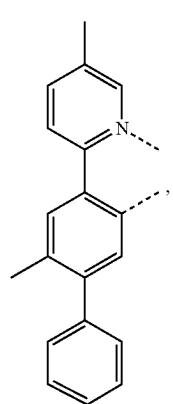
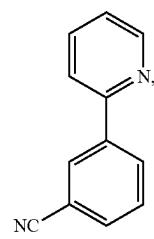
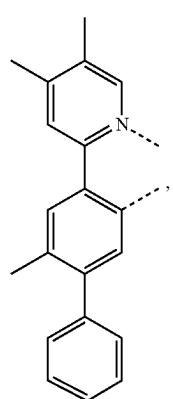
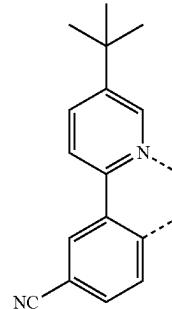
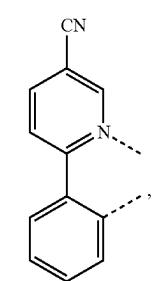
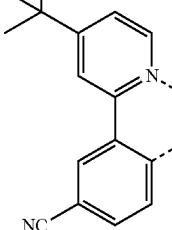
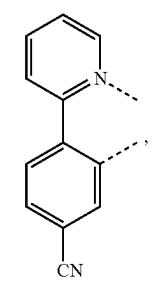
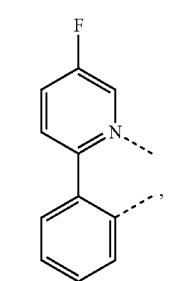
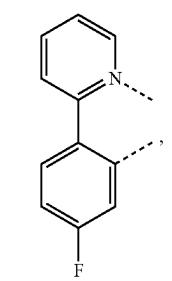
L_B89

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L_B93L_B90L_B94L_B91L_B95L_B92L_B96

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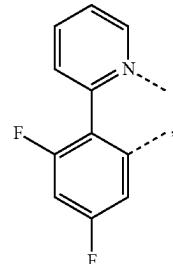
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L_B97L_B101L_B98L_B102L_B99L_B103L_B100L_B104L_B105

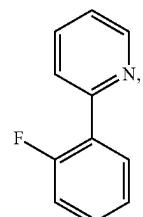
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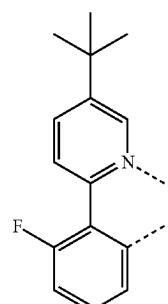
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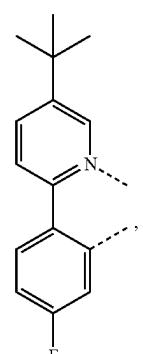
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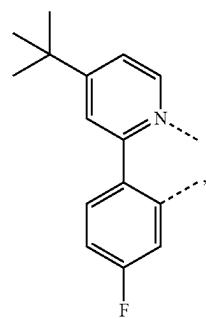
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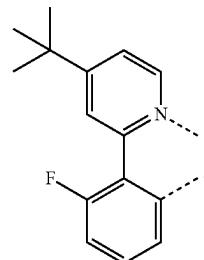
L-B100



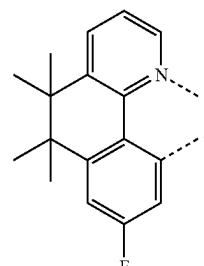
L_{R110}



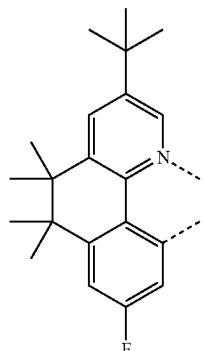
L_{B111}



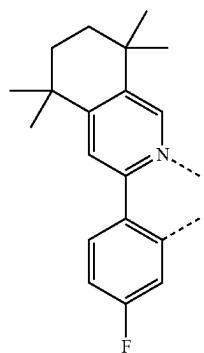
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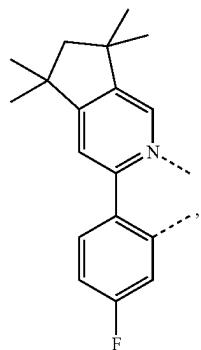
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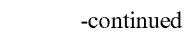
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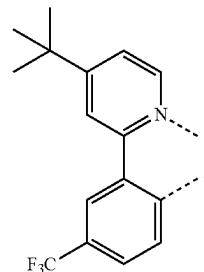
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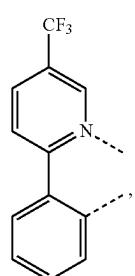
L_B115



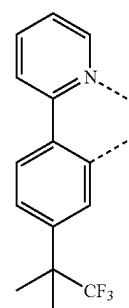
L_{B120}



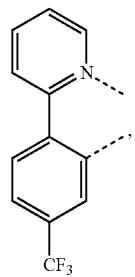
L_{B121}



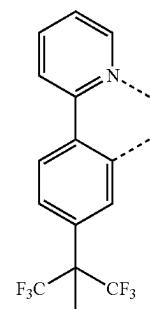
L_B116



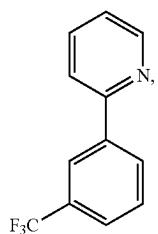
L_{B122}



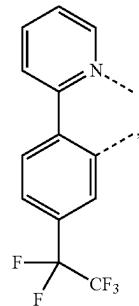
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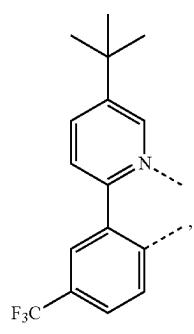
L_B|23



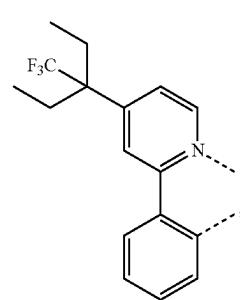
L_B118



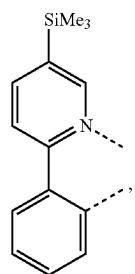
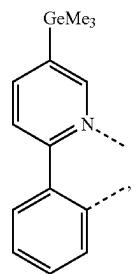
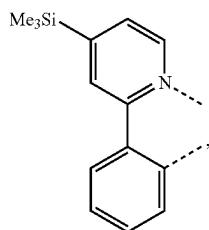
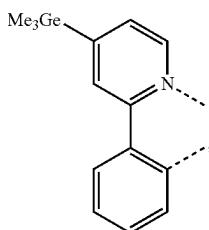
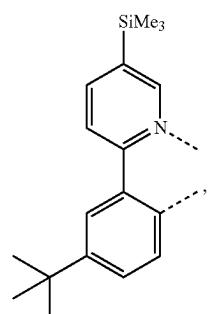
L_B124



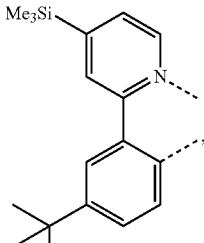
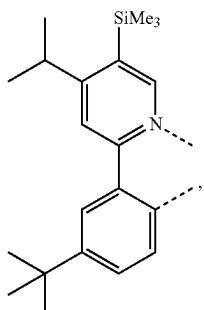
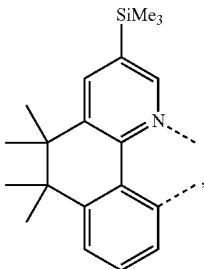
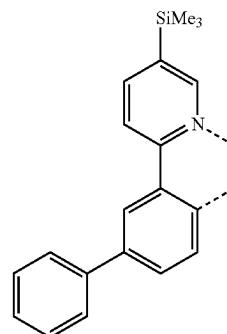
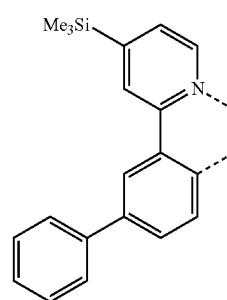
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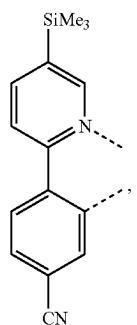
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L_B125L_B126L_B127L_B128L_B129

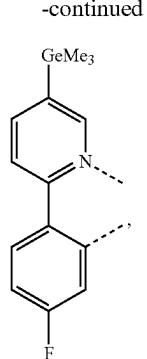
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L_B130L_B131L_B132L_B133L_B134

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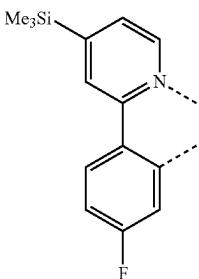


L_B135



L_B139

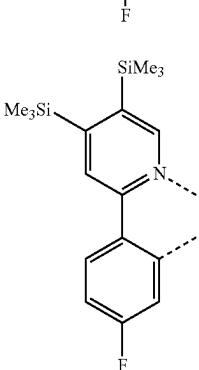
L_B136



L_B|40

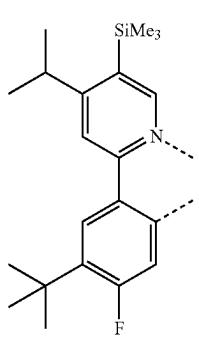
The chemical structure shows a pyridine ring substituted at the 4-position with a phenyl group. This phenyl group is attached via a single bond to the ring and via a double bond to another phenyl group. The latter phenyl group is further substituted at the 4-position with a cyano group (C≡N).

L_B137

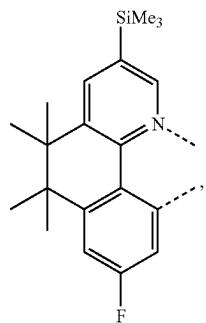


J_{CP}R143

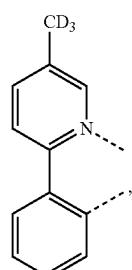
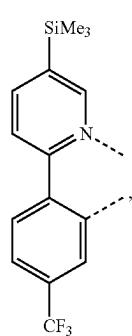
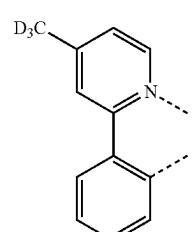
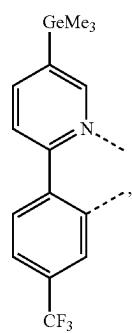
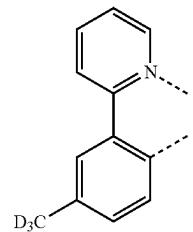
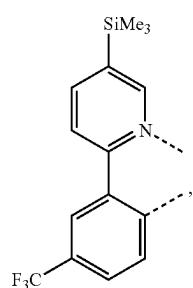
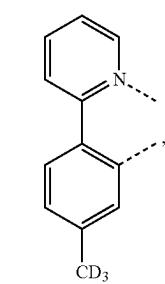
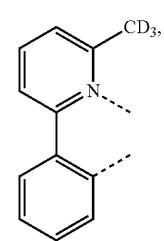
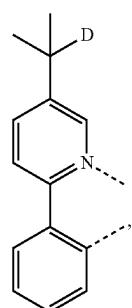
L_{B138}



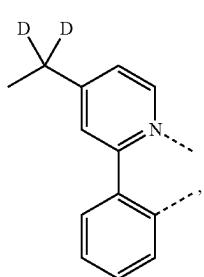
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L_B144

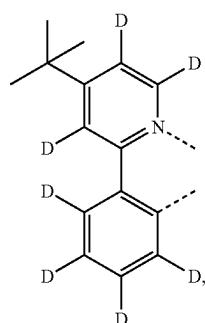
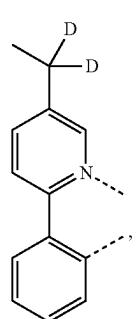
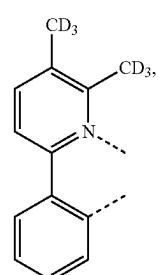
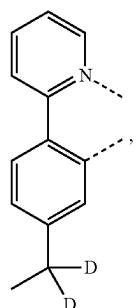
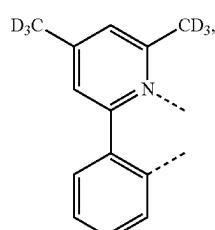
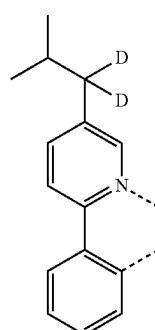
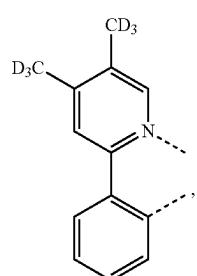
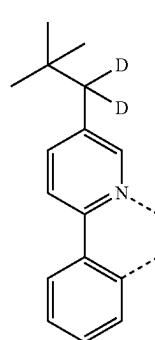
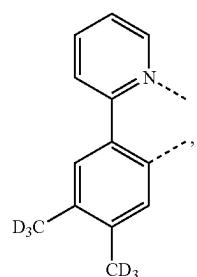
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L_B149L_B145L_B150L_B146L_B151L_B147L_B152L_B148L_B153

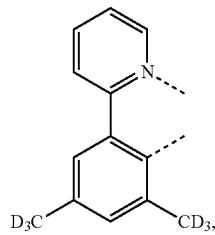
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L_B154

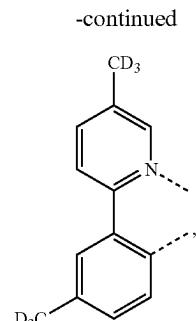
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L_B159L_B155L_B160L_B156L_B161L_B157L_B162L_B158L_B163

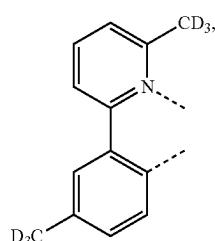
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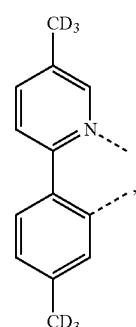
L_B164



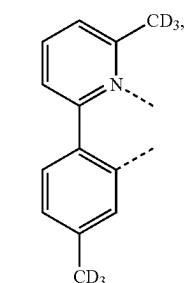
L_B169



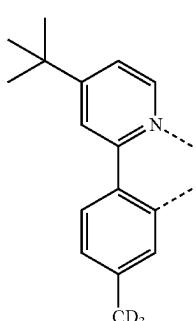
LB165



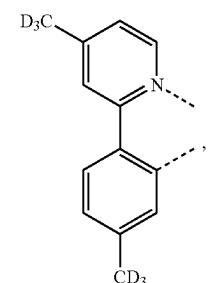
L_B170



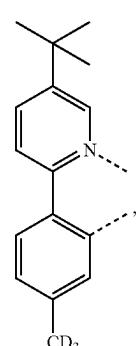
L_B166



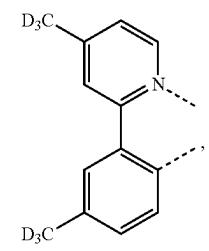
L_B171



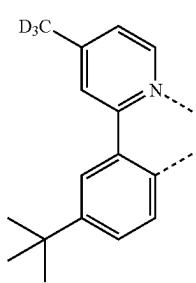
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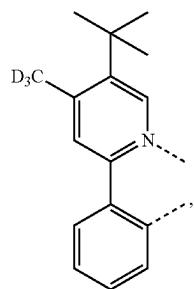
J_B172



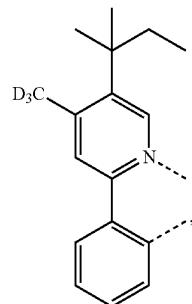
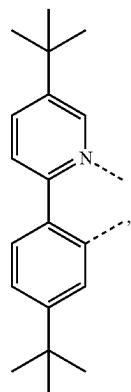
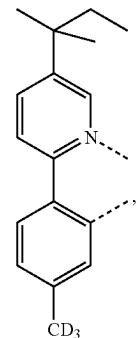
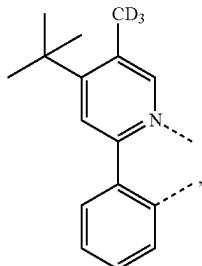
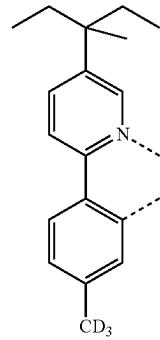
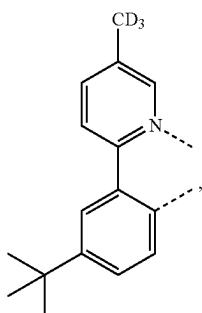
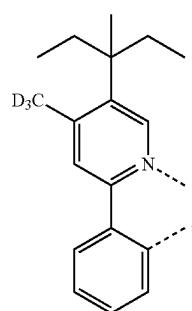
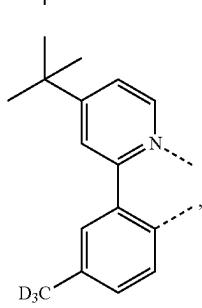
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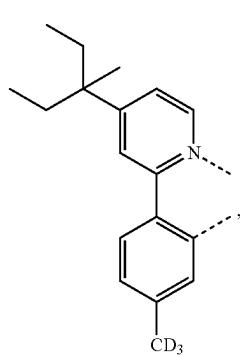
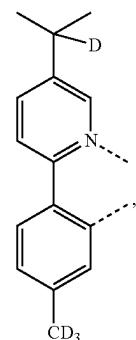
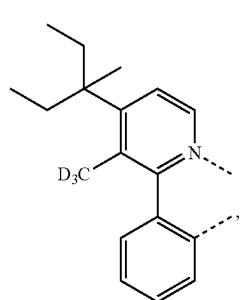
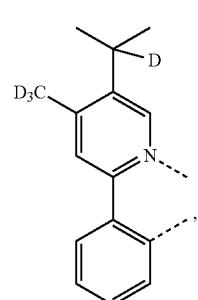
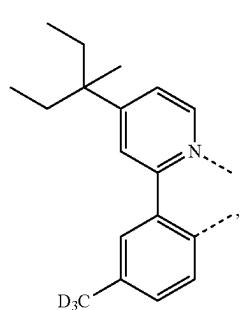
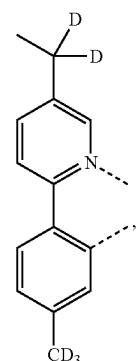
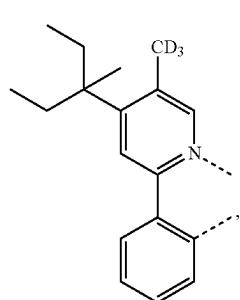
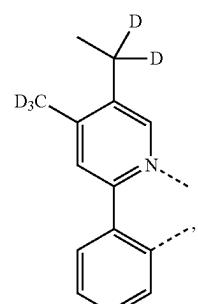
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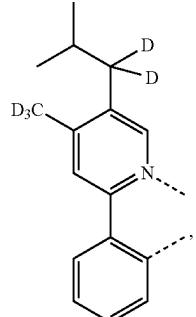
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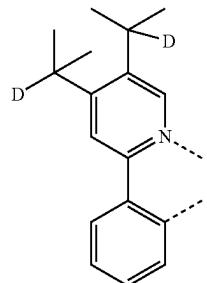
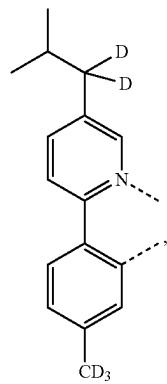
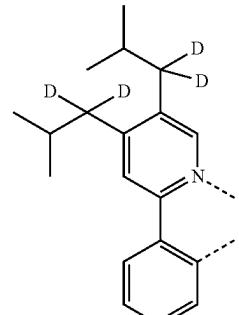
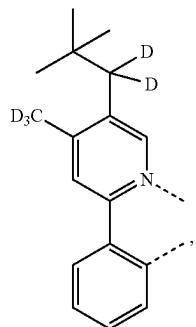
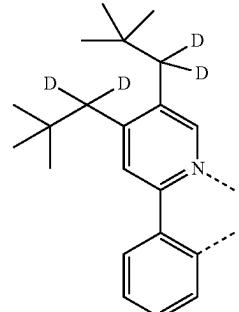
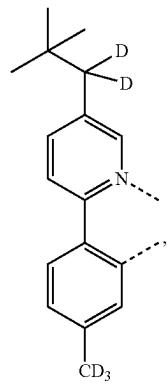
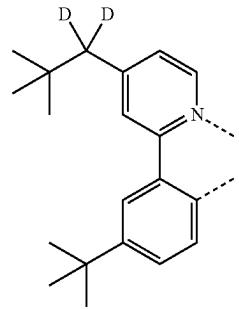
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L_B183L_B187L_B184L_B188L_B185L_B189L_B186L_B190

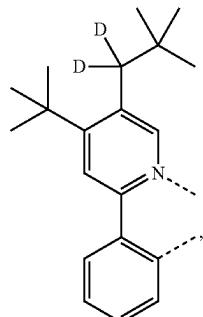
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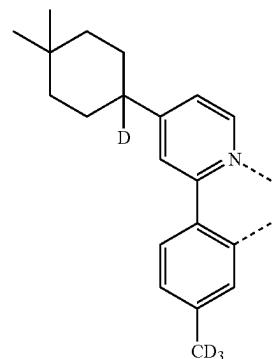
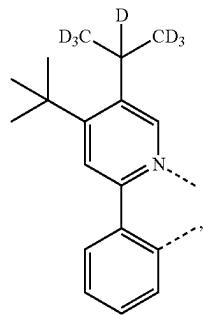
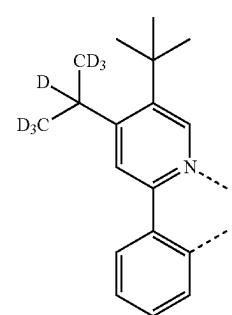
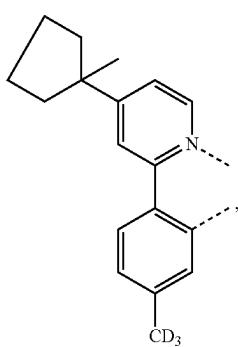
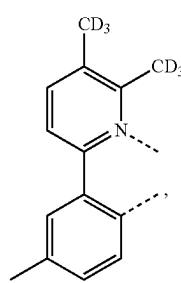
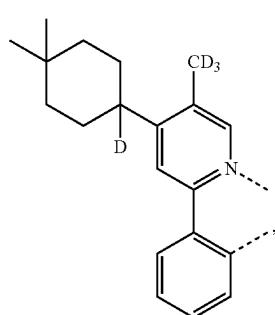
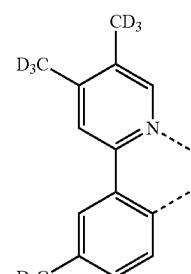
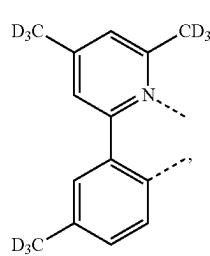
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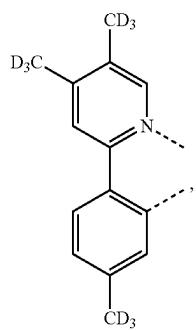
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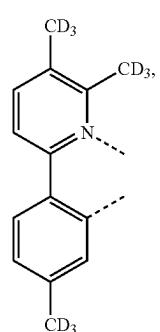
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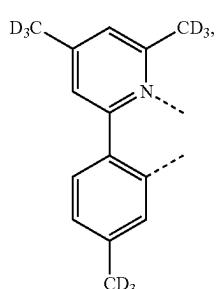
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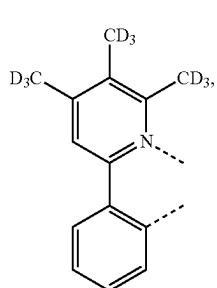
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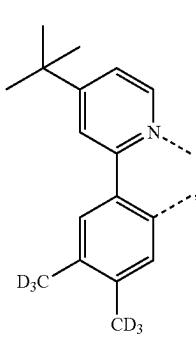
L_{B209}



L_{B210}

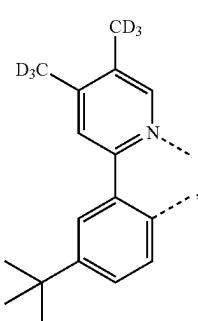


J. B. 211

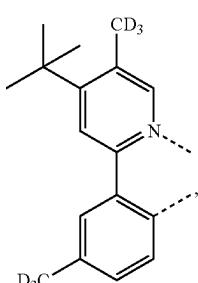


L_{R212}

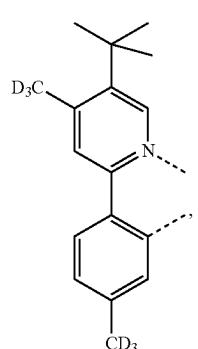
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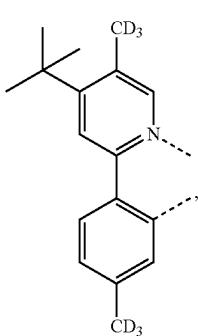
L_{B213}



L_{B2}14

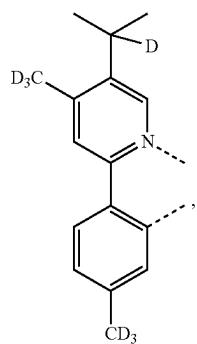


L_{B2}15

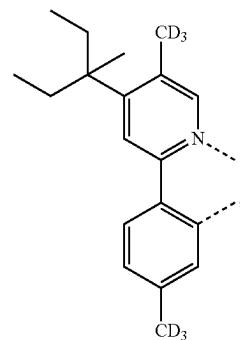
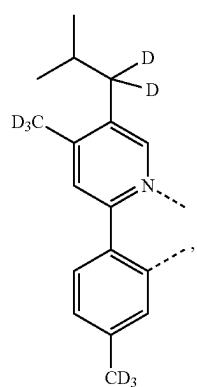
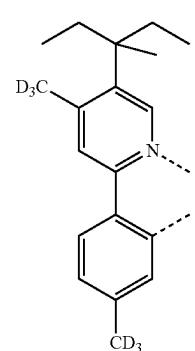
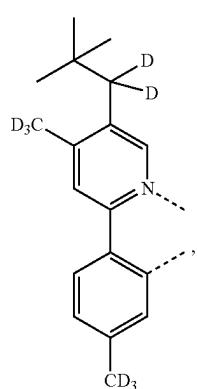
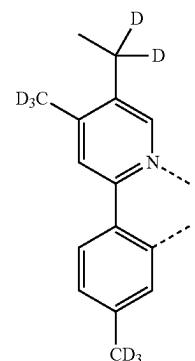
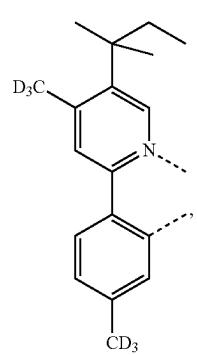
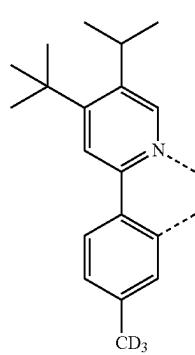


L_{B216}

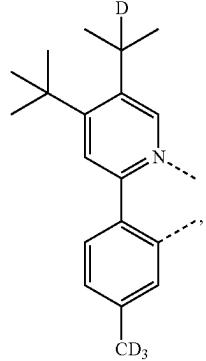
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L_{B217}

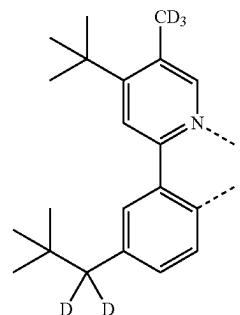
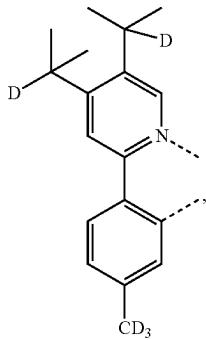
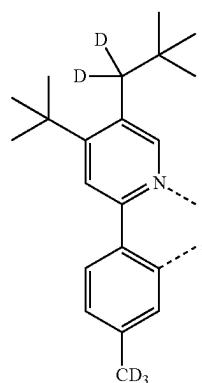
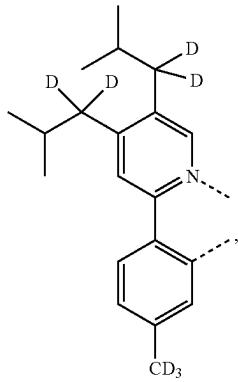
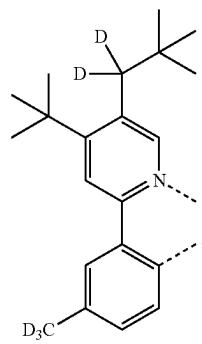
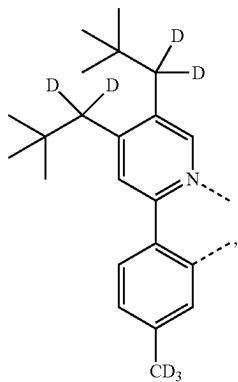
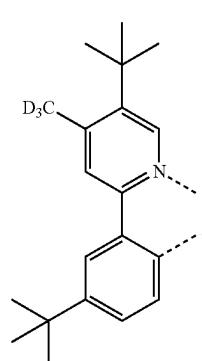
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L_{B221}L_{B218}L_{B222}L_{B219}L_{B223}L_{B220}L_{B224}

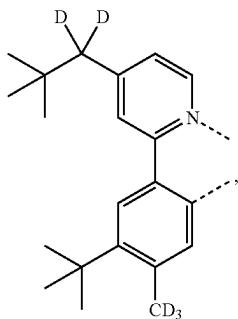
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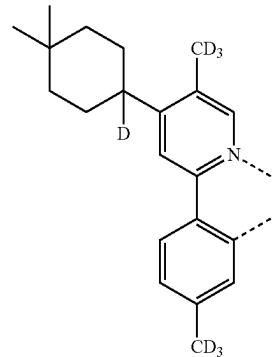
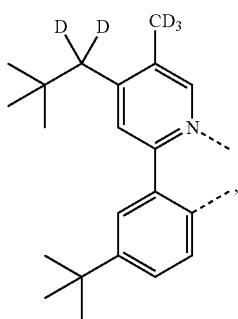
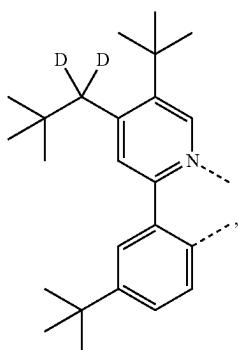
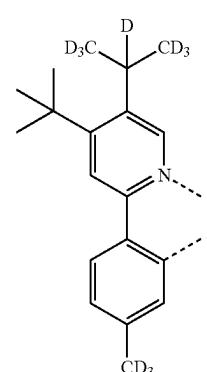
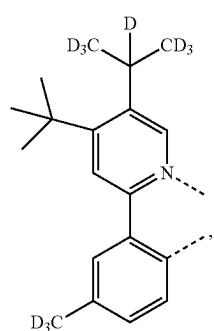
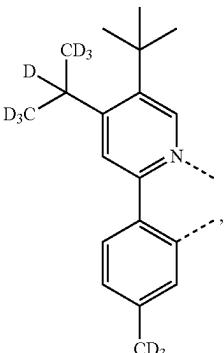
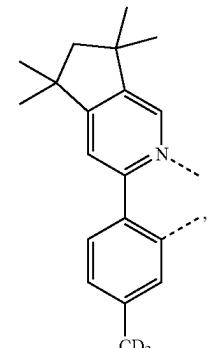
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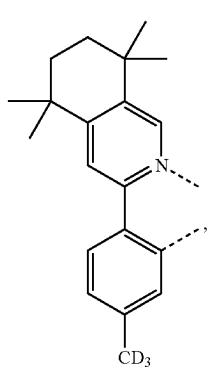
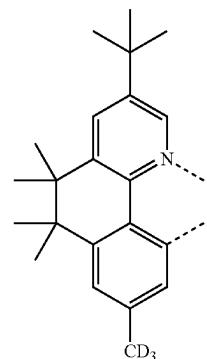
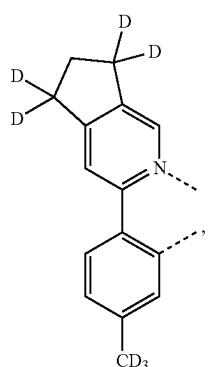
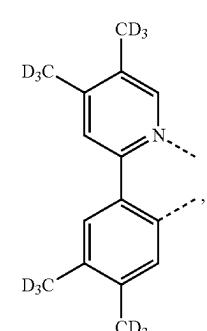
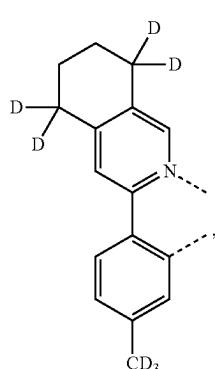
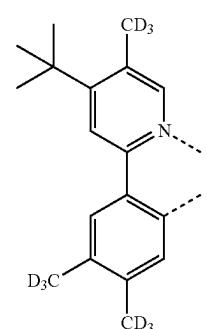
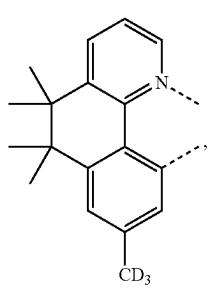
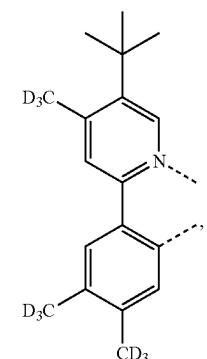
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L_{B237}L_{B234}L_{B235}L_{B238}L_{B236}L_{B239}L_{B240}

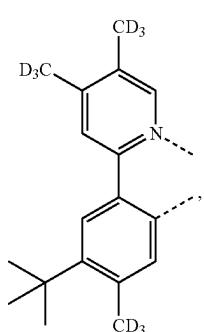
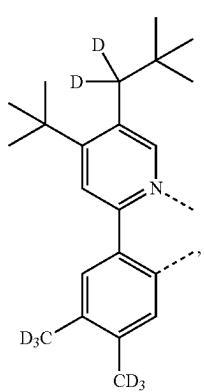
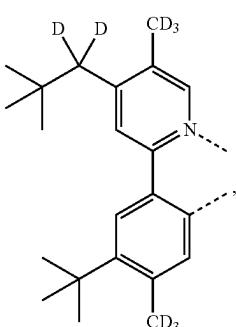
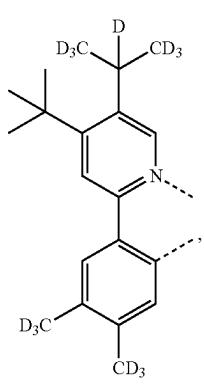
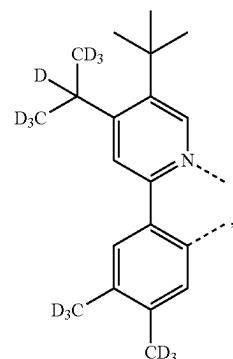
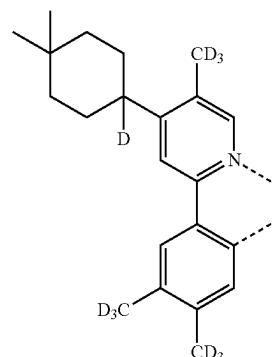
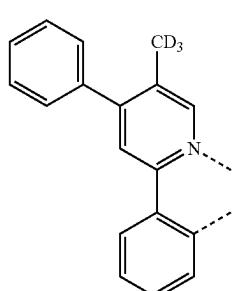
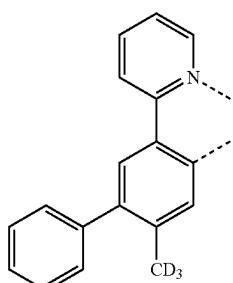
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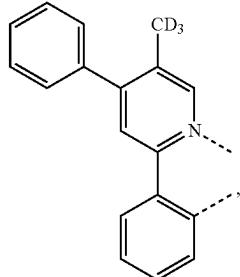
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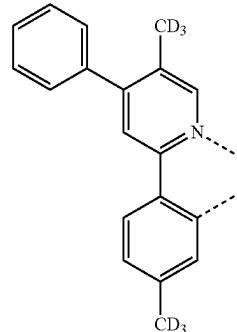
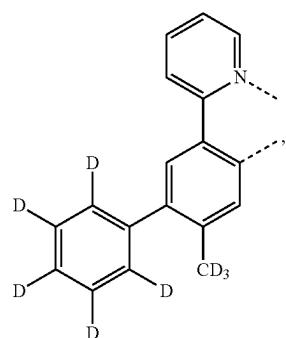
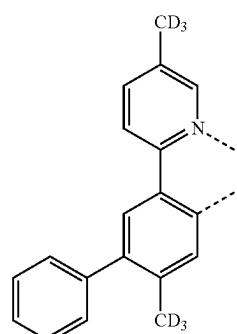
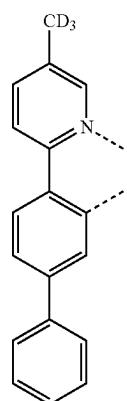
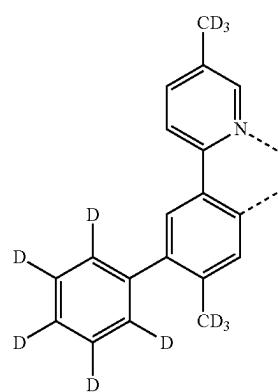
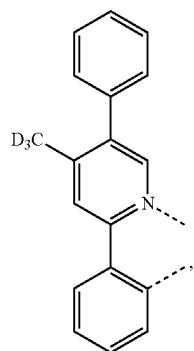
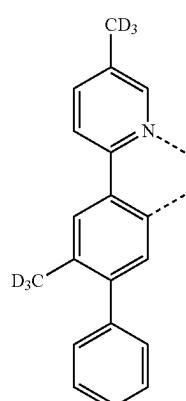
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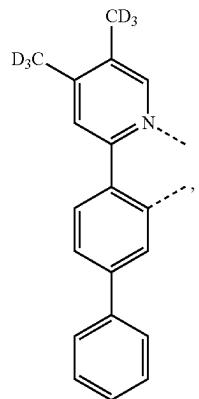
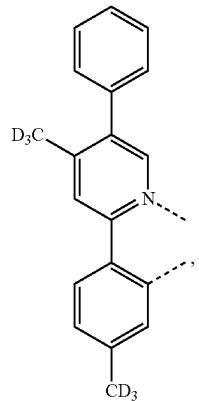
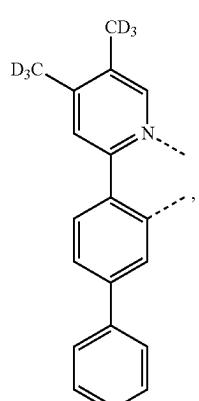
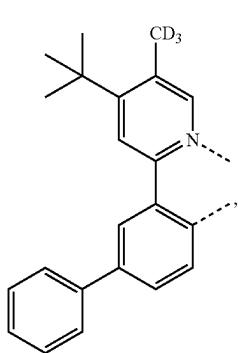
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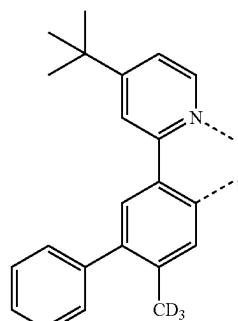
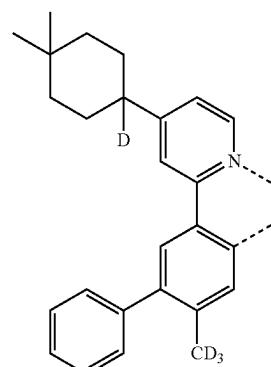
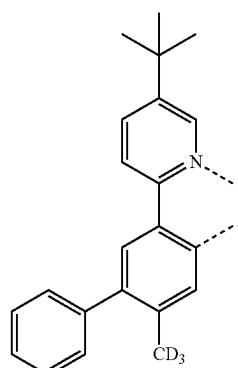
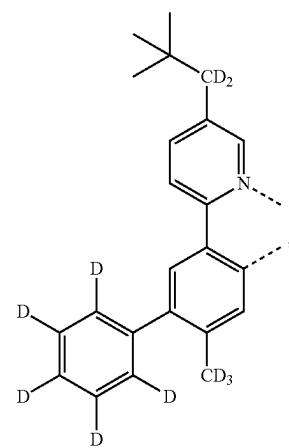
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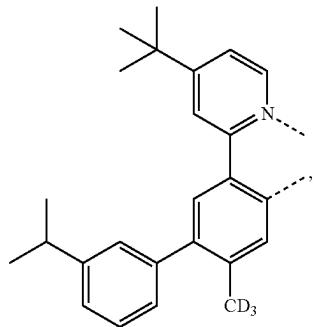
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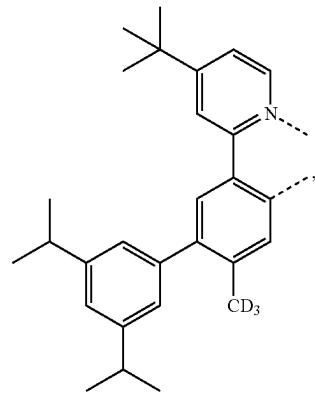
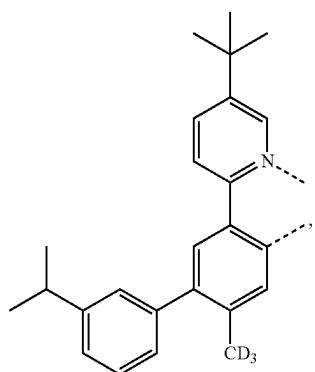
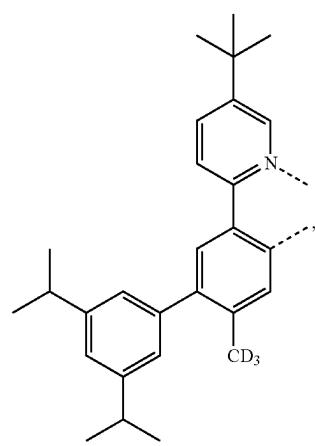
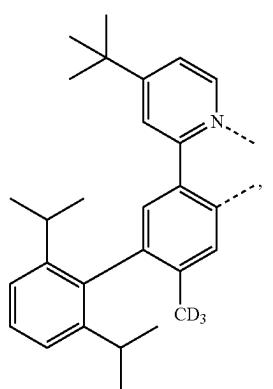
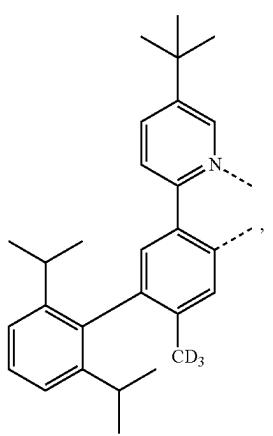
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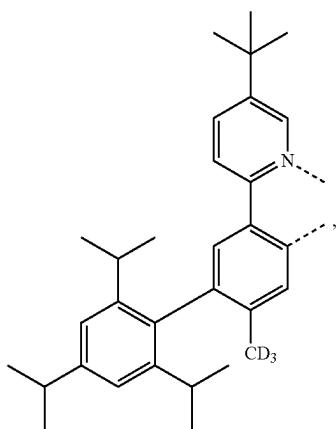
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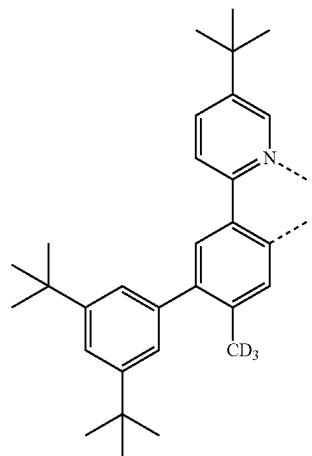
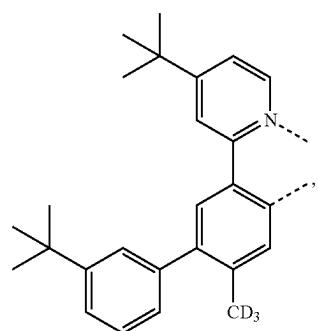
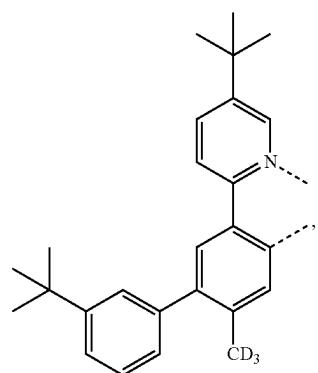
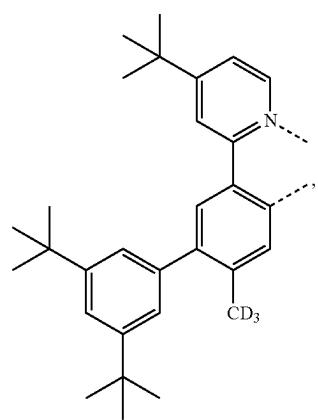
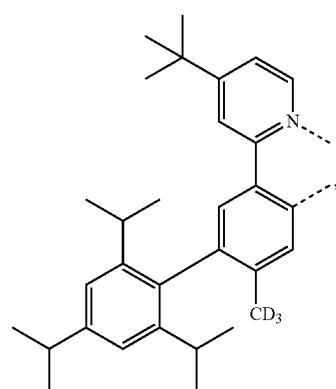
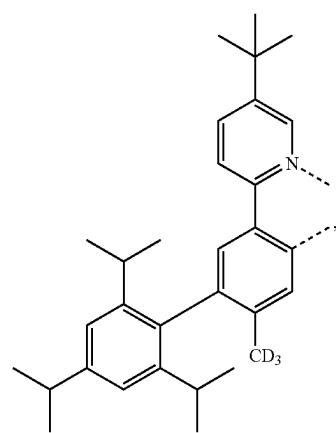
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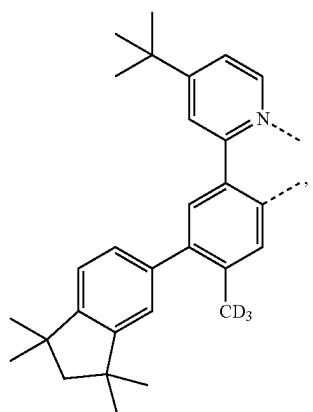
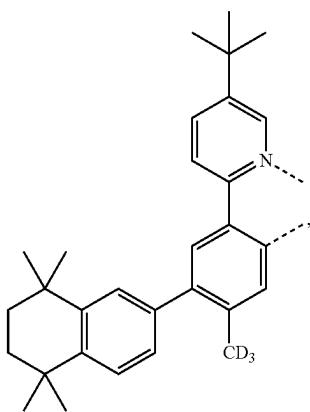
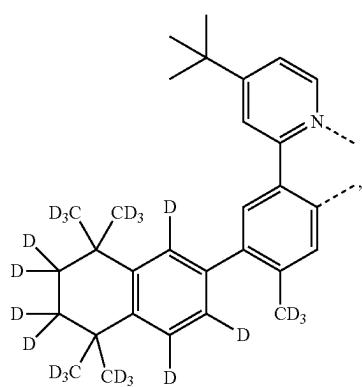
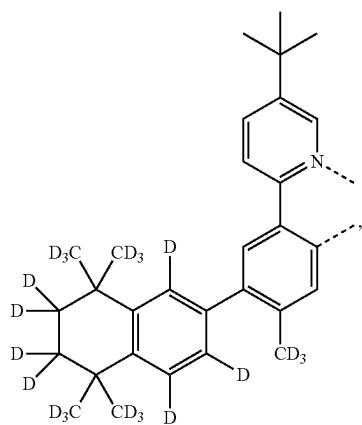
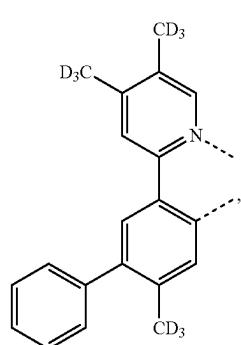
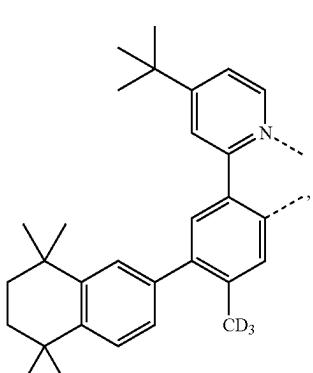
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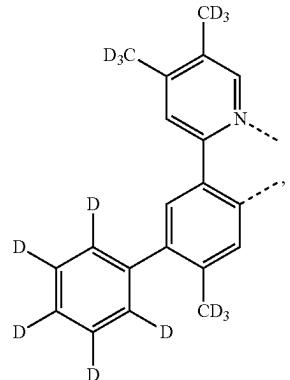
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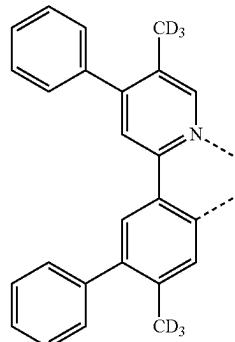
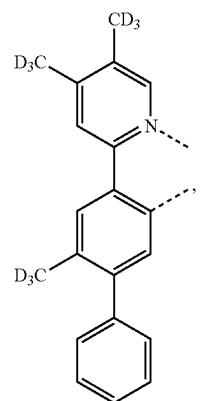
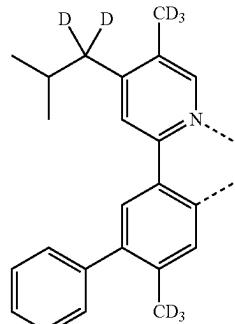
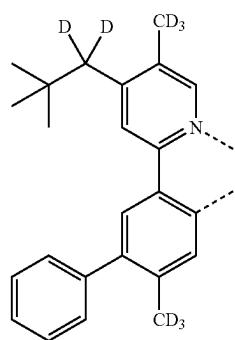
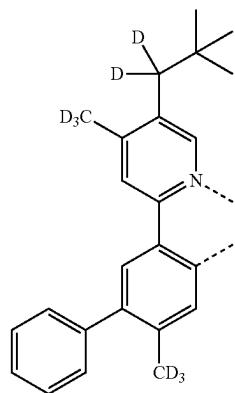
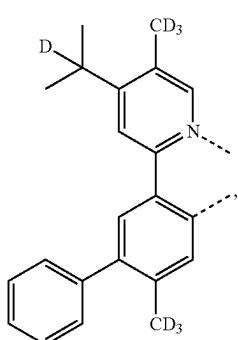
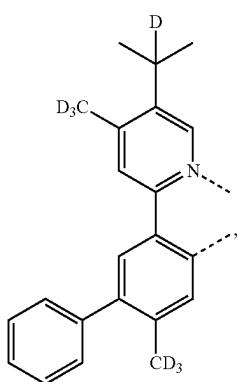
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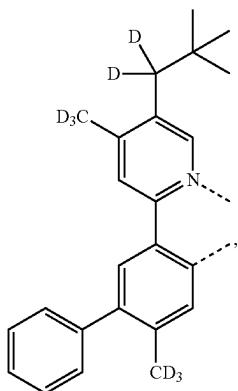
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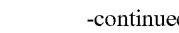
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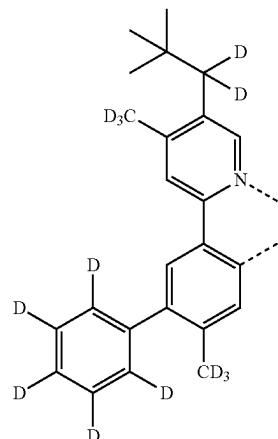
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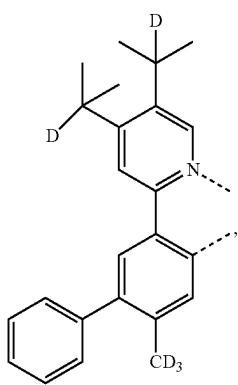
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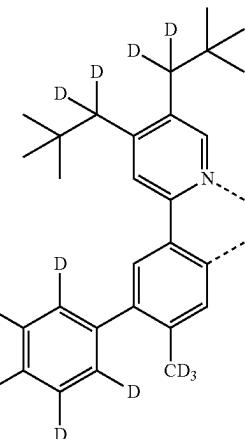
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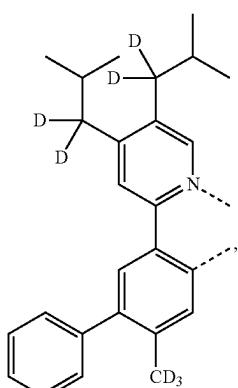
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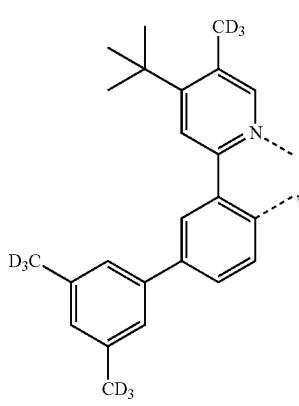
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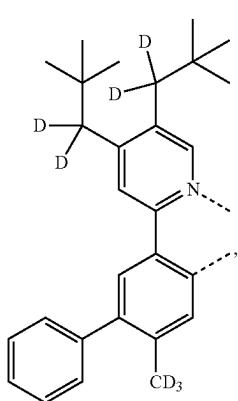
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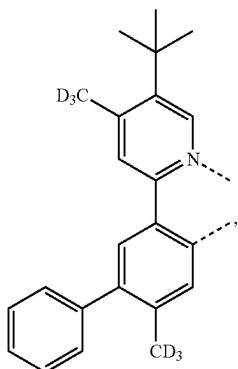
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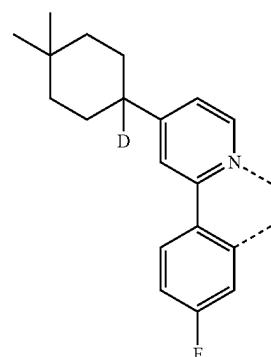
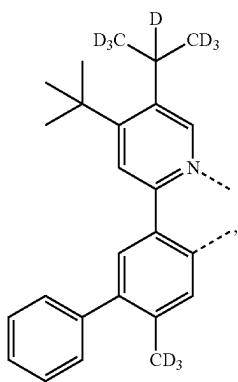
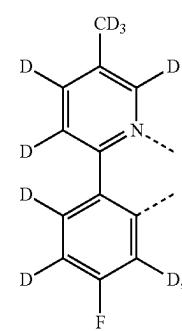
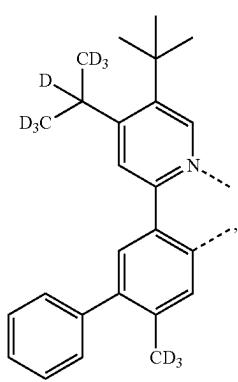
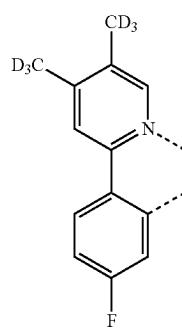
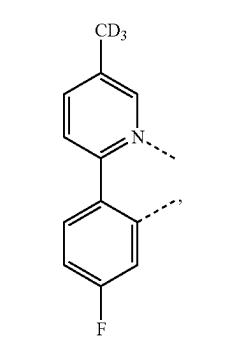
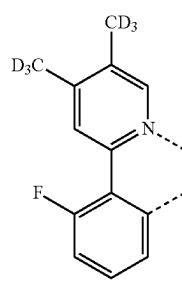
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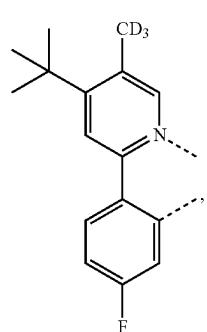
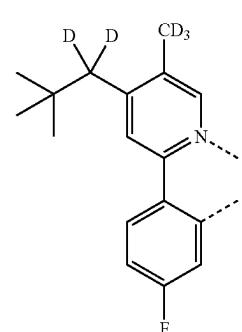
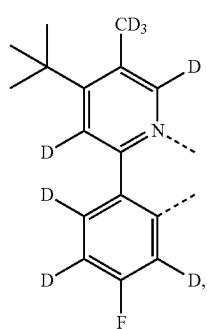
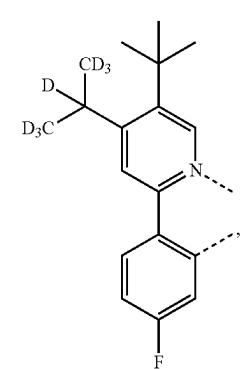
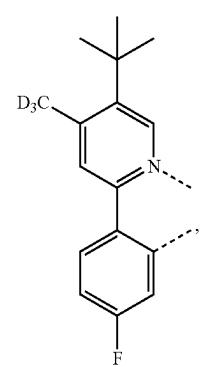
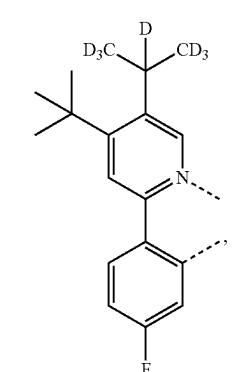
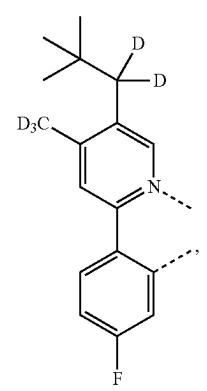
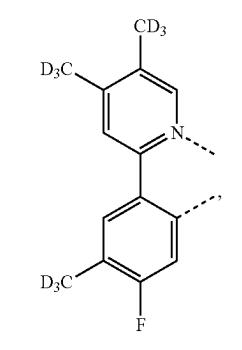
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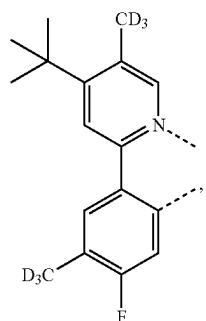
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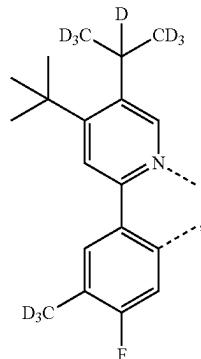
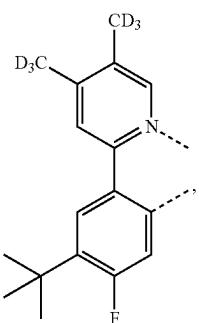
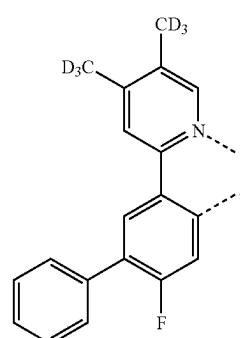
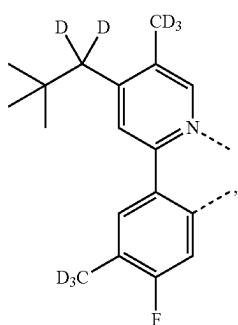
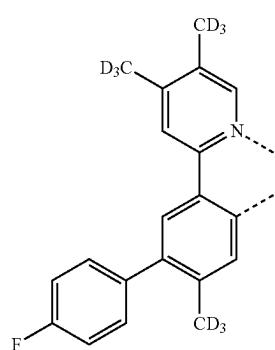
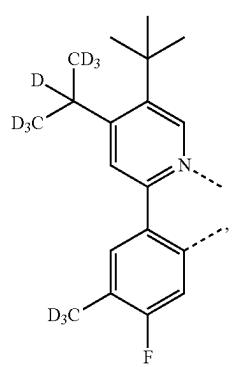
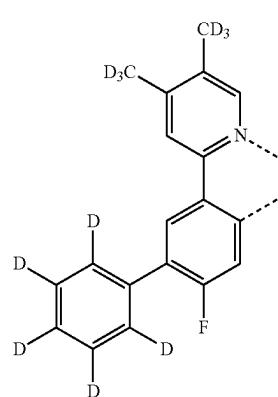
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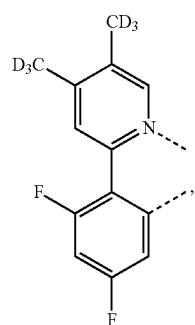
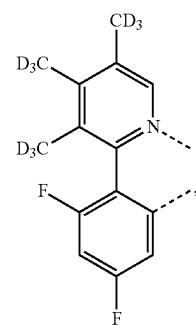
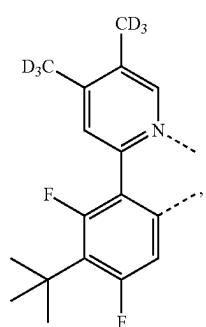
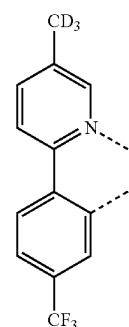
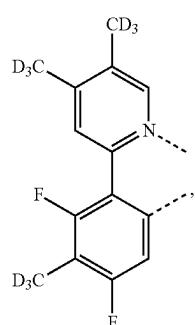
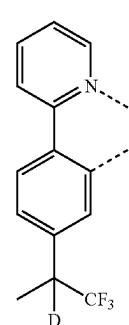
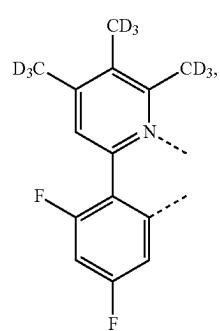
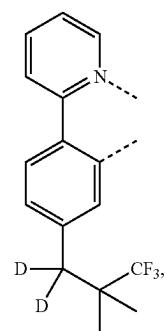
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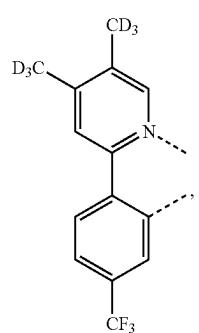
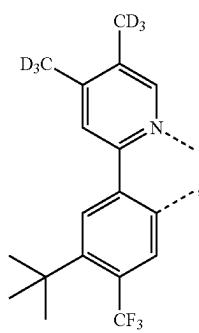
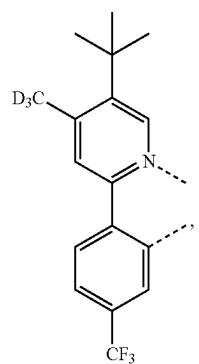
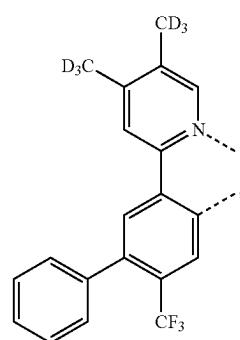
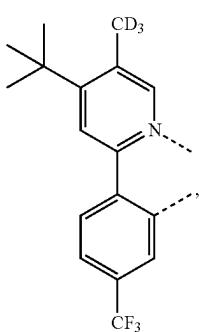
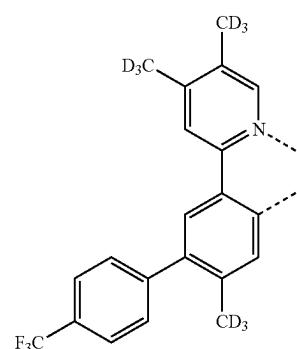
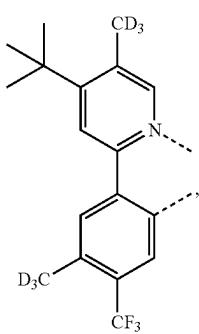
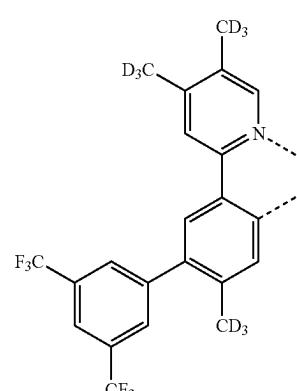
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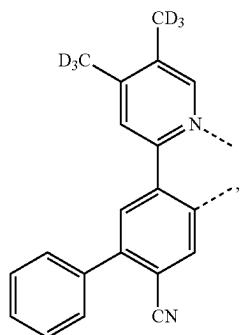
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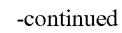
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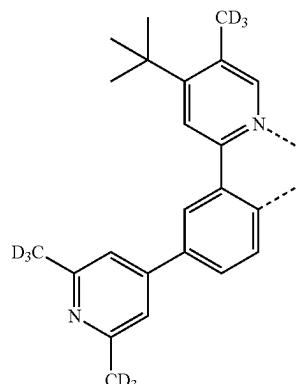
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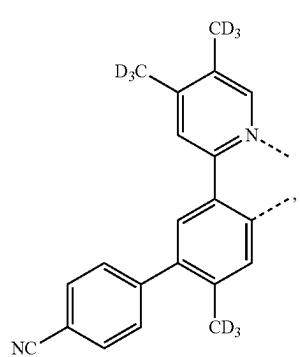
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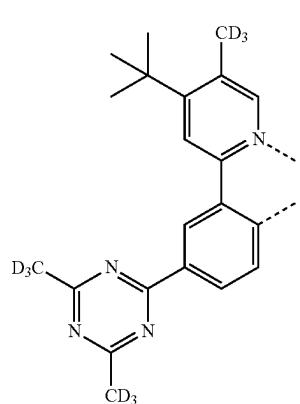
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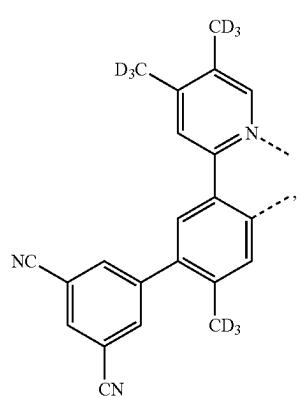
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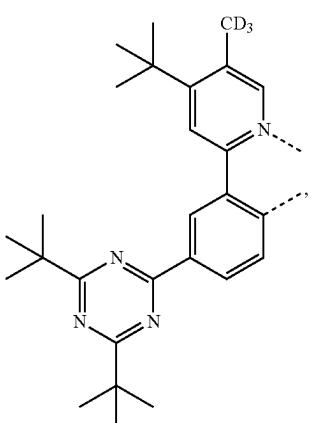
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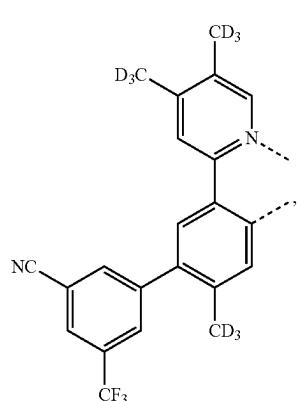
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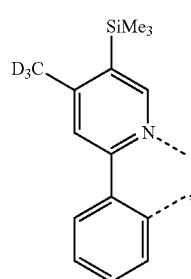
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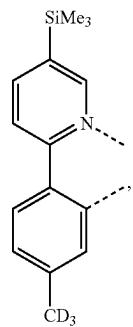
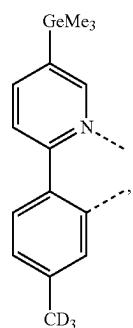
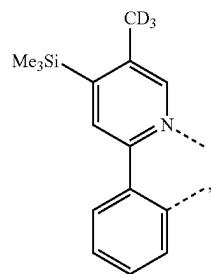
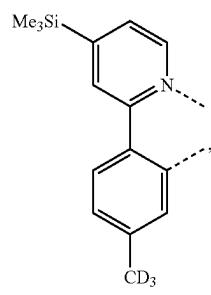
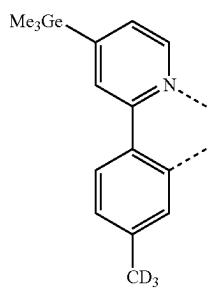
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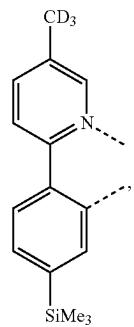
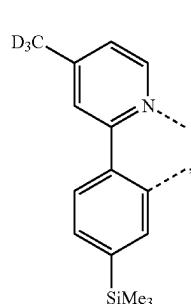
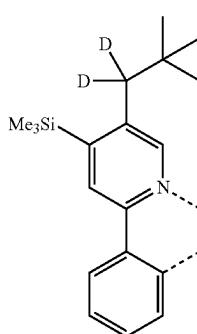
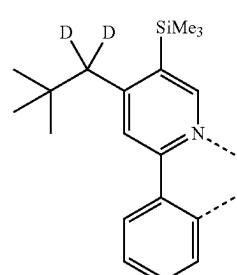
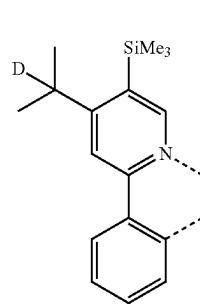
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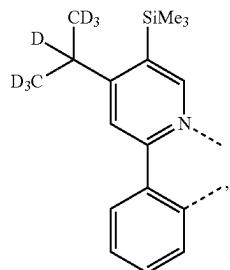
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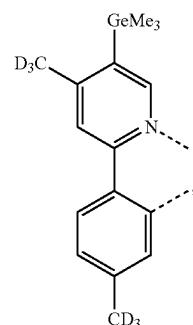
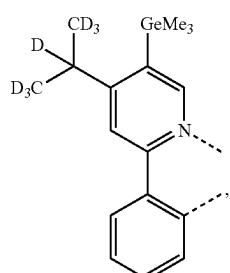
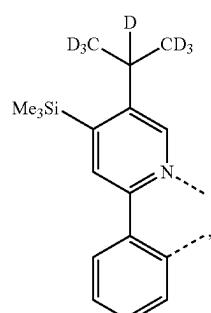
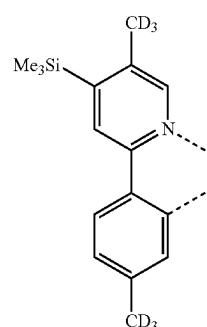
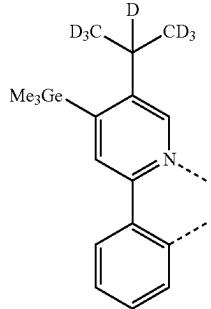
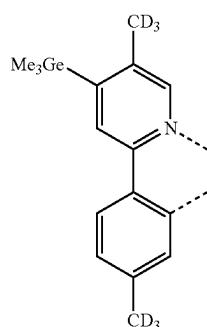
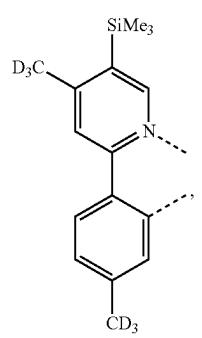
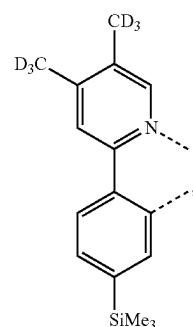
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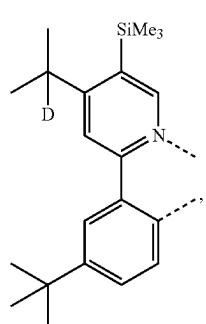
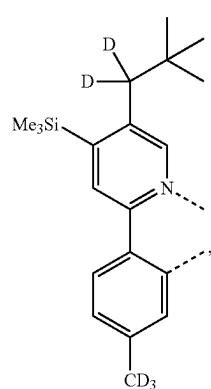
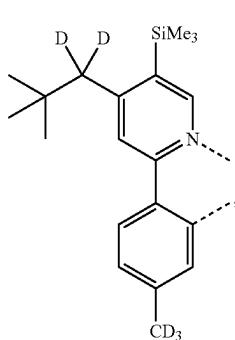
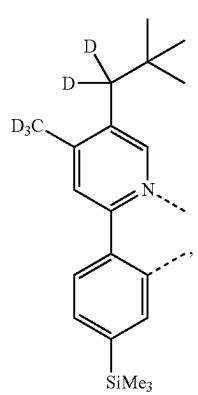
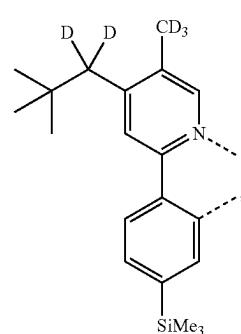
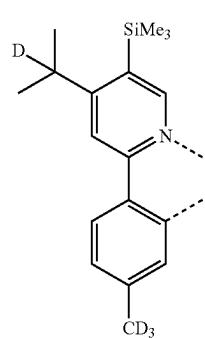
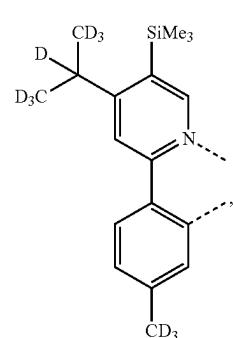
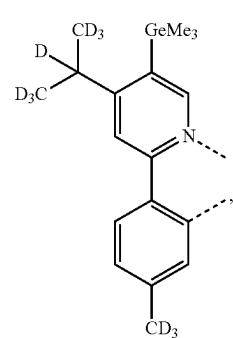
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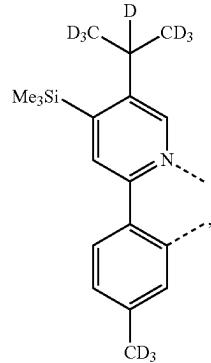
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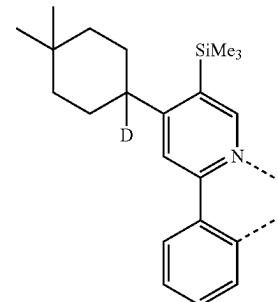
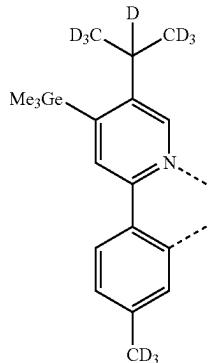
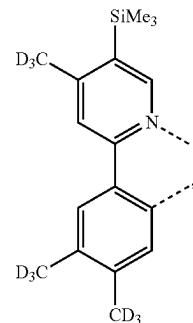
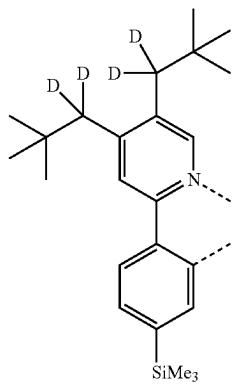
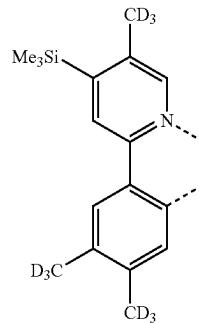
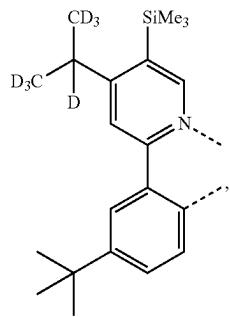
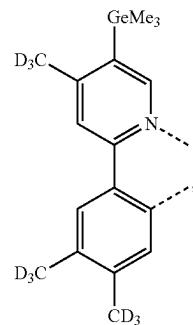
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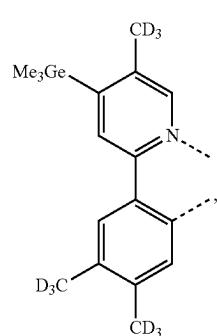
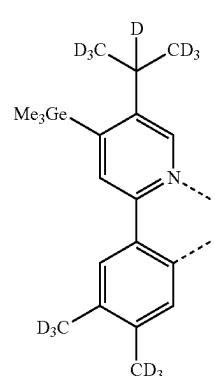
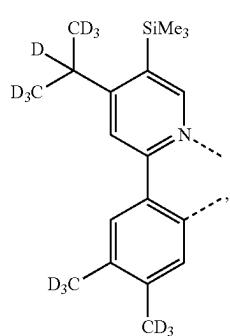
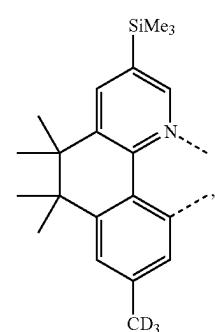
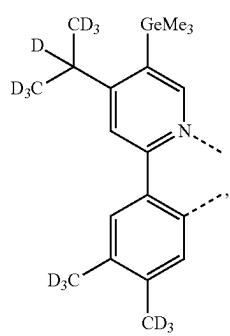
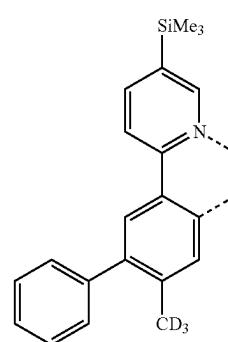
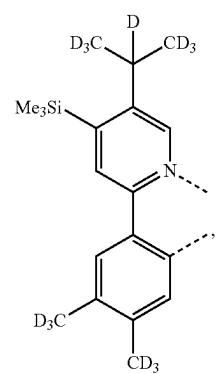
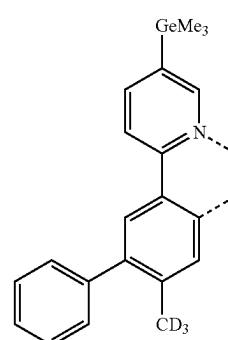
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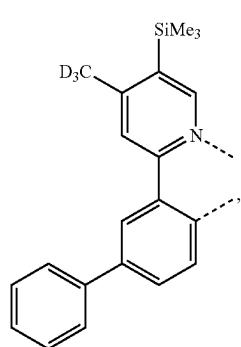
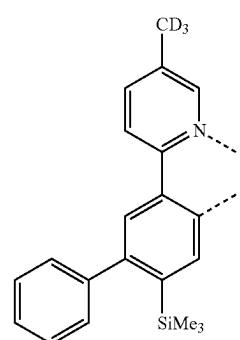
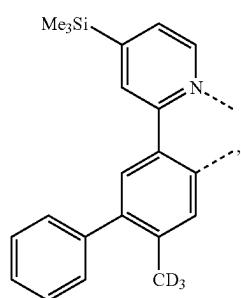
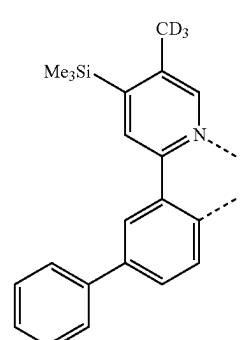
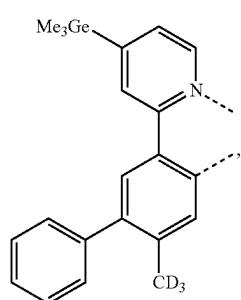
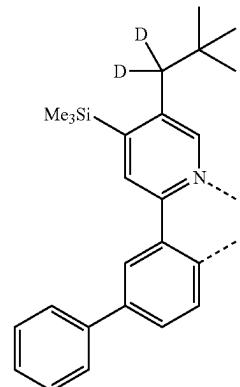
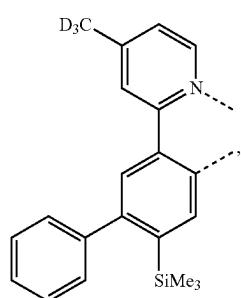
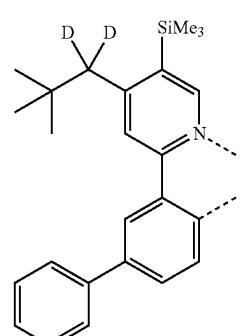
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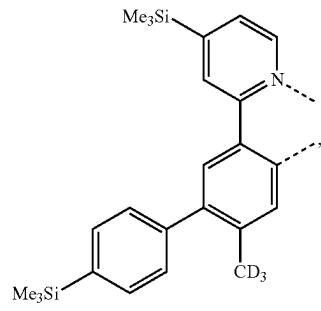
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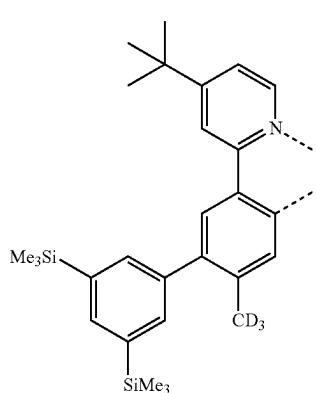
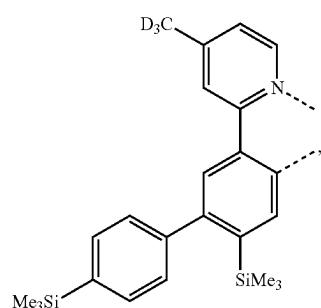
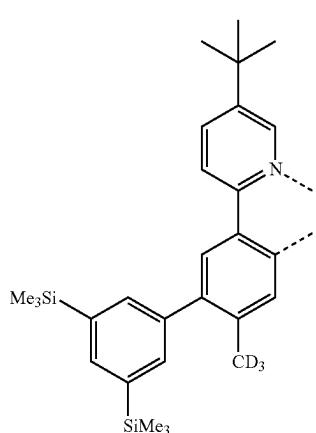
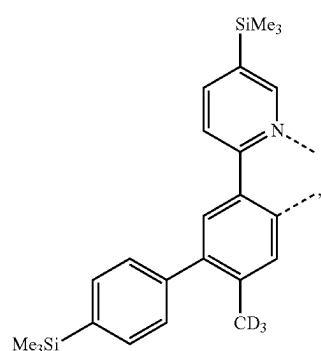
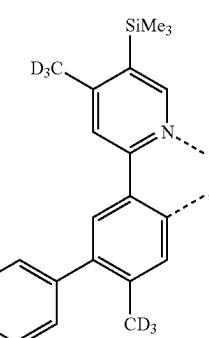
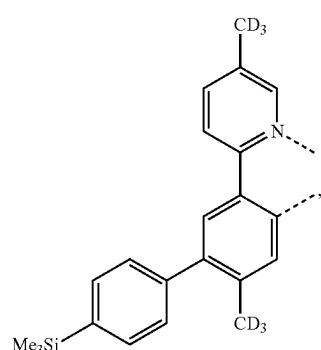
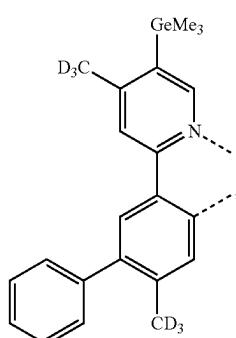
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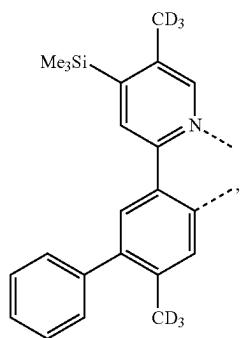
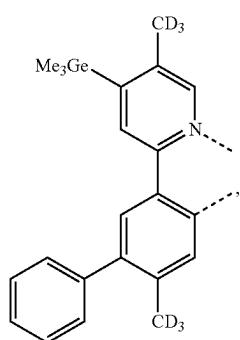
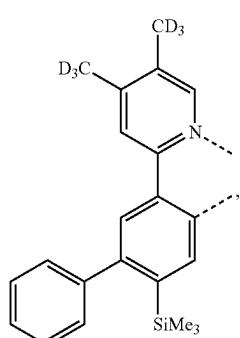
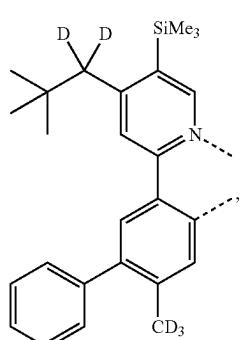
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L_B408

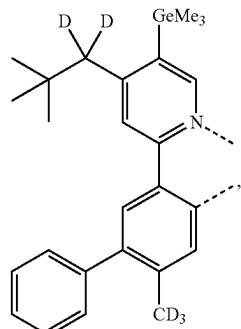
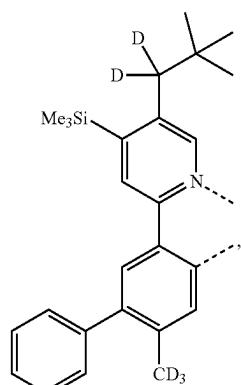
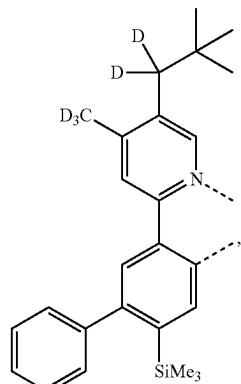
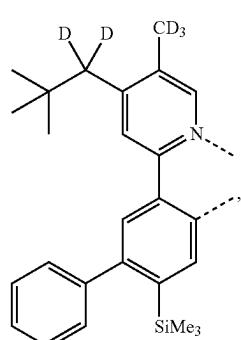
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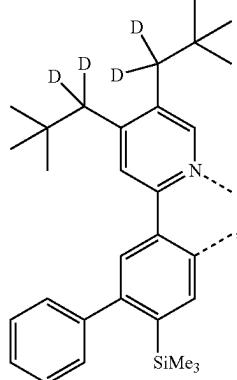
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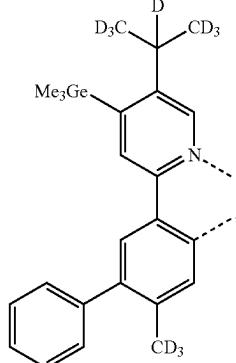
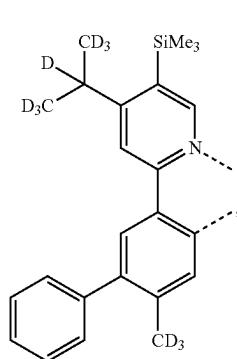
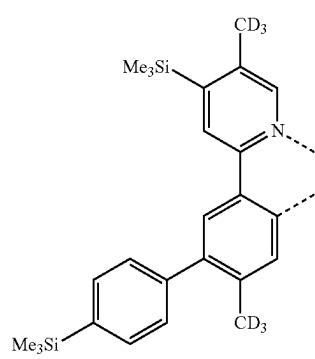
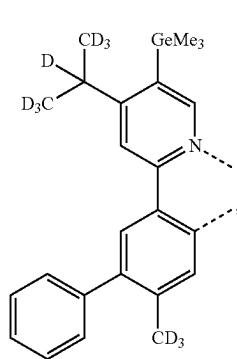
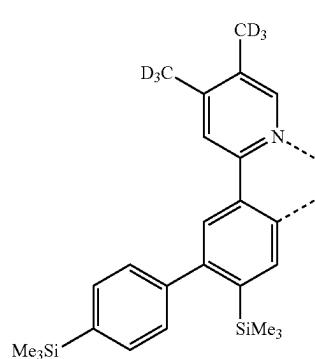
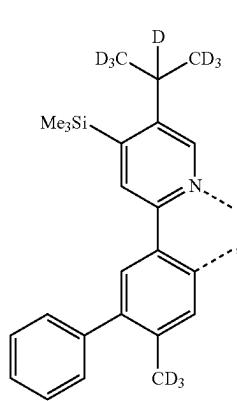
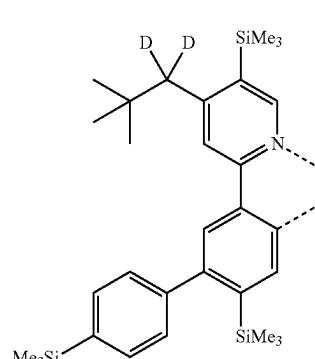
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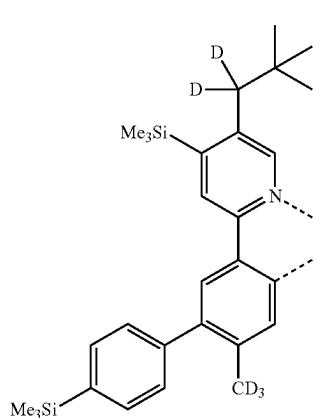
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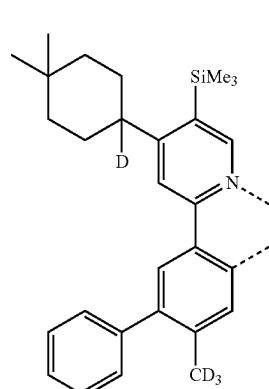
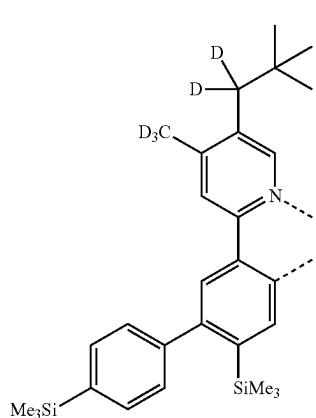
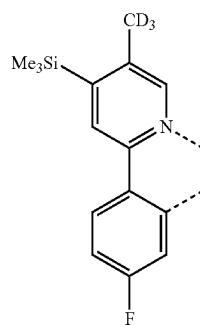
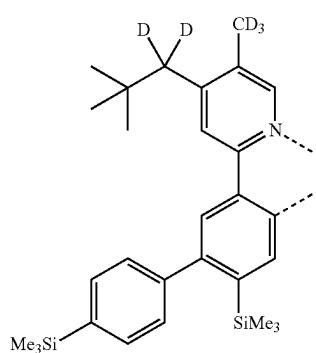
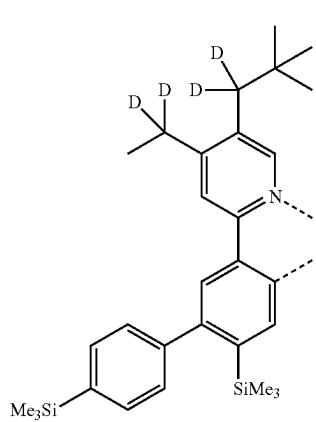
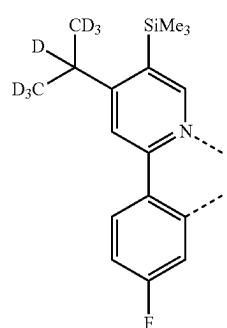
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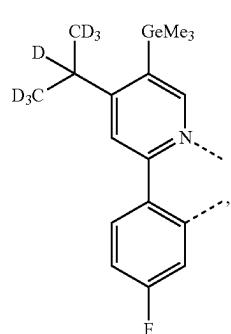
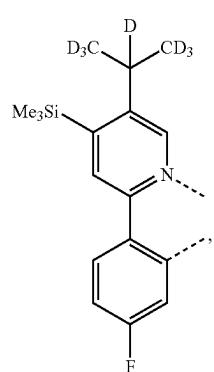
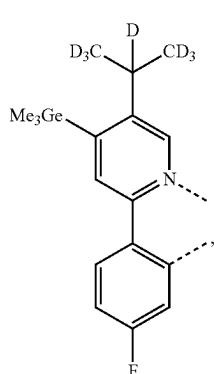
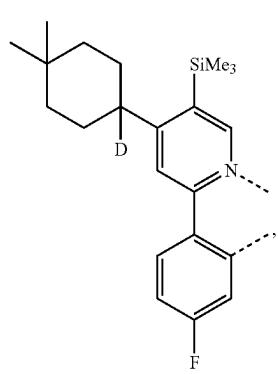
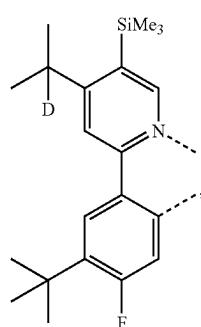
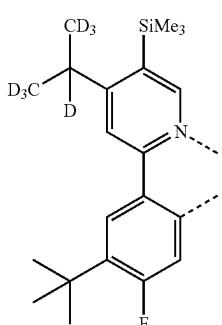
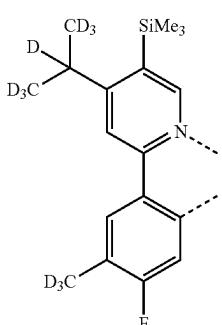
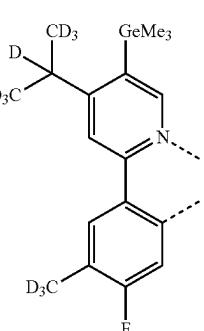
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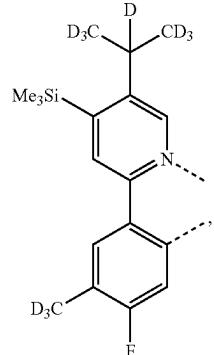
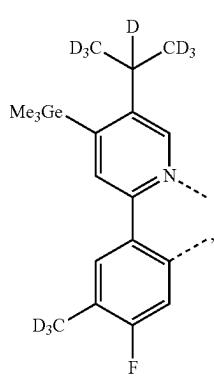
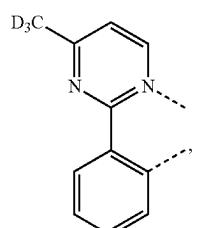
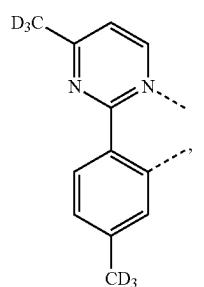
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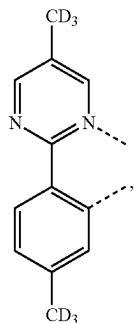
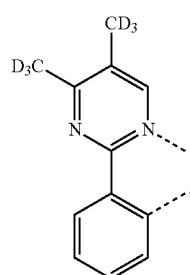
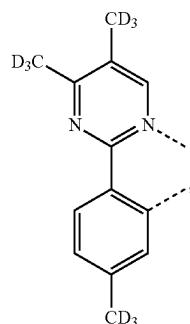
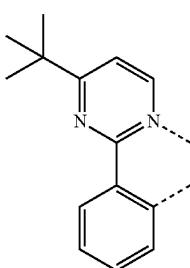
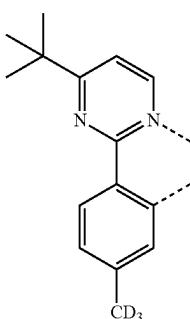
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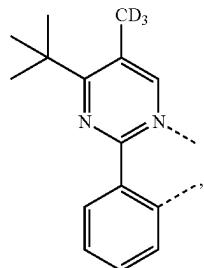
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L_{B448}L_{B449}L_{B450}L_{B451}

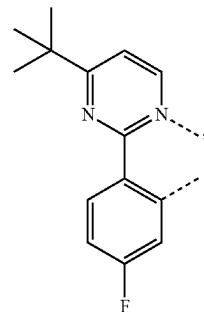
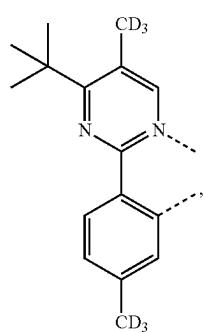
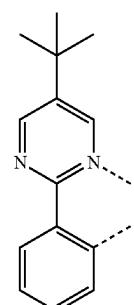
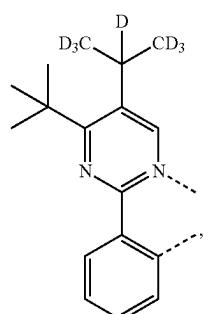
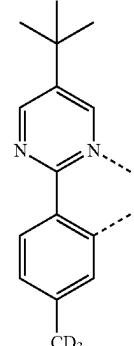
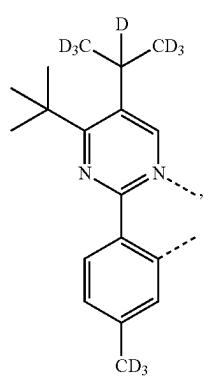
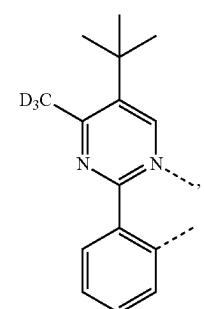
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L_{B452}L_{B453}L_{B454}L_{B455}L_{B456}

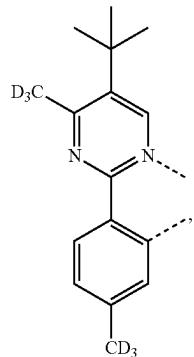
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L_{B457}

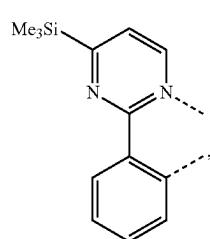
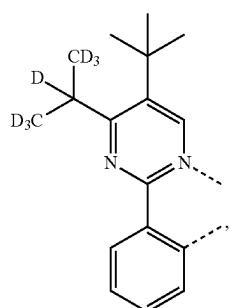
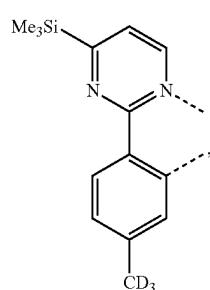
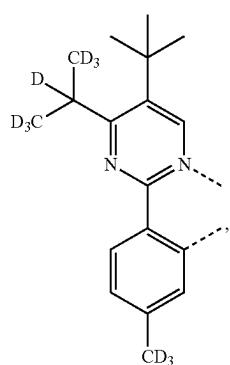
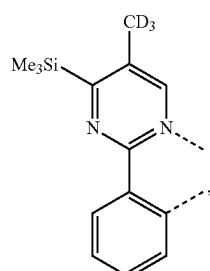
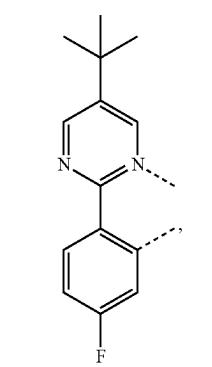
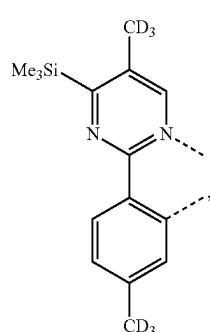
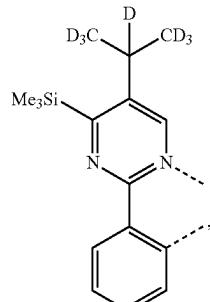
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L_{B461}L_{B458}L_{B462}L_{B459}L_{B463}L_{B460}L_{B464}

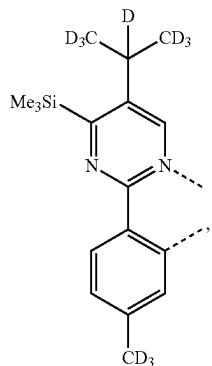
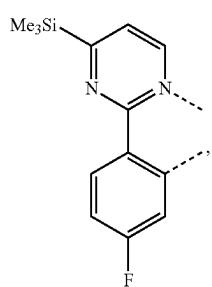
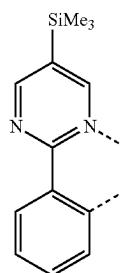
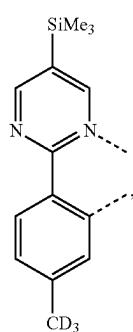
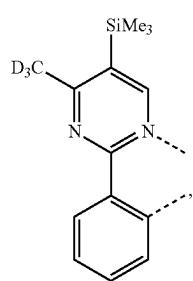
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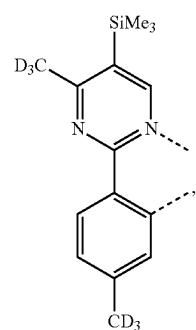
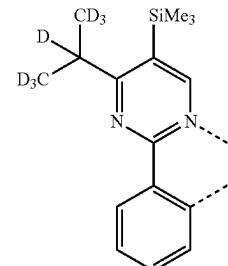
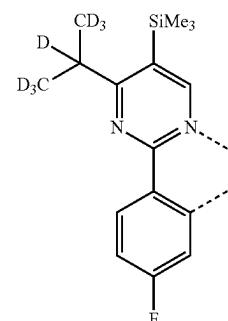
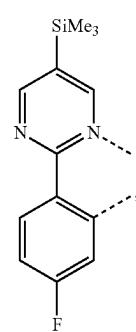
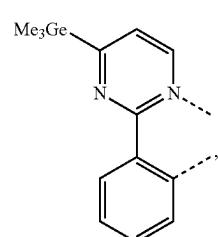
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L_{B469}L_{B466}L_{B470}L_{B467}L_{B471}L_{B468}L_{B472}L_{B473}

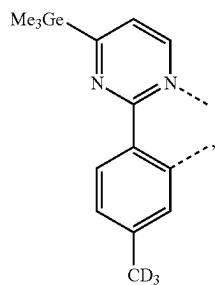
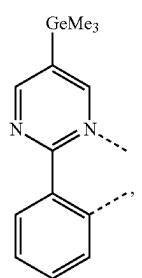
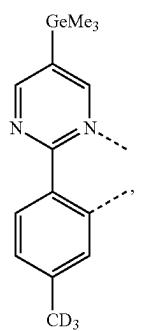
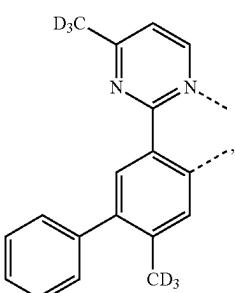
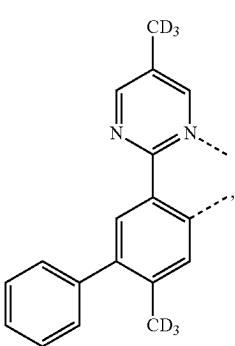
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L_{B474}L_{B475}L_{B476}L_{B477}L_{B478}

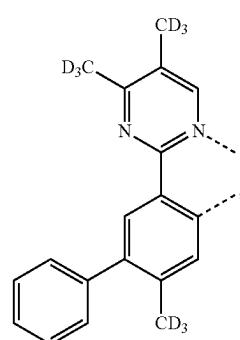
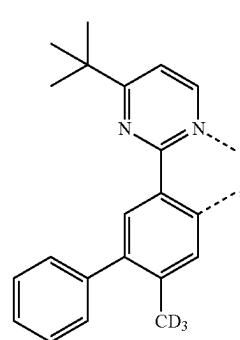
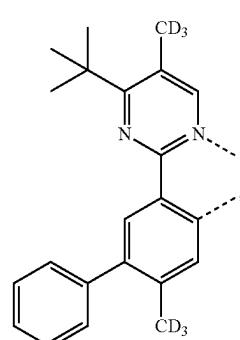
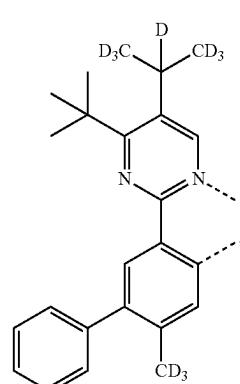
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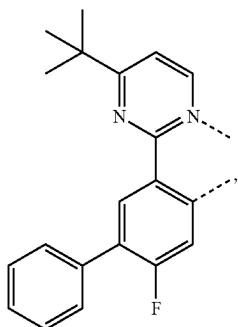
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L_{B484}L_{B485}L_{B486}L_{B487}L_{B488}

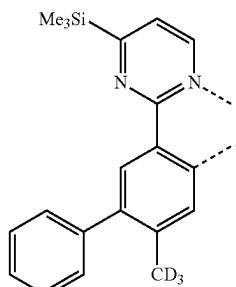
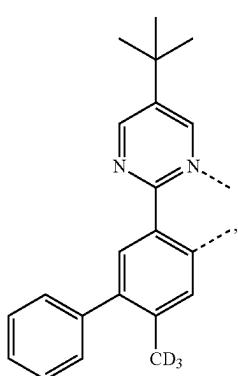
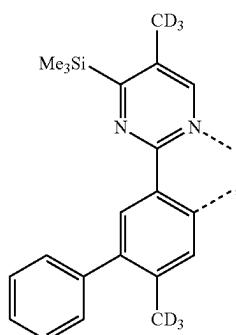
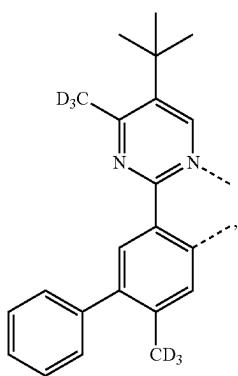
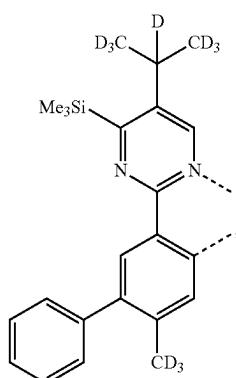
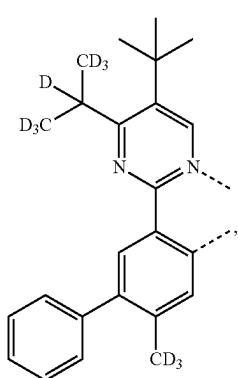
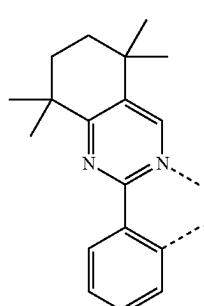
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L_{B489}L_{B490}L_{B491}L_{B492}

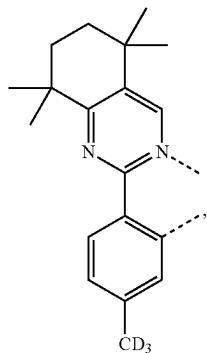
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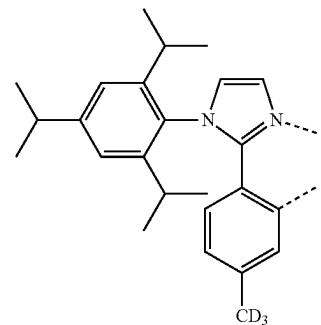
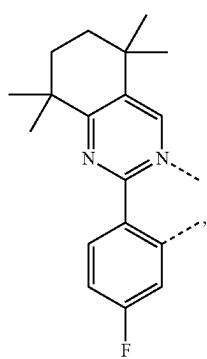
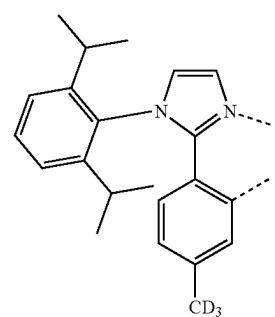
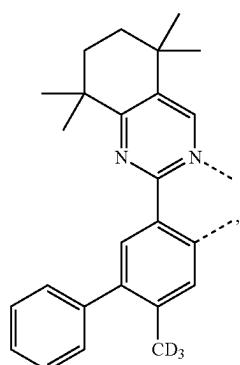
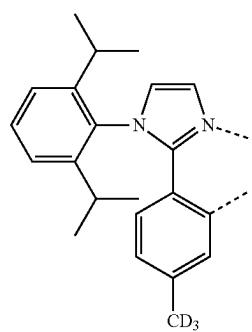
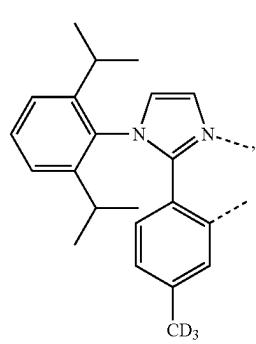
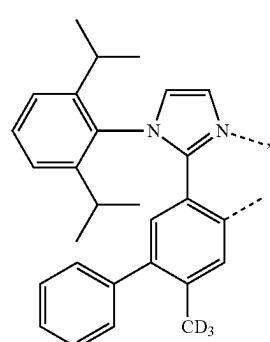
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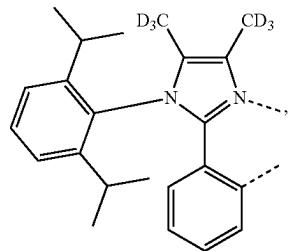
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L_B501

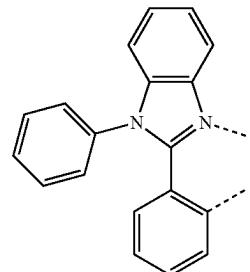
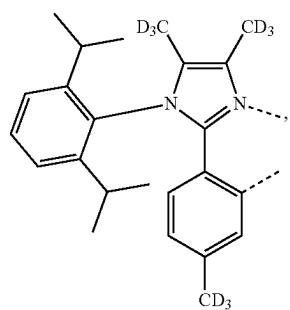
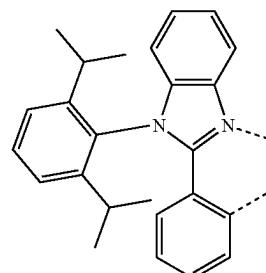
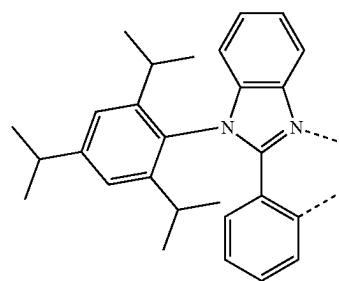
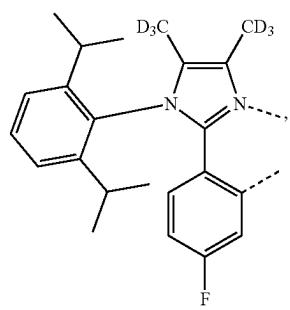
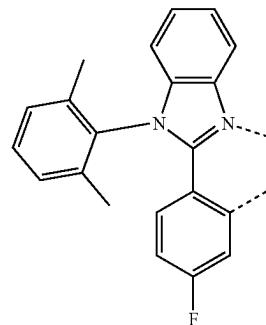
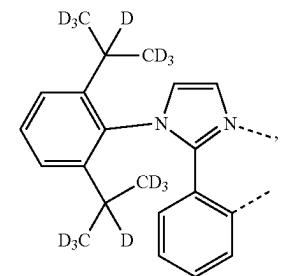
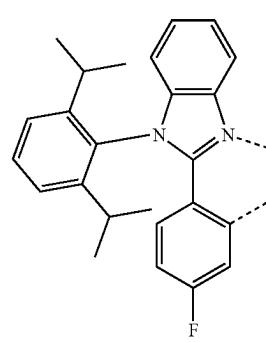
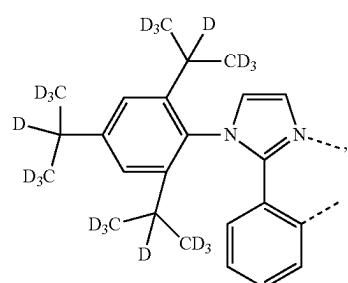
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L_B505L_B502L_B506L_B503L_B507L_B504L_B508

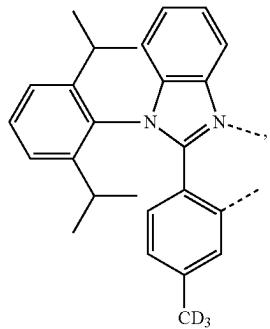
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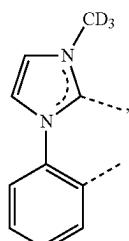
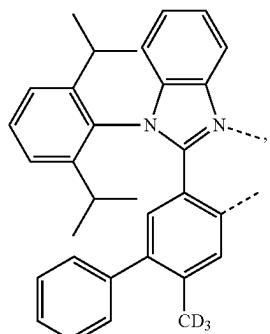
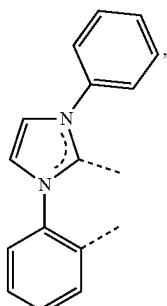
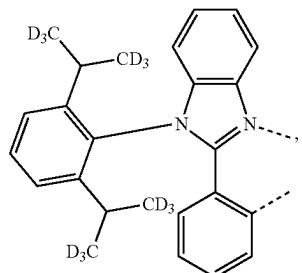
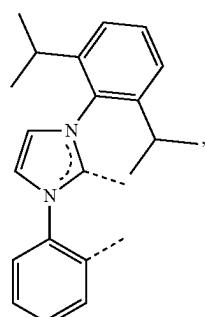
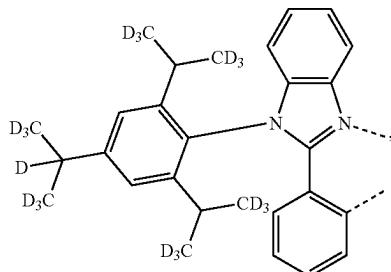
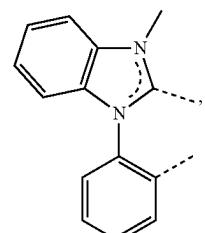
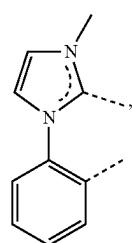
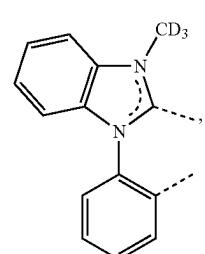
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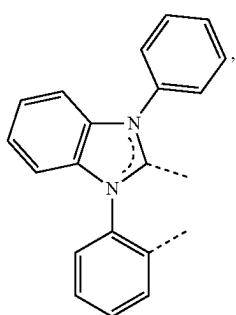
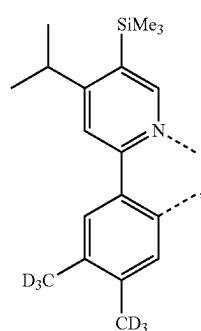
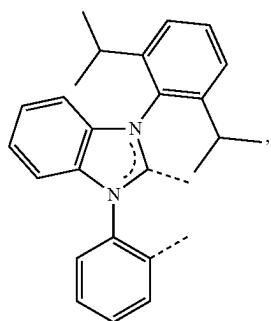
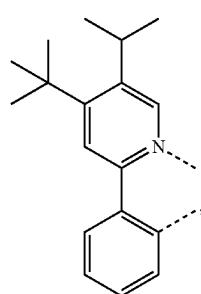
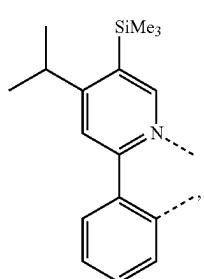
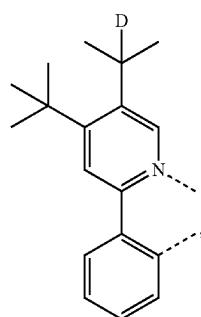
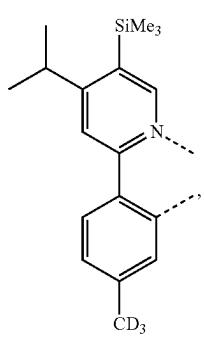
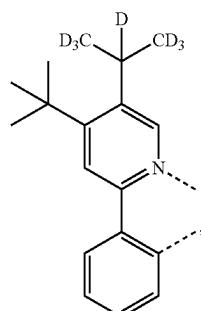
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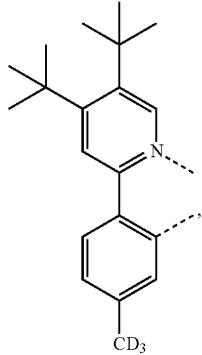
 L_{B524}  L_{B520}  L_{B525}  L_{B521}  L_{B526}  L_{B522}  L_{B527}  L_{B523}  L_{B528} 

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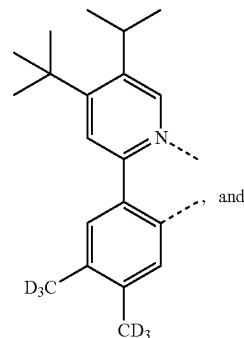
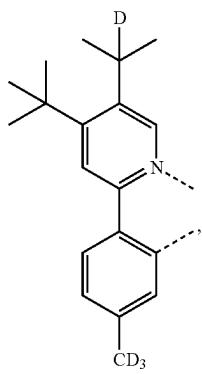
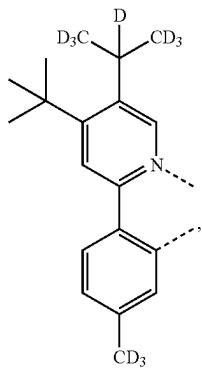
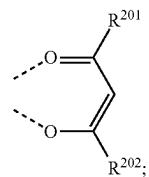
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L_{B529}L_{B533}L_{B530}L_{B534}L_{B531}L_{B535}L_{B532}L_{B536}

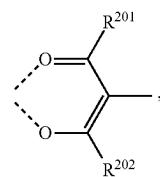
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L_{B537}

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L_{B540}L_{B541}L_{B538}L_{B539}wherein each L_{cj-I} has a structure based on formula

and

each L_{cj-II} has a structure based on formula

and

each L_{cj-n} has a structure based on formulawherein for each L_{cj} in L_{cj-I} and L_{cj-II}, R²⁰¹ and R²⁰² have the structures defined as follows:

L _{Cj}	R ²⁰¹	R ²⁰²	L _{Cj}	R ²⁰¹	R ²⁰²	L _{Cj}	R ²⁰¹	R ²⁰²	L _{Cj}	R ²⁰¹	R ²⁰²
L _{C1}	R ^{D1}	R ^{D1}	L _{C193}	R ^{D1}	R ^{D3}	L _{C385}	R ^{D17}	R ^{D40}	L _{C577}	R ^{D143}	R ^{D120}
L _{C2}	R ^{D2}	R ^{D2}	L _{C194}	R ^{D1}	R ^{D4}	L _{C386}	R ^{D17}	R ^{D41}	L _{C578}	R ^{D143}	R ^{D133}
L _{C3}	R ^{D3}	R ^{D3}	L _{C195}	R ^{D1}	R ^{D5}	L _{C387}	R ^{D17}	R ^{D42}	L _{C579}	R ^{D143}	R ^{D134}
L _{C4}	R ^{D4}	R ^{D4}	L _{C196}	R ^{D1}	R ^{D9}	L _{C388}	R ^{D17}	R ^{D43}	L _{C580}	R ^{D143}	R ^{D135}
L _{C5}	R ^{D5}	R ^{D5}	L _{C197}	R ^{D1}	R ^{D10}	L _{C389}	R ^{D17}	R ^{D48}	L _{C581}	R ^{D143}	R ^{D136}
L _{C6}	R ^{D6}	R ^{D6}	L _{C198}	R ^{D1}	R ^{D17}	L _{C390}	R ^{D17}	R ^{D49}	L _{C582}	R ^{D143}	R ^{D144}

-continued

L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}
L_{C7}	R^{D7}	R^{D7}	L_{C199}	R^{D1}	R^{D18}	L_{C391}	R^{D17}	R^{D50}	L_{C583}	R^{D143}	R^{D145}
L_{C8}	R^{D8}	R^{D8}	L_{C200}	R^{D1}	R^{D20}	L_{C392}	R^{D17}	R^{D54}	L_{C584}	R^{D143}	R^{D146}
L_{C9}	R^{D9}	R^{D9}	L_{C201}	R^{D1}	R^{D22}	L_{C393}	R^{D17}	R^{D55}	L_{C585}	R^{D143}	R^{D147}
L_{C10}	R^{D10}	R^{D10}	L_{C202}	R^{D1}	R^{D37}	L_{C394}	R^{D17}	R^{D58}	L_{C586}	R^{D143}	R^{D149}
L_{C11}	R^{D11}	R^{D11}	L_{C203}	R^{D1}	R^{D40}	L_{C395}	R^{D17}	R^{D59}	L_{C587}	R^{D143}	R^{D151}
L_{C12}	R^{D12}	R^{D12}	L_{C204}	R^{D1}	R^{D41}	L_{C396}	R^{D17}	R^{D78}	L_{C588}	R^{D143}	R^{D154}
L_{C13}	R^{D13}	R^{D13}	L_{C205}	R^{D1}	R^{D42}	L_{C397}	R^{D17}	R^{D79}	L_{C589}	R^{D143}	R^{D155}
L_{C14}	R^{D14}	R^{D14}	L_{C206}	R^{D1}	R^{D43}	L_{C398}	R^{D17}	R^{D81}	L_{C590}	R^{D143}	R^{D161}
L_{C15}	R^{D15}	R^{D15}	L_{C207}	R^{D1}	R^{D48}	L_{C399}	R^{D17}	R^{D87}	L_{C591}	R^{D143}	R^{D175}
L_{C16}	R^{D16}	R^{D16}	L_{C208}	R^{D1}	R^{D49}	L_{C400}	R^{D17}	R^{D88}	L_{C592}	R^{D144}	R^{D3}
L_{C17}	R^{D17}	R^{D17}	L_{C209}	R^{D1}	R^{D50}	L_{C401}	R^{D17}	R^{D89}	L_{C593}	R^{D144}	R^{D5}
L_{C18}	R^{D18}	R^{D18}	L_{C210}	R^{D1}	R^{D54}	L_{C402}	R^{D17}	R^{D93}	L_{C594}	R^{D144}	R^{D17}
L_{C19}	R^{D19}	R^{D19}	L_{C211}	R^{D1}	R^{D55}	L_{C403}	R^{D17}	R^{D116}	L_{C595}	R^{D144}	R^{D18}
L_{C20}	R^{D20}	R^{D20}	L_{C212}	R^{D1}	R^{D58}	L_{C404}	R^{D17}	R^{D117}	L_{C596}	R^{D144}	R^{D20}
L_{C21}	R^{D21}	R^{D21}	L_{C213}	R^{D1}	R^{D59}	L_{C405}	R^{D17}	R^{D118}	L_{C597}	R^{D144}	R^{D22}
L_{C22}	R^{D22}	R^{D22}	L_{C214}	R^{D1}	R^{D78}	L_{C406}	R^{D17}	R^{D119}	L_{C598}	R^{D144}	R^{D37}
L_{C23}	R^{D23}	R^{D23}	L_{C215}	R^{D1}	R^{D79}	L_{C407}	R^{D17}	R^{D120}	L_{C599}	R^{D144}	R^{D40}
L_{C24}	R^{D24}	R^{D24}	L_{C216}	R^{D1}	R^{D81}	L_{C408}	R^{D17}	R^{D133}	L_{C600}	R^{D144}	R^{D41}
L_{C25}	R^{D25}	R^{D25}	L_{C217}	R^{D1}	R^{D87}	L_{C409}	R^{D17}	R^{D134}	L_{C601}	R^{D144}	R^{D42}
L_{C26}	R^{D26}	R^{D26}	L_{C218}	R^{D1}	R^{D88}	L_{C410}	R^{D17}	R^{D135}	L_{C602}	R^{D144}	R^{D43}
L_{C27}	R^{D27}	R^{D27}	L_{C219}	R^{D1}	R^{D89}	L_{C411}	R^{D17}	R^{D136}	L_{C603}	R^{D144}	R^{D48}
L_{C28}	R^{D28}	R^{D28}	L_{C220}	R^{D1}	R^{D93}	L_{C412}	R^{D17}	R^{D143}	L_{C604}	R^{D144}	R^{D49}
L_{C29}	R^{D29}	R^{D29}	L_{C221}	R^{D1}	R^{D116}	L_{C413}	R^{D17}	R^{D144}	L_{C605}	R^{D144}	R^{D54}
L_{C30}	R^{D30}	R^{D30}	L_{C222}	R^{D1}	R^{D117}	L_{C414}	R^{D17}	R^{D145}	L_{C606}	R^{D144}	R^{D58}
L_{C31}	R^{D31}	R^{D31}	L_{C223}	R^{D1}	R^{D118}	L_{C415}	R^{D17}	R^{D146}	L_{C607}	R^{D144}	R^{D59}
L_{C32}	R^{D32}	R^{D32}	L_{C224}	R^{D1}	R^{D119}	L_{C416}	R^{D17}	R^{D147}	L_{C608}	R^{D144}	R^{D78}
L_{C33}	R^{D33}	R^{D33}	L_{C225}	R^{D1}	R^{D120}	L_{C417}	R^{D17}	R^{D149}	L_{C609}	R^{D144}	R^{D79}
L_{C34}	R^{D34}	R^{D34}	L_{C226}	R^{D1}	R^{D133}	L_{C418}	R^{D17}	R^{D151}	L_{C610}	R^{D144}	R^{D81}
L_{C35}	R^{D35}	R^{D35}	L_{C227}	R^{D1}	R^{D134}	L_{C419}	R^{D17}	R^{D154}	L_{C611}	R^{D144}	R^{D87}
L_{C36}	R^{D36}	R^{D36}	L_{C228}	R^{D1}	R^{D135}	L_{C420}	R^{D17}	R^{D155}	L_{C612}	R^{D144}	R^{D88}
L_{C37}	R^{D37}	R^{D37}	L_{C229}	R^{D1}	R^{D136}	L_{C421}	R^{D17}	R^{D161}	L_{C613}	R^{D144}	R^{D89}
L_{C38}	R^{D38}	R^{D38}	L_{C230}	R^{D1}	R^{D143}	L_{C422}	R^{D17}	R^{D175}	L_{C614}	R^{D144}	R^{D93}
L_{C39}	R^{D39}	R^{D39}	L_{C231}	R^{D1}	R^{D144}	L_{C423}	R^{D50}	R^{D3}	L_{C615}	R^{D144}	R^{D116}
L_{C40}	R^{D40}	R^{D40}	L_{C232}	R^{D1}	R^{D145}	L_{C424}	R^{D50}	R^{D5}	L_{C616}	R^{D144}	R^{D117}
L_{C41}	R^{D41}	R^{D41}	L_{C233}	R^{D1}	R^{D146}	L_{C425}	R^{D50}	R^{D18}	L_{C617}	R^{D144}	R^{D118}
L_{C42}	R^{D42}	R^{D42}	L_{C234}	R^{D1}	R^{D147}	L_{C426}	R^{D50}	R^{D20}	L_{C618}	R^{D144}	R^{D119}
L_{C43}	R^{D43}	R^{D43}	L_{C235}	R^{D1}	R^{D149}	L_{C427}	R^{D50}	R^{D22}	L_{C619}	R^{D144}	R^{D120}
L_{C44}	R^{D44}	R^{D44}	L_{C236}	R^{D1}	R^{D151}	L_{C428}	R^{D50}	R^{D37}	L_{C620}	R^{D144}	R^{D133}
L_{C45}	R^{D45}	R^{D45}	L_{C237}	R^{D1}	R^{D154}	L_{C429}	R^{D50}	R^{D40}	L_{C621}	R^{D144}	R^{D134}
L_{C46}	R^{D46}	R^{D46}	L_{C238}	R^{D1}	R^{D155}	L_{C430}	R^{D50}	R^{D41}	L_{C622}	R^{D144}	R^{D135}
L_{C47}	R^{D47}	R^{D47}	L_{C239}	R^{D1}	R^{D161}	L_{C431}	R^{D50}	R^{D42}	L_{C623}	R^{D144}	R^{D136}
L_{C48}	R^{D48}	R^{D48}	L_{C240}	R^{D1}	R^{D175}	L_{C432}	R^{D50}	R^{D43}	L_{C624}	R^{D144}	R^{D145}
L_{C49}	R^{D49}	R^{D49}	L_{C241}	R^{D4}	R^{D3}	L_{C433}	R^{D50}	R^{D48}	L_{C625}	R^{D144}	R^{D146}
L_{C50}	R^{D50}	R^{D50}	L_{C242}	R^{D4}	R^{D5}	L_{C434}	R^{D50}	R^{D49}	L_{C626}	R^{D144}	R^{D147}
L_{C51}	R^{D51}	R^{D51}	L_{C243}	R^{D4}	R^{D9}	L_{C435}	R^{D50}	R^{D54}	L_{C627}	R^{D144}	R^{D149}
L_{C52}	R^{D52}	R^{D52}	L_{C244}	R^{D4}	R^{D10}	L_{C436}	R^{D50}	R^{D55}	L_{C628}	R^{D144}	R^{D151}
L_{C53}	R^{D53}	R^{D53}	L_{C245}	R^{D4}	R^{D17}	L_{C437}	R^{D50}	R^{D58}	L_{C629}	R^{D144}	R^{D154}
L_{C54}	R^{D54}	R^{D54}	L_{C246}	R^{D4}	R^{D18}	L_{C438}	R^{D50}	R^{D59}	L_{C630}	R^{D144}	R^{D155}
L_{C55}	R^{D55}	R^{D55}	L_{C247}	R^{D4}	R^{D20}	L_{C439}	R^{D50}	R^{D78}	L_{C631}	R^{D144}	R^{D161}
L_{C56}	R^{D56}	R^{D56}	L_{C248}	R^{D4}	R^{D22}	L_{C440}	R^{D50}	R^{D79}	L_{C632}	R^{D144}	R^{D175}
L_{C57}	R^{D57}	R^{D57}	L_{C249}	R^{D4}	R^{D37}	L_{C441}	R^{D50}	R^{D81}	L_{C633}	R^{D145}	R^{D3}
L_{C58}	R^{D58}	R^{D58}	L_{C250}	R^{D4}	R^{D40}	L_{C442}	R^{D50}	R^{D87}	L_{C634}	R^{D145}	R^{D5}
L_{C59}	R^{D59}	R^{D59}	L_{C251}	R^{D4}	R^{D41}	L_{C443}	R^{D50}	R^{D88}	L_{C635}	R^{D145}	R^{D17}
L_{C60}	R^{D60}	R^{D60}	L_{C252}	R^{D4}	R^{D42}	L_{C444}	R^{D50}	R^{D89}	L_{C636}	R^{D145}	R^{D18}
L_{C61}	R^{D61}	R^{D61}	L_{C253}	R^{D4}	R^{D43}	L_{C445}	R^{D50}	R^{D93}	L_{C637}	R^{D145}	R^{D20}
L_{C62}	R^{D62}	R^{D62}	L_{C254}	R^{D4}	R^{D48}	L_{C446}	R^{D50}	R^{D116}	L_{C638}	R^{D145}	R^{D22}
L_{C63}	R^{D63}	R^{D63}	L_{C255}	R^{D4}	R^{D49}	L_{C447}	R^{D50}	R^{D117}	L_{C639}	R^{D145}	R^{D37}
L_{C64}	R^{D64}	R^{D64}	L_{C256}	R^{D4}	R^{D50}	L_{C448}	R^{D50}	R^{D118}	L_{C640}	R^{D145}	R^{D40}
L_{C65}	R^{D65}	R^{D65}	L_{C257}	R^{D4}	R^{D54}	L_{C449}	R^{D50}	R^{D119}	L_{C641}	R^{D145}	R^{D41}
L_{C66}	R^{D66}	R^{D66}	L_{C258}	R^{D4}	R^{D55}	L_{C450}	R^{D50}	R^{D120}	L_{C642}	R^{D145}	R^{D42}
L_{C67}	R^{D67}	R^{D67}	L_{C259}	R^{D4}	R^{D58}	L_{C451}	R^{D50}	R^{D133}	L_{C643}	R^{D145}	R^{D43}
L_{C68}	R^{D68}	R^{D68}	L_{C260}	R^{D4}	R^{D59}	L_{C452}	R^{D50}	R^{D134}	L_{C644}	R^{D145}	R^{D48}
L_{C69}	R^{D69}	R^{D69}	L_{C261}	R^{D4}	R^{D78}	L_{C453}	R^{D50}	R^{D135}	L_{C645}	R^{D145}	R^{D49}
L_{C70}	R^{D70}	R^{D70}	L_{C262}	R^{D4}	R^{D79}	L_{C454}	R^{D50}	R^{D136}	L_{C646}	R^{D145}	R^{D54}
L_{C71}	R^{D71}	R^{D71}	L_{C263}	R^{D4}	R^{D81}	L_{C455}	R^{D50}	R^{D143}	L_{C647}	R^{D145}	R^{D58}
L_{C72}	R^{D72}	R^{D72}	$L_{$								

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L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}
L_{C81}	R^{D81}	R^{D81}	L_{C273}	R^{D4}	R^{D133}	L_{C465}	R^{D50}	R^{D175}	L_{C657}	R^{D145}	R^{D117}
L_{C82}	R^{D82}	R^{D82}	L_{C274}	R^{D4}	R^{D134}	L_{C466}	R^{D55}	R^{D3}	L_{C658}	R^{D145}	R^{D118}
L_{C83}	R^{D83}	R^{D83}	L_{C275}	R^{D4}	R^{D135}	L_{C467}	R^{D55}	R^{D5}	L_{C659}	R^{D145}	R^{D119}
L_{C84}	R^{D84}	R^{D84}	L_{C276}	R^{D4}	R^{D136}	L_{C468}	R^{D55}	R^{D18}	L_{C660}	R^{D145}	R^{D120}
L_{C85}	R^{D85}	R^{D85}	L_{C277}	R^{D4}	R^{D143}	L_{C469}	R^{D55}	R^{D20}	L_{C661}	R^{D145}	R^{D133}
L_{C86}	R^{D86}	R^{D86}	L_{C278}	R^{D4}	R^{D144}	L_{C470}	R^{D55}	R^{D22}	L_{C662}	R^{D145}	R^{D134}
L_{C87}	R^{D87}	R^{D87}	L_{C279}	R^{D4}	R^{D145}	L_{C471}	R^{D55}	R^{D37}	L_{C663}	R^{D145}	R^{D135}
L_{C88}	R^{D88}	R^{D88}	L_{C280}	R^{D4}	R^{D146}	L_{C472}	R^{D55}	R^{D40}	L_{C664}	R^{D145}	R^{D136}
L_{C89}	R^{D89}	R^{D89}	L_{C281}	R^{D4}	R^{D147}	L_{C473}	R^{D55}	R^{D41}	L_{C665}	R^{D145}	R^{D146}
L_{C90}	R^{D90}	R^{D90}	L_{C282}	R^{D4}	R^{D149}	L_{C474}	R^{D55}	R^{D42}	L_{C666}	R^{D145}	R^{D147}
L_{C91}	R^{D91}	R^{D91}	L_{C283}	R^{D4}	R^{D151}	L_{C475}	R^{D55}	R^{D43}	L_{C667}	R^{D145}	R^{D149}
L_{C92}	R^{D92}	R^{D92}	L_{C284}	R^{D4}	R^{D154}	L_{C476}	R^{D55}	R^{D48}	L_{C668}	R^{D145}	R^{D151}
L_{C93}	R^{D93}	R^{D93}	L_{C285}	R^{D4}	R^{D155}	L_{C477}	R^{D55}	R^{D49}	L_{C669}	R^{D145}	R^{D154}
L_{C94}	R^{D94}	R^{D94}	L_{C286}	R^{D4}	R^{D161}	L_{C478}	R^{D55}	R^{D54}	L_{C670}	R^{D145}	R^{D155}
L_{C95}	R^{D95}	R^{D95}	L_{C287}	R^{D4}	R^{D175}	L_{C479}	R^{D55}	R^{D58}	L_{C671}	R^{D145}	R^{D161}
L_{C96}	R^{D96}	R^{D96}	L_{C288}	R^{D9}	R^{D3}	L_{C480}	R^{D55}	R^{D59}	L_{C672}	R^{D145}	R^{D175}
L_{C97}	R^{D97}	R^{D97}	L_{C289}	R^{D9}	R^{D5}	L_{C481}	R^{D55}	R^{D78}	L_{C673}	R^{D146}	R^{D3}
L_{C98}	R^{D98}	R^{D98}	L_{C290}	R^{D9}	R^{D10}	L_{C482}	R^{D55}	R^{D79}	L_{C674}	R^{D146}	R^{D5}
L_{C99}	R^{D99}	R^{D99}	L_{C291}	R^{D9}	R^{D17}	L_{C483}	R^{D55}	R^{D81}	L_{C675}	R^{D146}	R^{D17}
L_{C100}	R^{D100}	R^{D100}	L_{C292}	R^{D9}	R^{D18}	L_{C484}	R^{D55}	R^{D87}	L_{C676}	R^{D146}	R^{D18}
L_{C101}	R^{D101}	R^{D101}	L_{C293}	R^{D9}	R^{D20}	L_{C485}	R^{D55}	R^{D88}	L_{C677}	R^{D146}	R^{D20}
L_{C102}	R^{D102}	R^{D102}	L_{C294}	R^{D9}	R^{D22}	L_{C486}	R^{D55}	R^{D89}	L_{C678}	R^{D146}	R^{D22}
L_{C103}	R^{D103}	R^{D103}	L_{C295}	R^{D9}	R^{D37}	L_{C487}	R^{D55}	R^{D93}	L_{C679}	R^{D146}	R^{D37}
L_{C104}	R^{D104}	R^{D104}	L_{C296}	R^{D9}	R^{D40}	L_{C488}	R^{D55}	R^{D116}	L_{C680}	R^{D146}	R^{D40}
L_{C105}	R^{D105}	R^{D105}	L_{C297}	R^{D9}	R^{D41}	L_{C489}	R^{D55}	R^{D117}	L_{C681}	R^{D146}	R^{D41}
L_{C106}	R^{D106}	R^{D106}	L_{C298}	R^{D9}	R^{D42}	L_{C490}	R^{D55}	R^{D118}	L_{C682}	R^{D146}	R^{D42}
L_{C107}	R^{D107}	R^{D107}	L_{C299}	R^{D9}	R^{D43}	L_{C491}	R^{D55}	R^{D119}	L_{C683}	R^{D146}	R^{D43}
L_{C108}	R^{D108}	R^{D108}	L_{C300}	R^{D9}	R^{D48}	L_{C492}	R^{D55}	R^{D120}	L_{C684}	R^{D146}	R^{D48}
L_{C109}	R^{D109}	R^{D109}	L_{C301}	R^{D9}	R^{D49}	L_{C493}	R^{D55}	R^{D133}	L_{C685}	R^{D146}	R^{D49}
L_{C110}	R^{D110}	R^{D110}	L_{C302}	R^{D9}	R^{D50}	L_{C494}	R^{D55}	R^{D134}	L_{C686}	R^{D146}	R^{D54}
L_{C111}	R^{D111}	R^{D111}	L_{C303}	R^{D9}	R^{D54}	L_{C495}	R^{D55}	R^{D135}	L_{C687}	R^{D146}	R^{D58}
L_{C112}	R^{D112}	R^{D112}	L_{C304}	R^{D9}	R^{D55}	L_{C496}	R^{D55}	R^{D136}	L_{C688}	R^{D146}	R^{D59}
L_{C113}	R^{D113}	R^{D113}	L_{C305}	R^{D9}	R^{D58}	L_{C497}	R^{D55}	R^{D143}	L_{C689}	R^{D146}	R^{D78}
L_{C114}	R^{D114}	R^{D114}	L_{C306}	R^{D9}	R^{D59}	L_{C498}	R^{D55}	R^{D144}	L_{C690}	R^{D146}	R^{D79}
L_{C115}	R^{D115}	R^{D115}	L_{C307}	R^{D9}	R^{D78}	L_{C499}	R^{D55}	R^{D145}	L_{C691}	R^{D146}	R^{D81}
L_{C116}	R^{D116}	R^{D116}	L_{C308}	R^{D9}	R^{D79}	L_{C500}	R^{D55}	R^{D146}	L_{C692}	R^{D146}	R^{D87}
L_{C117}	R^{D117}	R^{D117}	L_{C309}	R^{D9}	R^{D81}	L_{C501}	R^{D55}	R^{D147}	L_{C693}	R^{D146}	R^{D88}
L_{C118}	R^{D118}	R^{D118}	L_{C310}	R^{D9}	R^{D87}	L_{C502}	R^{D55}	R^{D149}	L_{C694}	R^{D146}	R^{D89}
L_{C119}	R^{D119}	R^{D119}	L_{C311}	R^{D9}	R^{D88}	L_{C503}	R^{D55}	R^{D151}	L_{C695}	R^{D146}	R^{D93}
L_{C120}	R^{D120}	R^{D120}	L_{C312}	R^{D9}	R^{D89}	L_{C504}	R^{D55}	R^{D154}	L_{C696}	R^{D146}	R^{D117}
L_{C121}	R^{D121}	R^{D121}	L_{C313}	R^{D9}	R^{D93}	L_{C505}	R^{D55}	R^{D155}	L_{C697}	R^{D146}	R^{D118}
L_{C122}	R^{D122}	R^{D122}	L_{C314}	R^{D9}	R^{D116}	L_{C506}	R^{D55}	R^{D161}	L_{C698}	R^{D146}	R^{D119}
L_{C123}	R^{D123}	R^{D123}	L_{C315}	R^{D9}	R^{D117}	L_{C507}	R^{D55}	R^{D175}	L_{C699}	R^{D146}	R^{D120}
L_{C124}	R^{D124}	R^{D124}	L_{C316}	R^{D9}	R^{D118}	L_{C508}	R^{D116}	R^{D3}	L_{C700}	R^{D146}	R^{D133}
L_{C125}	R^{D125}	R^{D125}	L_{C317}	R^{D9}	R^{D119}	L_{C509}	R^{D116}	R^{D5}	L_{C701}	R^{D146}	R^{D134}
L_{C126}	R^{D126}	R^{D126}	L_{C318}	R^{D9}	R^{D120}	L_{C510}	R^{D116}	R^{D17}	L_{C702}	R^{D146}	R^{D135}
L_{C127}	R^{D127}	R^{D127}	L_{C319}	R^{D9}	R^{D133}	L_{C511}	R^{D116}	R^{D18}	L_{C703}	R^{D146}	R^{D136}
L_{C128}	R^{D128}	R^{D128}	L_{C320}	R^{D9}	R^{D134}	L_{C512}	R^{D116}	R^{D20}	L_{C704}	R^{D146}	R^{D146}
L_{C129}	R^{D129}	R^{D129}	L_{C321}	R^{D9}	R^{D135}	L_{C513}	R^{D116}	R^{D22}	L_{C705}	R^{D146}	R^{D147}
L_{C130}	R^{D130}	R^{D130}	L_{C322}	R^{D9}	R^{D136}	L_{C514}	R^{D116}	R^{D37}	L_{C706}	R^{D146}	R^{D149}
L_{C131}	R^{D131}	R^{D131}	L_{C323}	R^{D9}	R^{D143}	L_{C515}	R^{D116}	R^{D40}	L_{C707}	R^{D146}	R^{D151}
L_{C132}	R^{D132}	R^{D132}	L_{C324}	R^{D9}	R^{D144}	L_{C516}	R^{D116}	R^{D41}	L_{C708}	R^{D146}	R^{D154}
L_{C133}	R^{D133}	R^{D133}	L_{C325}	R^{D9}	R^{D145}	L_{C517}	R^{D116}	R^{D42}	L_{C709}	R^{D146}	R^{D155}
L_{C134}	R^{D134}	R^{D134}	L_{C326}	R^{D9}	R^{D146}	L_{C518}	R^{D116}	R^{D43}	L_{C710}	R^{D146}	R^{D161}
L_{C135}	R^{D135}	R^{D135}	L_{C327}	R^{D9}	R^{D147}	L_{C519}	R^{D116}	R^{D48}	L_{C711}	R^{D146}	R^{D175}
L_{C136}	R^{D136}	R^{D136}	L_{C328}	R^{D9}	R^{D149}	L_{C520}	R^{D116}	R^{D49}	L_{C712}	R^{D146}	R^{D3}
L_{C137}	R^{D137}	R^{D137}	L_{C329}	R^{D9}	R^{D151}	L_{C521}	R^{D116}	R^{D54}	L_{C713}	R^{D146}	R^{D5}
L_{C138}	R^{D138}	R^{D138}	L_{C330}	R^{D9}	R^{D154}	L_{C522}	R^{D116}	R^{D58}	L_{C714}	R^{D146}	R^{D3}
L_{C139}	R^{D139}	R^{D139}	L_{C331}	R^{D9}	R^{D155}	L_{C523}	R^{D116}	R^{D59}	L_{C715}	R^{D146}	R^{D18}
L_{C140}	R^{D140}	R^{D140}	L_{C332}	R^{D9}	R^{D161}	L_{C524}	R^{D116}	R^{D78}	L_{C716}	R^{D146}	R^{D20}
L_{C141}	R^{D141}	R^{D141}	L_{C333}	R^{D9}	R^{D175}	L_{C525}	R^{D116}	R^{D79}	L_{C717}	R^{D146}	R^{D22}
L_{C142}	R^{D142}	R^{D142}	L_{C334}	R^{D10}	R^{D3}	L_{C526}	R^{D116}	R^{D81}	L_{C718}	R^{D133}	R^{D37}
L_{C143}	R^{D143}	R^{D143}	L_{C335}	R^{D10}	R^{D5}	L_{C527}	R^{D116}	R^{D87}	L_{C719}	R^{D133}	R^{D40}
L_{C144}	R^{D144}	R^{D144}	L_{C336}	R^{D10}	R^{D17}	L_{C528}	R^{D116}	R^{D88}	L_{C720}	R^{D133}	R^{D41}
L_{C145}	R^{D145}	R									

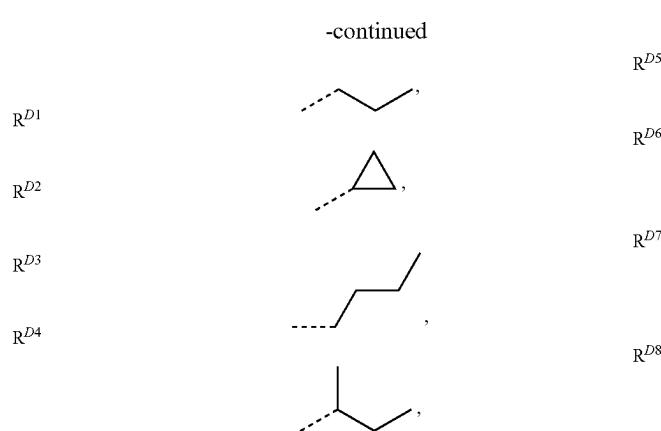
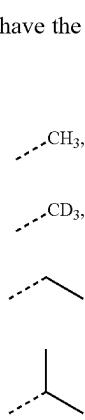
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L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}	L_{Cj}	R^{201}	R^{202}
L_{C155}	R^{D155}	R^{D155}	L_{C347}	R^{D10}	R^{D50}	L_{C539}	R^{D116}	R^{D143}	L_{C731}	R^{D133}	R^{D87}
L_{C156}	R^{D156}	R^{D156}	L_{C348}	R^{D10}	R^{D54}	L_{C540}	R^{D116}	R^{D144}	L_{C732}	R^{D133}	R^{D88}
L_{C157}	R^{D157}	R^{D157}	L_{C349}	R^{D10}	R^{D55}	L_{C541}	R^{D116}	R^{D145}	L_{C733}	R^{D133}	R^{D89}
L_{C158}	R^{D158}	R^{D158}	L_{C350}	R^{D10}	R^{D58}	L_{C542}	R^{D116}	R^{D146}	L_{C734}	R^{D133}	R^{D93}
L_{C159}	R^{D159}	R^{D159}	L_{C351}	R^{D10}	R^{D59}	L_{C543}	R^{D116}	R^{D147}	L_{C735}	R^{D133}	R^{D117}
L_{C160}	R^{D160}	R^{D160}	L_{C352}	R^{D10}	R^{D78}	L_{C544}	R^{D116}	R^{D149}	L_{C736}	R^{D133}	R^{D118}
L_{C161}	R^{D161}	R^{D161}	L_{C353}	R^{D10}	R^{D79}	L_{C545}	R^{D116}	R^{D151}	L_{C737}	R^{D133}	R^{D119}
L_{C162}	R^{D162}	R^{D162}	L_{C354}	R^{D10}	R^{D81}	L_{C546}	R^{D116}	R^{D154}	L_{C738}	R^{D133}	R^{D120}
L_{C163}	R^{D163}	R^{D163}	L_{C355}	R^{D10}	R^{D87}	L_{C547}	R^{D116}	R^{D155}	L_{C739}	R^{D133}	R^{D133}
L_{C164}	R^{D164}	R^{D164}	L_{C356}	R^{D10}	R^{D88}	L_{C548}	R^{D116}	R^{D161}	L_{C740}	R^{D133}	R^{D134}
L_{C165}	R^{D165}	R^{D165}	L_{C357}	R^{D10}	R^{D89}	L_{C549}	R^{D116}	R^{D175}	L_{C741}	R^{D133}	R^{D135}
L_{C166}	R^{D166}	R^{D166}	L_{C358}	R^{D10}	R^{D93}	L_{C550}	R^{D143}	R^{D3}	L_{C742}	R^{D133}	R^{D136}
L_{C167}	R^{D167}	R^{D167}	L_{C359}	R^{D10}	R^{D116}	L_{C551}	R^{D143}	R^{D5}	L_{C743}	R^{D133}	R^{D146}
L_{C168}	R^{D168}	R^{D168}	L_{C360}	R^{D10}	R^{D117}	L_{C552}	R^{D143}	R^{D17}	L_{C744}	R^{D133}	R^{D147}
L_{C169}	R^{D169}	R^{D169}	L_{C361}	R^{D10}	R^{D118}	L_{C553}	R^{D143}	R^{D18}	L_{C745}	R^{D133}	R^{D149}
L_{C170}	R^{D170}	R^{D170}	L_{C362}	R^{D10}	R^{D119}	L_{C554}	R^{D143}	R^{D20}	L_{C746}	R^{D133}	R^{D151}
L_{C171}	R^{D171}	R^{D171}	L_{C363}	R^{D10}	R^{D120}	L_{C555}	R^{D143}	R^{D22}	L_{C747}	R^{D133}	R^{D154}
L_{C172}	R^{D172}	R^{D172}	L_{C364}	R^{D10}	R^{D133}	L_{C556}	R^{D143}	R^{D37}	L_{C748}	R^{D133}	R^{D155}
L_{C173}	R^{D173}	R^{D173}	L_{C365}	R^{D10}	R^{D134}	L_{C557}	R^{D143}	R^{D40}	L_{C749}	R^{D133}	R^{D161}
L_{C174}	R^{D174}	R^{D174}	L_{C366}	R^{D10}	R^{D135}	L_{C558}	R^{D143}	R^{D41}	L_{C750}	R^{D133}	R^{D175}
L_{C175}	R^{D175}	R^{D175}	L_{C367}	R^{D10}	R^{D136}	L_{C559}	R^{D143}	R^{D42}	L_{C751}	R^{D175}	R^{D3}
L_{C176}	R^{D176}	R^{D176}	L_{C368}	R^{D10}	R^{D143}	L_{C560}	R^{D143}	R^{D43}	L_{C752}	R^{D175}	R^{D5}
L_{C177}	R^{D177}	R^{D177}	L_{C369}	R^{D10}	R^{D144}	L_{C561}	R^{D143}	R^{D48}	L_{C753}	R^{D175}	R^{D18}
L_{C178}	R^{D178}	R^{D178}	L_{C370}	R^{D10}	R^{D145}	L_{C562}	R^{D143}	R^{D49}	L_{C754}	R^{D175}	R^{D20}
L_{C179}	R^{D179}	R^{D179}	L_{C371}	R^{D10}	R^{D146}	L_{C563}	R^{D143}	R^{D54}	L_{C755}	R^{D175}	R^{D22}
L_{C180}	R^{D180}	R^{D180}	L_{C372}	R^{D10}	R^{D147}	L_{C564}	R^{D143}	R^{D58}	L_{C756}	R^{D175}	R^{D37}
L_{C181}	R^{D181}	R^{D181}	L_{C373}	R^{D10}	R^{D149}	L_{C565}	R^{D143}	R^{D59}	L_{C757}	R^{D175}	R^{D40}
L_{C182}	R^{D182}	R^{D182}	L_{C374}	R^{D10}	R^{D151}	L_{C566}	R^{D143}	R^{D78}	L_{C758}	R^{D175}	R^{D41}
L_{C183}	R^{D183}	R^{D183}	L_{C375}	R^{D10}	R^{D154}	L_{C567}	R^{D143}	R^{D79}	L_{C759}	R^{D175}	R^{D42}
L_{C184}	R^{D184}	R^{D184}	L_{C376}	R^{D10}	R^{D155}	L_{C568}	R^{D143}	R^{D81}	L_{C760}	R^{D175}	R^{D43}
L_{C185}	R^{D185}	R^{D185}	L_{C377}	R^{D10}	R^{D161}	L_{C569}	R^{D143}	R^{D87}	L_{C761}	R^{D175}	R^{D48}
L_{C186}	R^{D186}	R^{D186}	L_{C378}	R^{D10}	R^{D175}	L_{C570}	R^{D143}	R^{D88}	L_{C762}	R^{D175}	R^{D49}
L_{C187}	R^{D187}	R^{D187}	L_{C379}	R^{D17}	R^{D3}	L_{C571}	R^{D143}	R^{D89}	L_{C763}	R^{D175}	R^{D54}
L_{C188}	R^{D188}	R^{D188}	L_{C380}	R^{D17}	R^{D5}	L_{C572}	R^{D143}	R^{D93}	L_{C764}	R^{D175}	R^{D58}
L_{C189}	R^{D189}	R^{D189}	L_{C381}	R^{D17}	R^{D18}	L_{C573}	R^{D143}	R^{D116}	L_{C765}	R^{D175}	R^{D59}
L_{C190}	R^{D190}	R^{D190}	L_{C382}	R^{D17}	R^{D20}	L_{C574}	R^{D143}	R^{D117}	L_{C766}	R^{D175}	R^{D78}
L_{C191}	R^{D191}	R^{D191}	L_{C383}	R^{D17}	R^{D22}	L_{C575}	R^{D17}	R^{D118}	L_{C767}	R^{D175}	R^{D79}
L_{C192}	R^{D192}	R^{D192}	L_{C384}	R^{D17}	R^{D37}	L_{C576}	R^{D143}	R^{D119}	L_{C768}	R^{D175}	R^{D81}
L_{C769}	R^{D193}	R^{D193}	L_{C877}	R^{D1}	R^{D193}	L_{C983}	R^{D4}	R^{D193}	L_{C1093}	R^{D9}	R^{D193}
L_{C770}	R^{D194}	R^{D194}	L_{C878}	R^{D1}	R^{D194}	L_{C986}	R^{D4}	R^{D194}	L_{C1094}	R^{D9}	R^{D194}
L_{C771}	R^{D195}	R^{D195}	L_{C879}	R^{D1}	R^{D195}	L_{C987}	R^{D4}	R^{D195}	L_{C1095}	R^{D9}	R^{D195}
L_{C772}	R^{D196}	R^{D196}	L_{C880}	R^{D1}	R^{D196}	L_{C988}	R^{D4}	R^{D196}	L_{C1096}	R^{D9}	R^{D196}
L_{C773}	R^{D197}	R^{D197}	L_{C881}	R^{D1}	R^{D197}	L_{C989}	R^{D4}	R^{D197}	L_{C1097}	R^{D9}	R^{D197}
L_{C774}	R^{D198}	R^{D198}	L_{C882}	R^{D1}	R^{D198}	L_{C990}	R^{D4}	R^{D198}	L_{C1098}	R^{D9}	R^{D198}
L_{C775}	R^{D199}	R^{D199}	L_{C883}	R^{D1}	R^{D199}	L_{C991}	R^{D4}	R^{D199}	L_{C1099}	R^{D9}	R^{D199}
L_{C776}	R^{D200}	R^{D200}	L_{C884}	R^{D1}	R^{D200}	L_{C992}	R^{D4}	R^{D200}	L_{C1100}	R^{D9}	R^{D200}
L_{C777}	R^{D201}	R^{D201}	L_{C885}	R^{D1}	R^{D201}	L_{C993}	R^{D4}	R^{D201}	L_{C1101}	R^{D9}	R^{D201}
L_{C778}	R^{D202}	R^{D202}	L_{C886}	R^{D1}	R^{D202}	L_{C994}	R^{D4}	R^{D202}	L_{C1102}	R^{D9}	R^{D202}
L_{C779}	R^{D203}	R^{D203}	L_{C887}	R^{D1}	R^{D203}	L_{C995}	R^{D4}	R^{D203}	L_{C1103}	R^{D9}	R^{D203}
L_{C780}	R^{D204}	R^{D204}	L_{C888}	R^{D1}	R^{D204}	L_{C996}	R^{D4}	R^{D204}	L_{C1104}	R^{D9}	R^{D204}
L_{C781}	R^{D205}	R^{D205}	L_{C889}	R^{D1}	R^{D205}	L_{C997}	R^{D4}	R^{D205}	L_{C1105}	R^{D9}	R^{D205}
L_{C782}	R^{D206}	R^{D206}	L_{C890}	R^{D1}	R^{D206}	L_{C998}	R^{D4}	R^{D206}	L_{C1106}	R^{D9}	R^{D206}
L_{C783}	R^{D207}	R^{D207}	L_{C891}	R^{D1}	R^{D207}	L_{C999}	R^{D4}	R^{D207}	L_{C1107}	R^{D9}	R^{D207}
L_{C784}	R^{D208}	R^{D208}	L_{C892}	R^{D1}	R^{D208}	L_{C1000}	R^{D4}	R^{D208}	L_{C1108}	R^{D9}	R^{D208}
L_{C785}	R^{D209}	R^{D209}	L_{C893}	R^{D1}	R^{D209}	L_{C1001}	R^{D4}	R^{D209}	L_{C1109}	R^{D9}	R^{D209}
L_{C786}	R^{D210}	R^{D210}	L_{C894}	R^{D1}	R^{D210}	L_{C1002}	R^{D4}	R^{D210}	L_{C1110}	R^{D9}	R^{D210}
L_{C787}	R^{D211}	R^{D211}	L_{C895}	R^{D1}	R^{D211}	L_{C1003}	R^{D4}	R^{D211}	L_{C1111}	R^{D9}	R^{D211}
L_{C788}	R^{D212}	R^{D212}	L_{C896}	R^{D1}	R^{D212}	L_{C1004}	R^{D4}	R^{D212}	L_{C1112}	R^{D9}	R^{D212}
L_{C789}	R^{D213}	R^{D213}	L_{C897}	R^{D1}	R^{D213}	L_{C1005}	R^{D4}	R^{D213}	L_{C1113}	R^{D9}	R^{D213}
L_{C790}	R^{D214}	R^{D214}	L_{C898}	R^{D1}	R^{D214}	L_{C1006}	R^{D4}	R^{D214}	L_{C1114}	R^{D9}	R^{D214}
L_{C791}	R^{D215}	R^{D215}	L_{C899}	R^{D1}	R^{D215}	L_{C1007}	R^{D4}	R^{D215}	L_{C1115}	R^{D9}	R^{D215}
L_{C792}	R^{D216}	R^{D216}	L_{C900}	R^{D1}	R^{D216}	L_{C1008}	R^{D4}	R^{D216}	L_{C1116}	R^{D9}	R^{D216}
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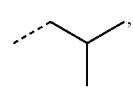
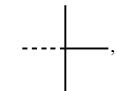
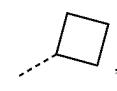
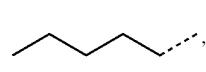
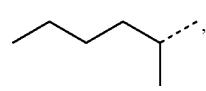
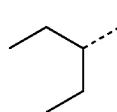
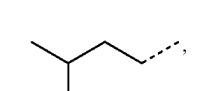
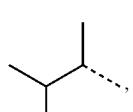
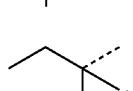
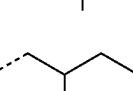
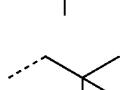
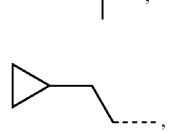
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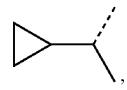
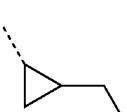
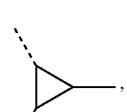
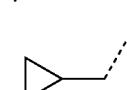
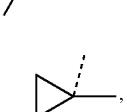
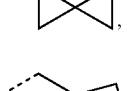
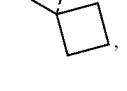
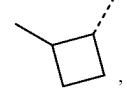
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L_{C1212}	R^{D10}	R^{D204}	L_{C1266}	R^{D55}	R^{D204}	L_{C1320}	R^{D37}	R^{D204}	L_{C1374}	R^{D143}	R^{D204}
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wherein R^{D1} to R^{D246} have the following structures:

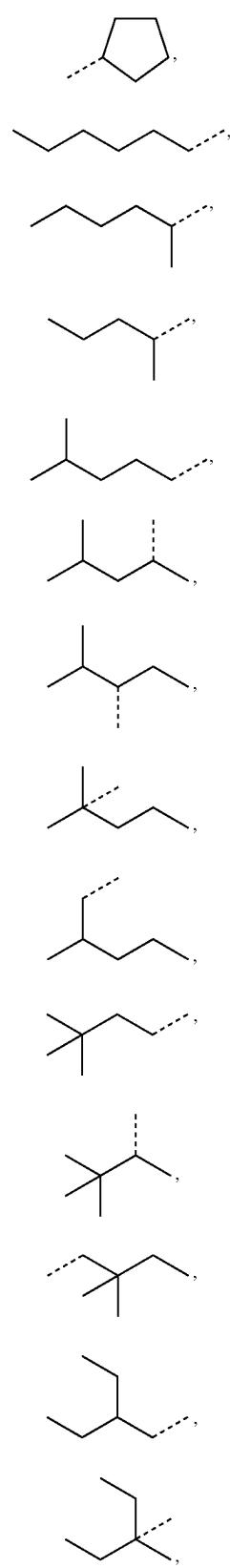
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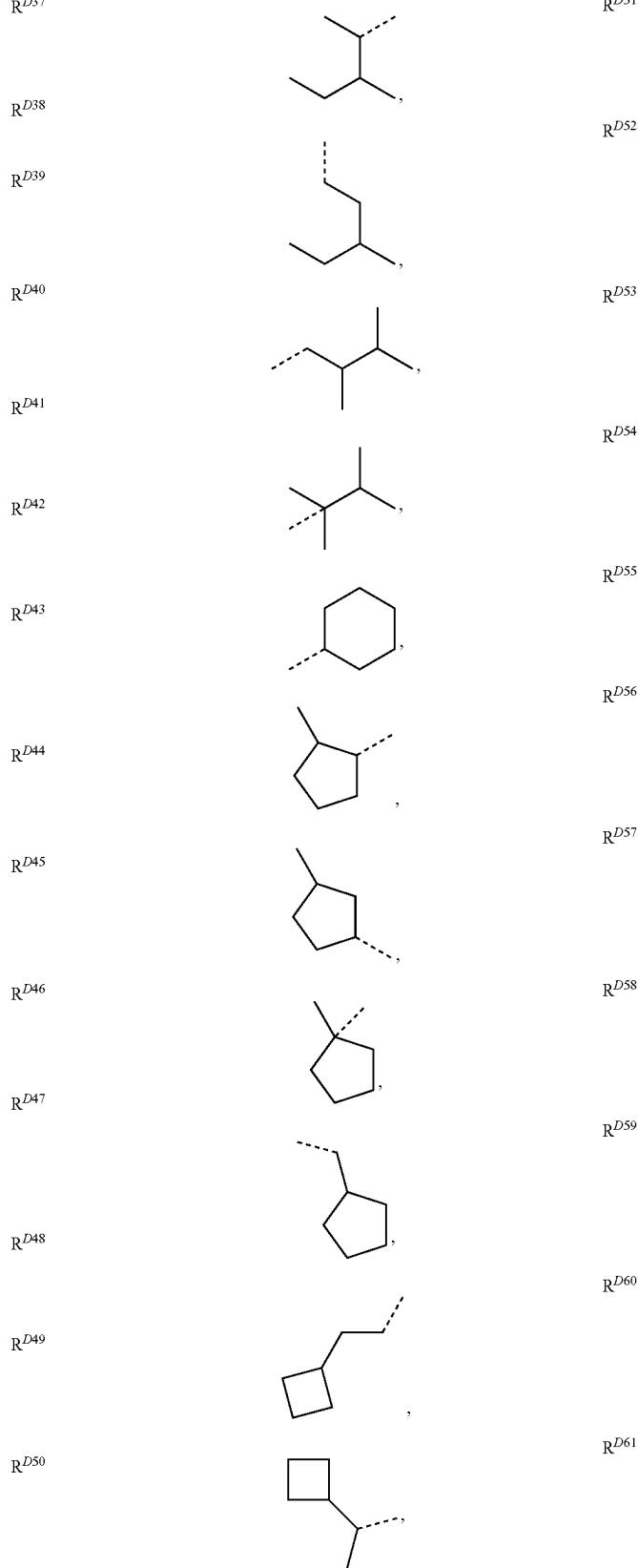
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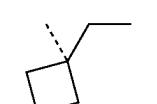
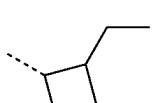
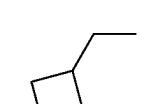
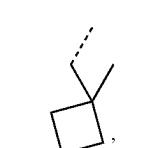
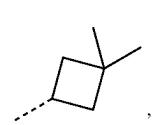
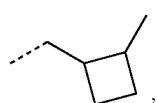
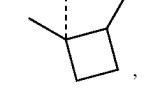
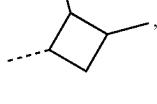
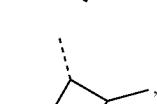
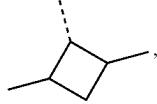
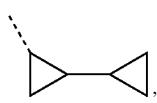
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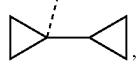
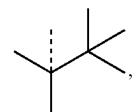
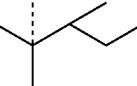
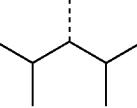
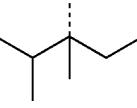
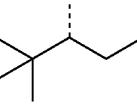
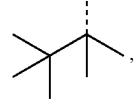
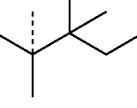
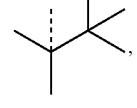
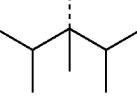
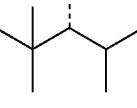
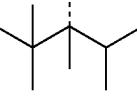
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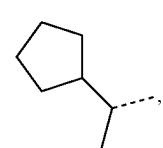
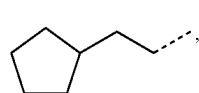
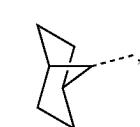
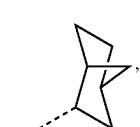
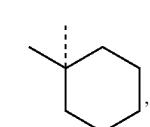
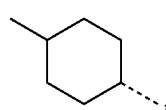
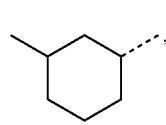
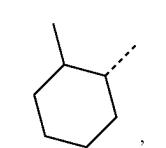
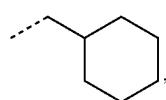
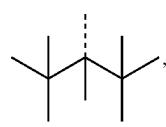
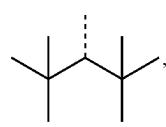
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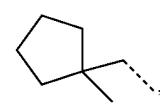
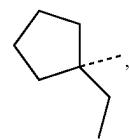
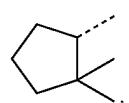
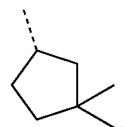
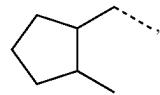
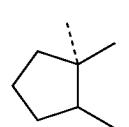
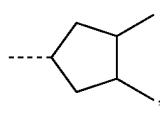
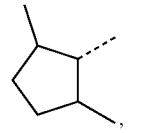
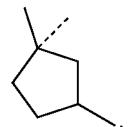
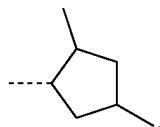
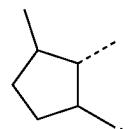
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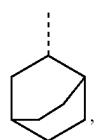
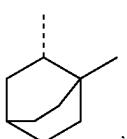
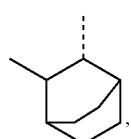
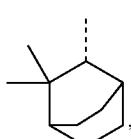
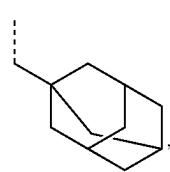
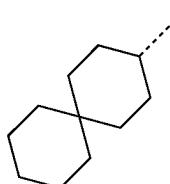
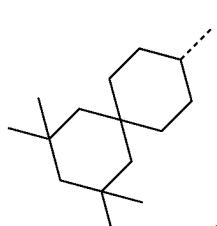
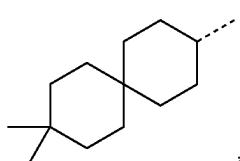
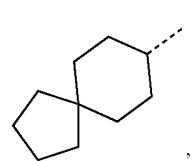
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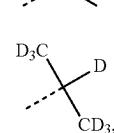
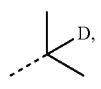
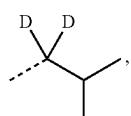
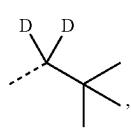
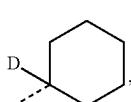
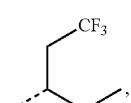
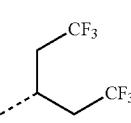
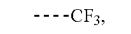
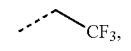
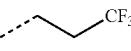
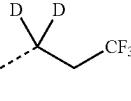
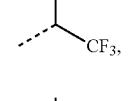
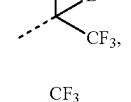
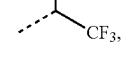
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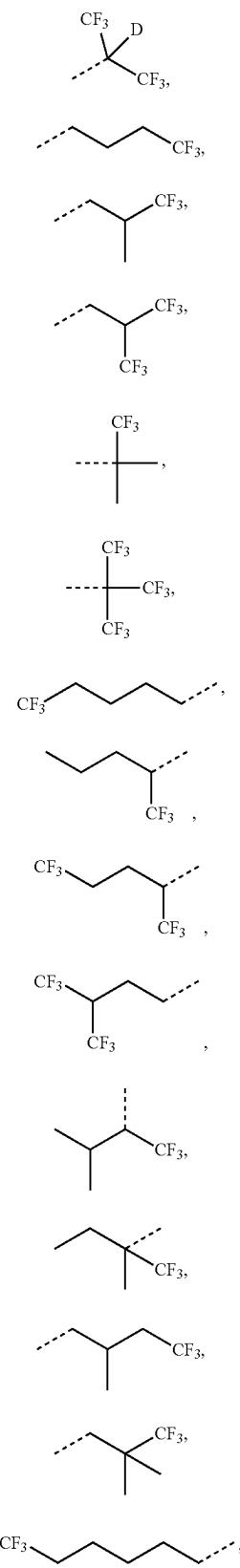
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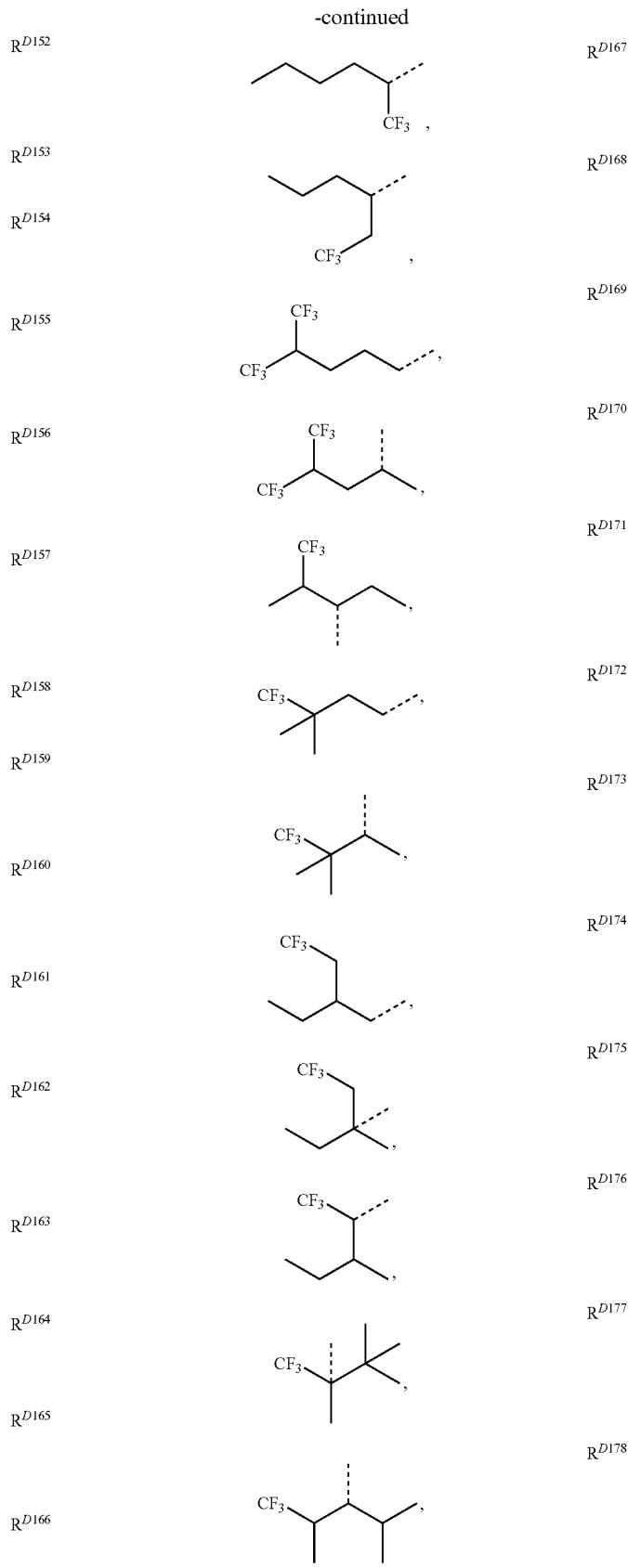
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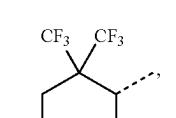
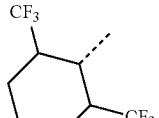
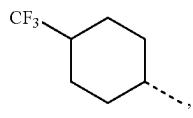
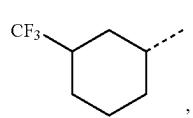
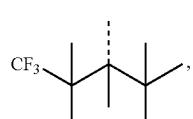
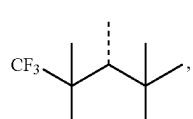
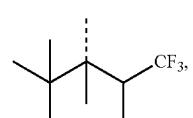
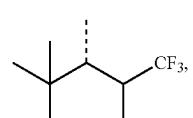
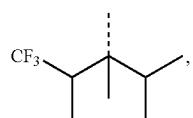
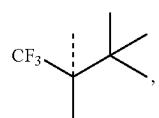
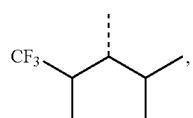
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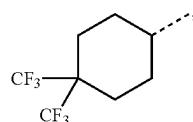
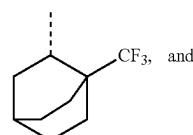
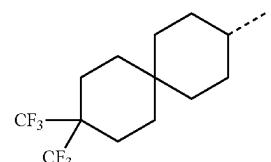
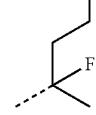
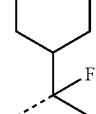
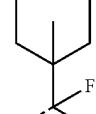
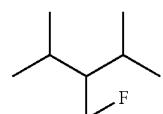
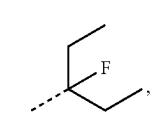
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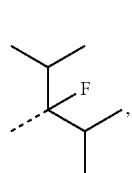
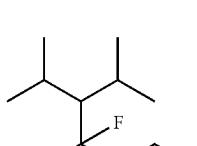
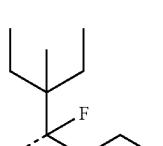
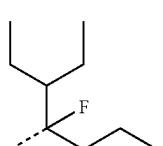
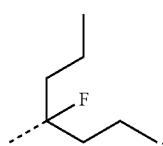
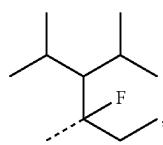
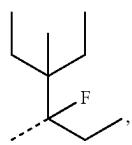
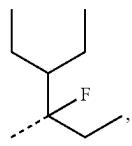
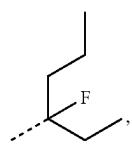
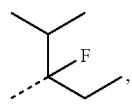
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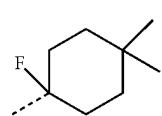
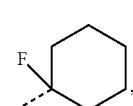
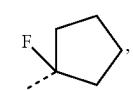
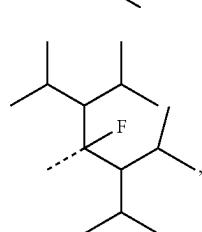
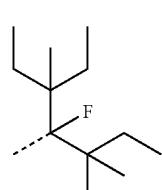
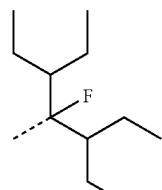
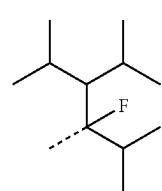
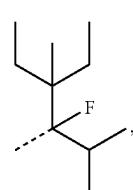
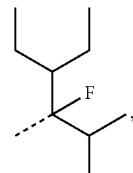
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 R^{D190}  R^{D191}  R^{D192}  R^{D193}  R^{D194}  R^{D195}  R^{D196}  R^{D197}  R^{D198}  R^{D199}  R^{D200} 

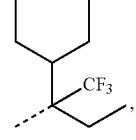
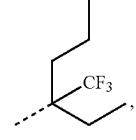
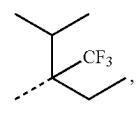
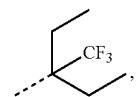
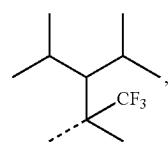
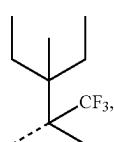
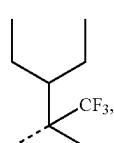
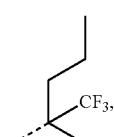
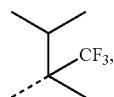
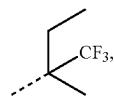
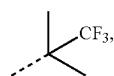
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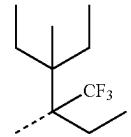
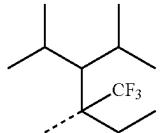
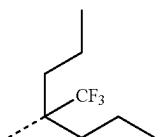
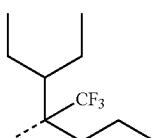
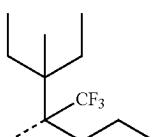
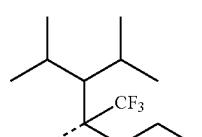
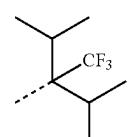
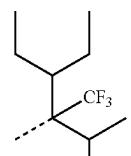
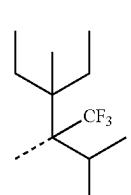
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 R^{D211} 

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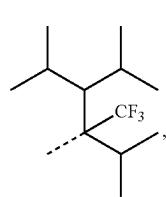
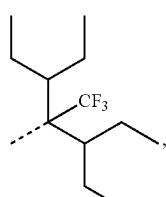
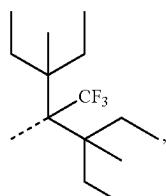
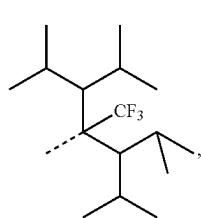
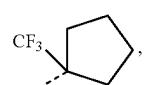
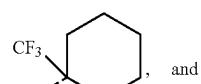
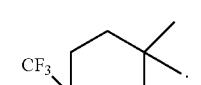
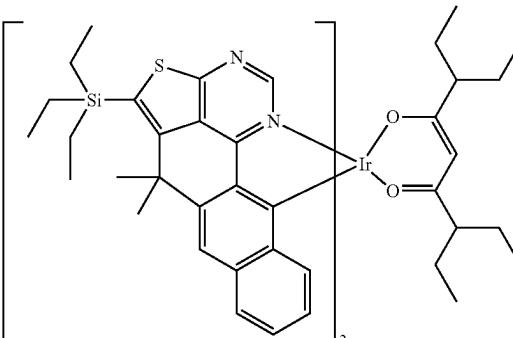
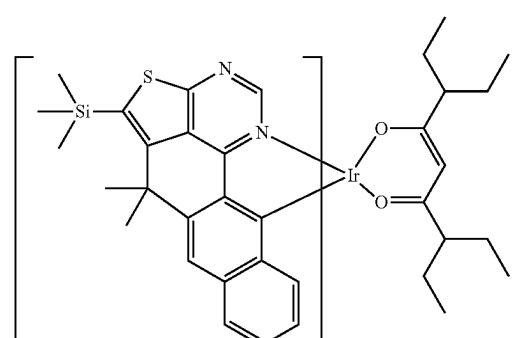
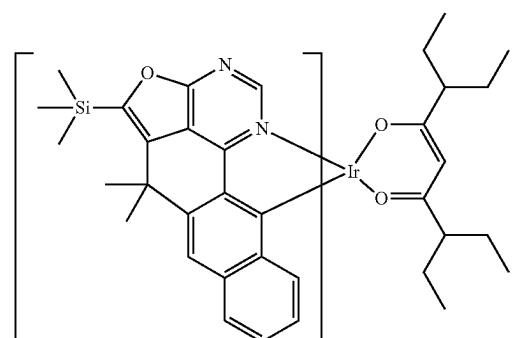
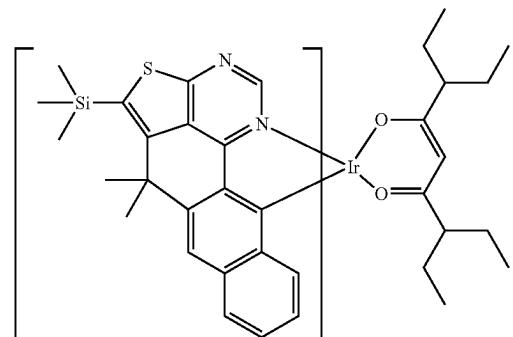


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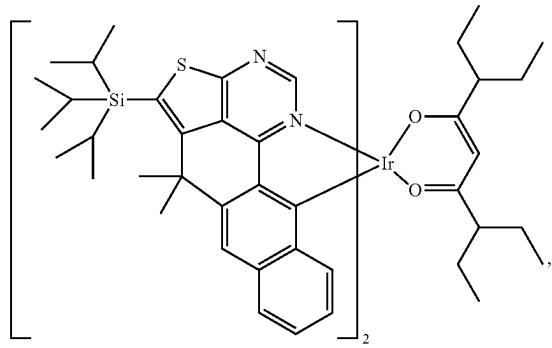
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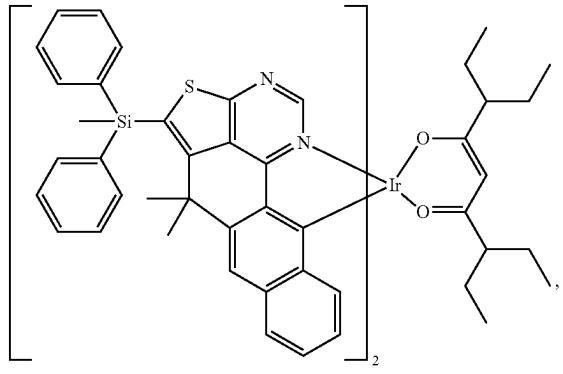
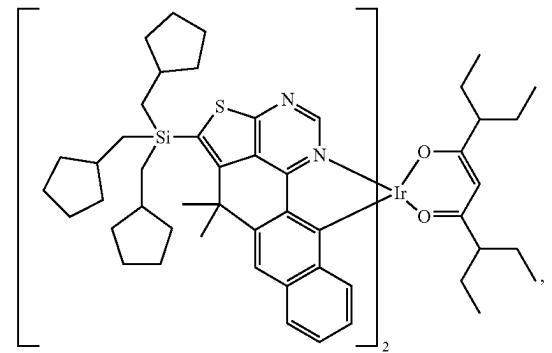
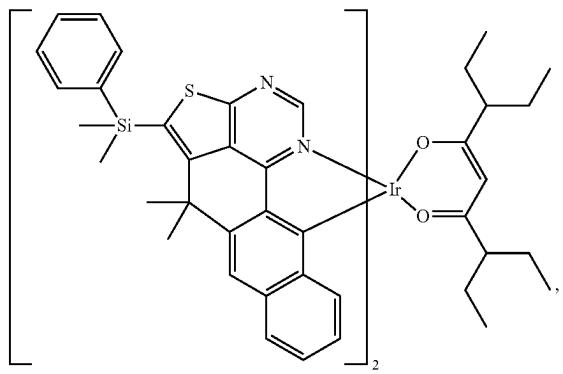
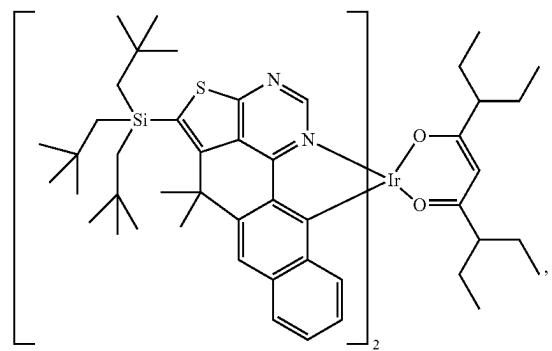
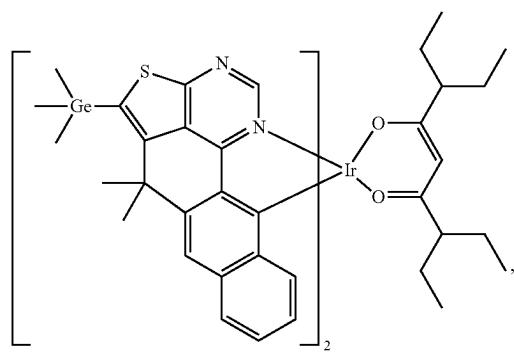
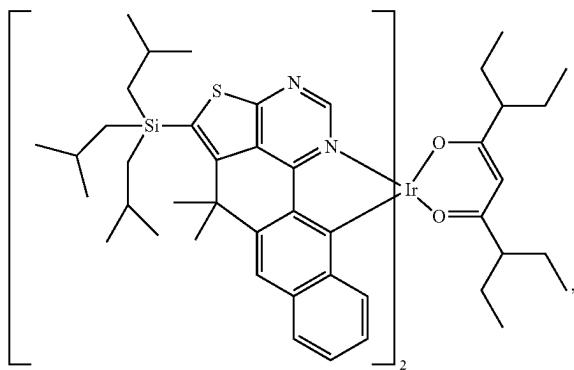
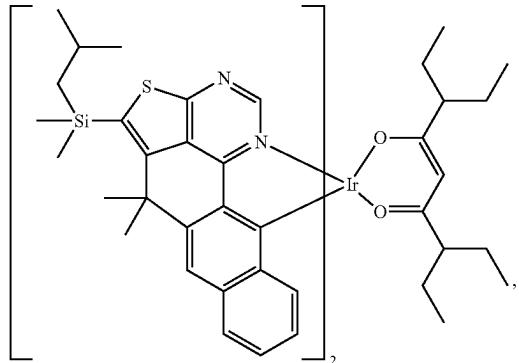
15. The compound of claim 1, wherein the compound is selected from the group consisting of:

 R^{D240}  R^{D241}  R^{D242}  R^{D243}  R^{D244}  R^{D245}  R^{D246} 

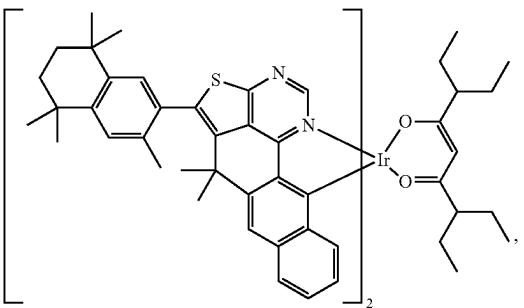
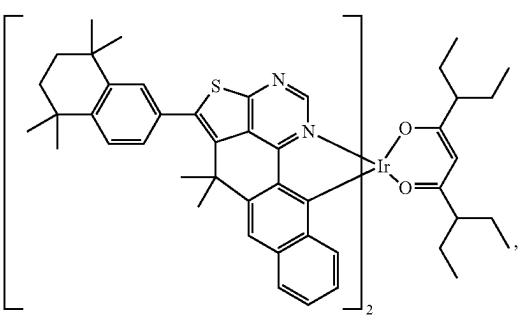
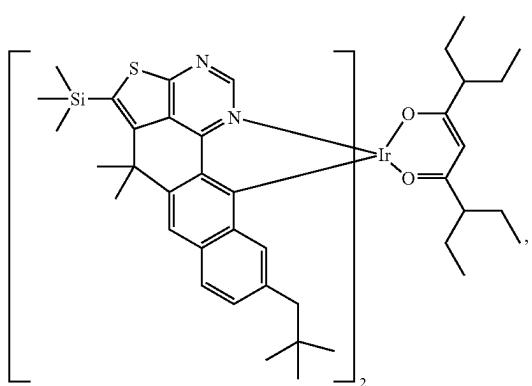
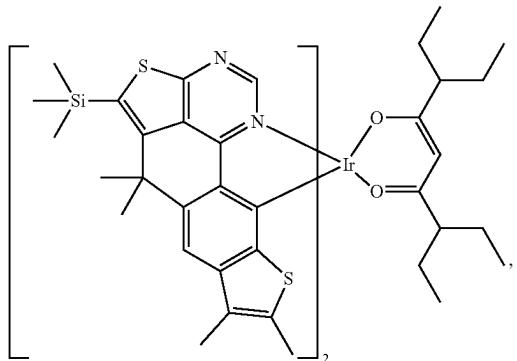
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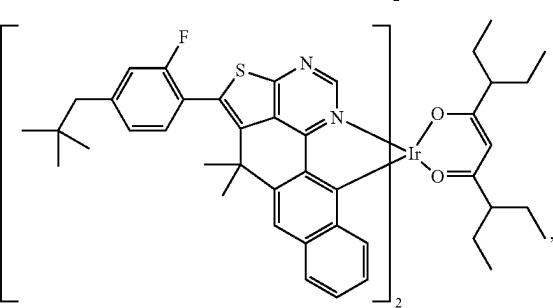
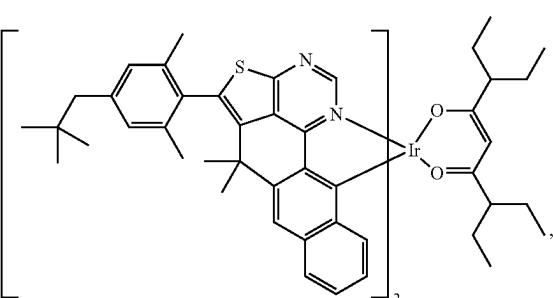
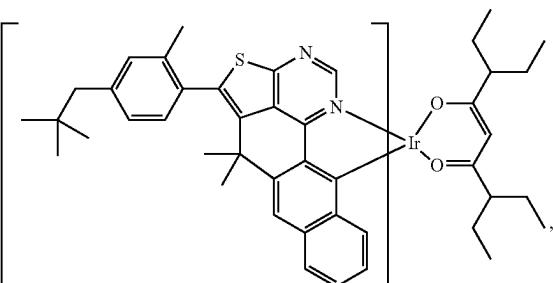
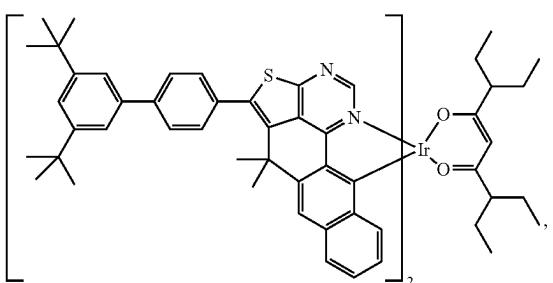
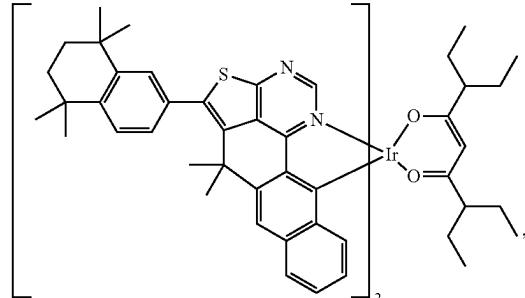
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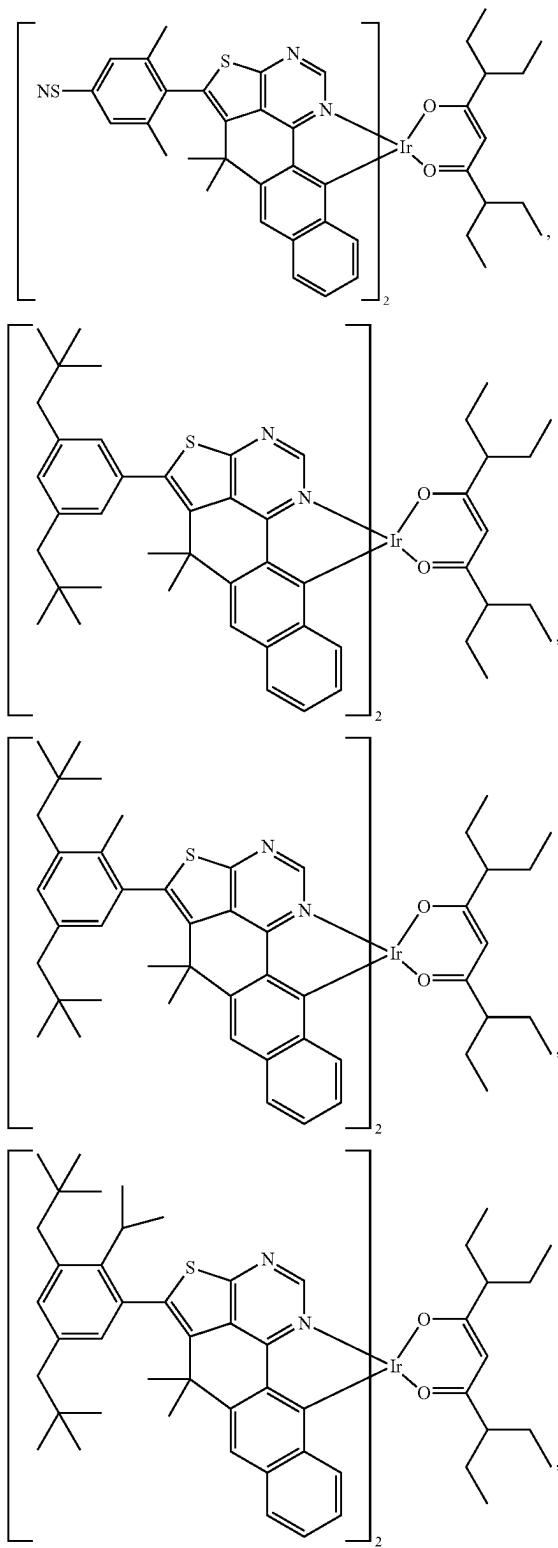
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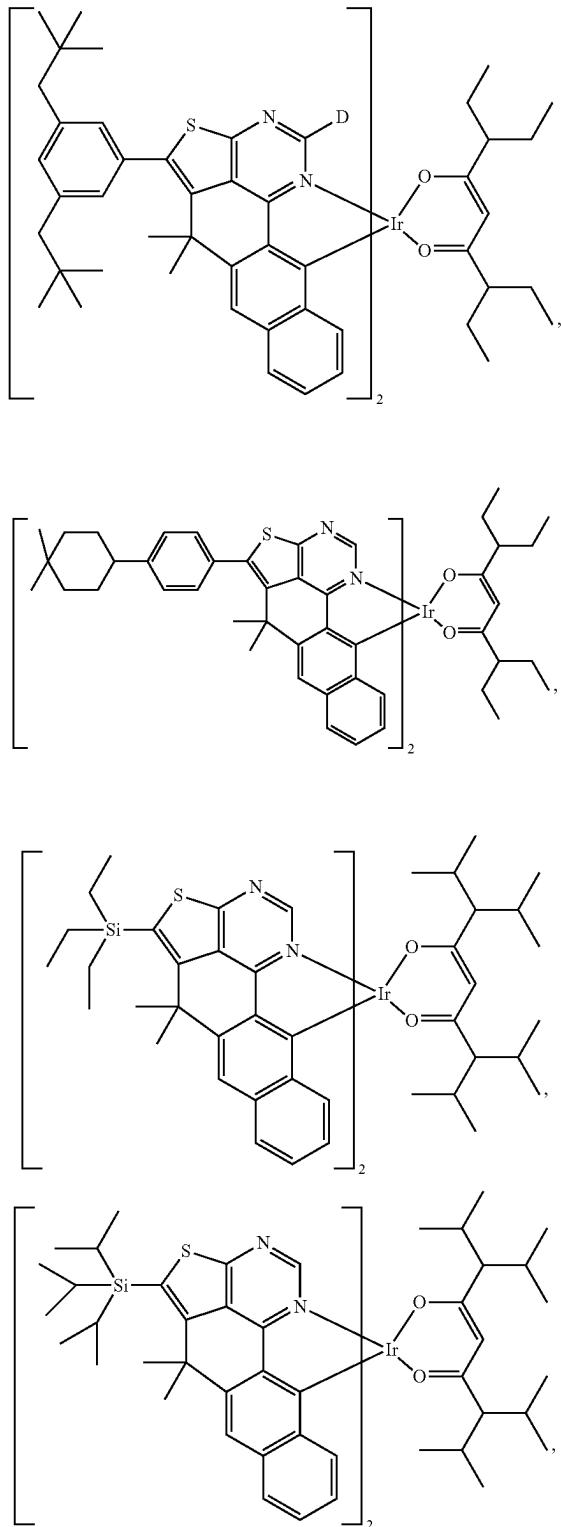
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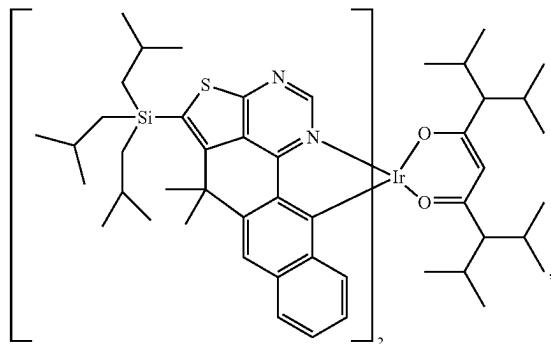
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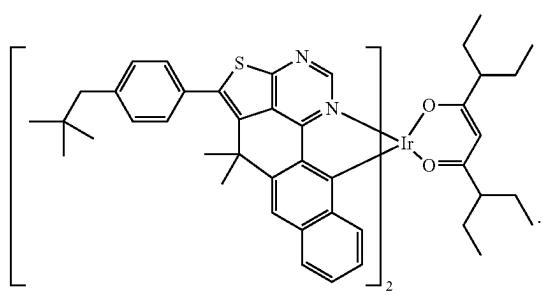
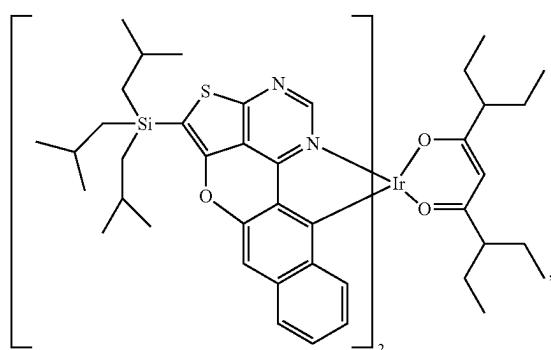
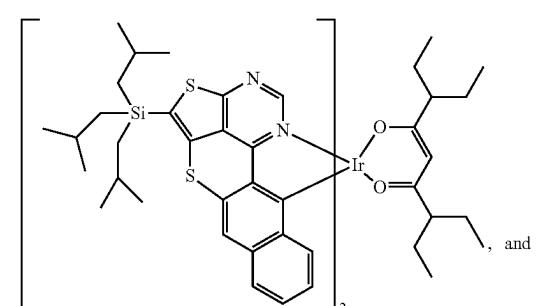
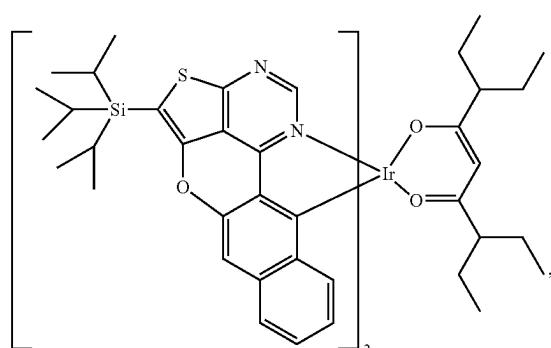
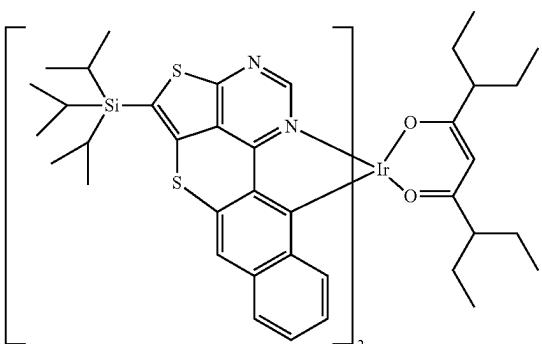
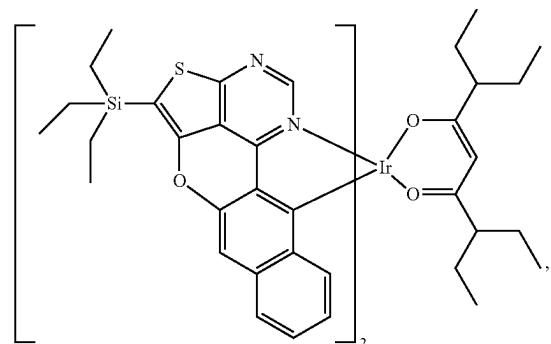
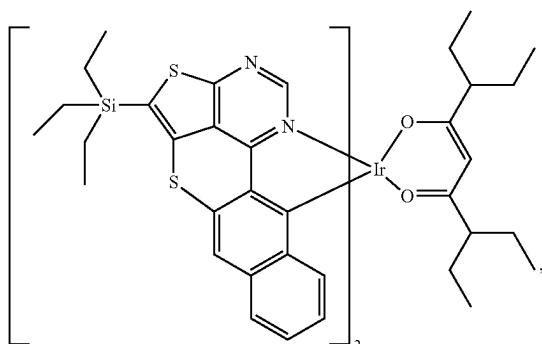
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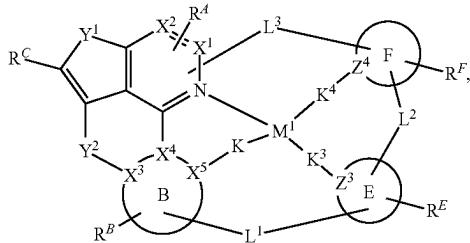
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16. The compound of claim 11, wherein the compound has the Formula III:

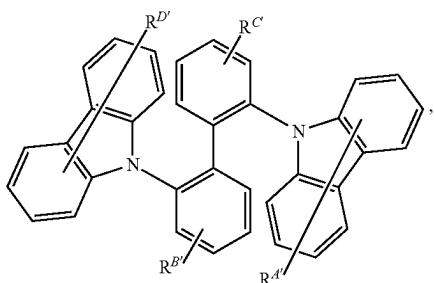


wherein:

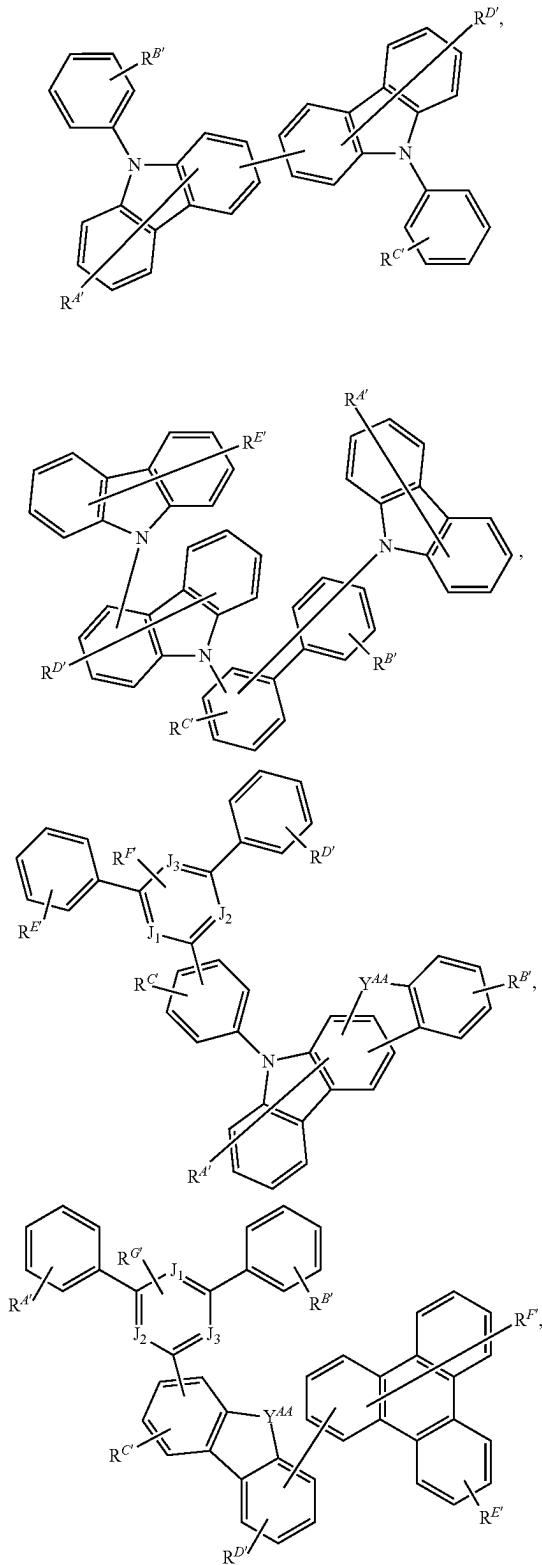
M¹ is Pd or Pt;
moieties E and F are each independently monocyclic or polycyclic ring structure, wherein the monocyclic ring or each ring of the polycyclic fused ring system is independently a 5-membered to 10-membered carbocyclic or heterocyclic ring;
Z³ and Z⁴ are each independently C or N;
K, K³, and K⁴ are each independently selected from the group consisting of a direct bond, O, and S, wherein at least two of them are direct bonds;
L¹, L², and L³ are each independently absent or selected from the group consisting of a direct bond, BR, BRR', NR, PR, P(O)R, O, S, Se, C=O, C=S, C=Se, C=NR, C=CRR', S=O, SO₂, CR, CRR', SiRR', GeRR', alkylene, cycloalkyl, aryl, cycloalkylene, arylene, heteroarylene, and combinations thereof, wherein at least one of L¹ and L² is present;
R^E and R^F each independently represents zero, mono, or up to a maximum allowed number of substitutions; each of R, R', R^E, and R^F is independently a hydrogen or a substituent selected from the group consisting of deuterium, halide, alkyl, cycloalkyl, heteroalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carbonyl, carboxylic acid, ester, nitrile, isonitrile, sulfanyl, selenyl, sulfinyl, sulfonyl, phosphino, and combinations thereof; and
two adjacent R^A, R^B, R^C, R^E, and R^F can be joined or fused together to form a ring.

17. An organic light emitting device (OLED) comprising:
an anode;
a cathode; and
an organic layer disposed between the anode and the cathode, wherein the organic layer comprises a compound according to claim 1.

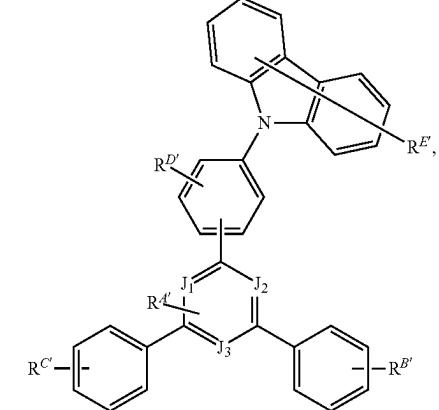
18. The OLED of claim 17, wherein the host is selected from the group consisting of:



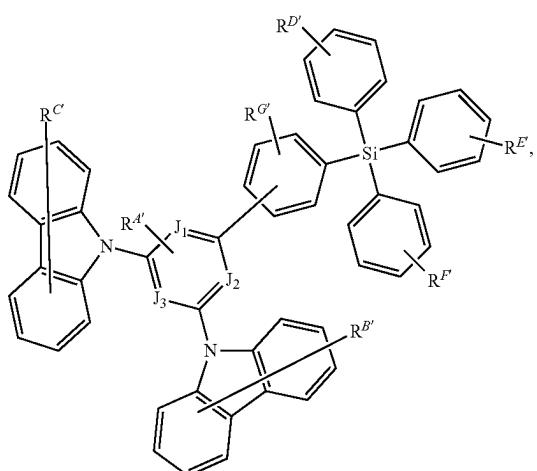
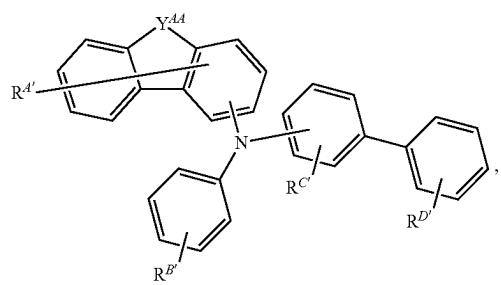
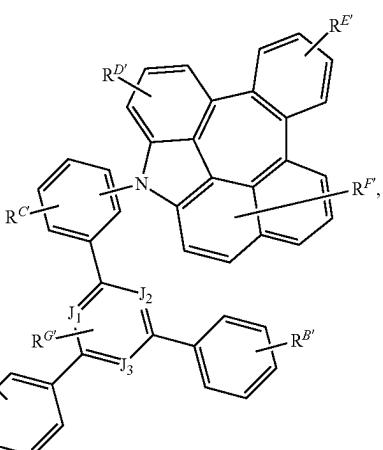
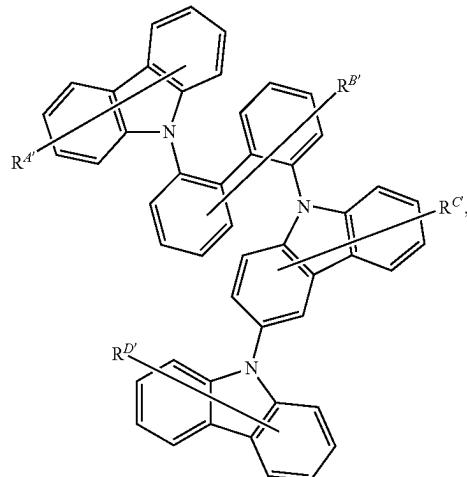
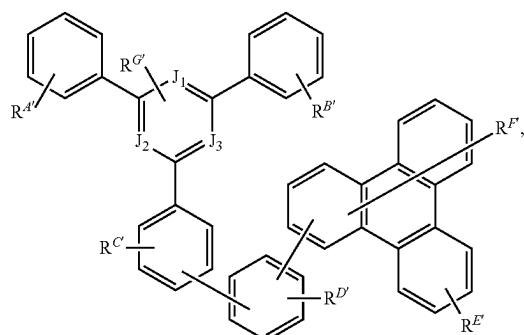
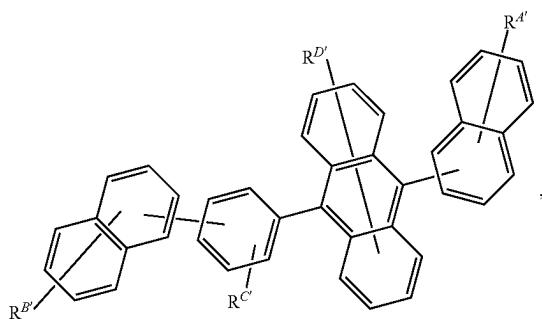
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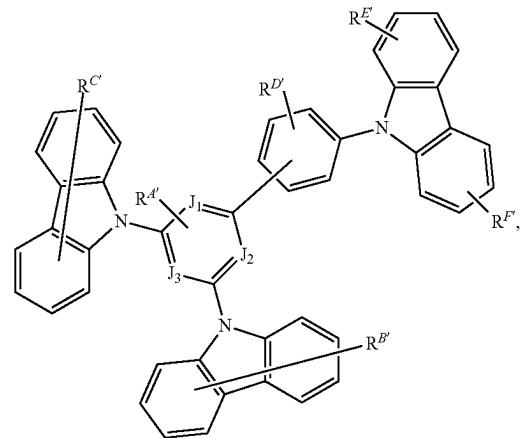
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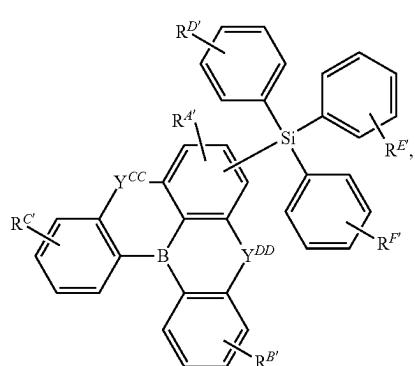
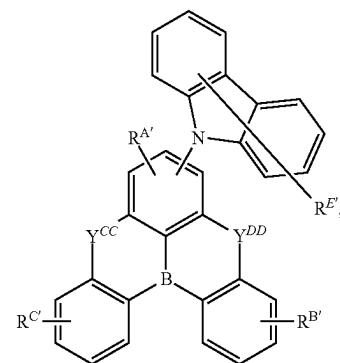
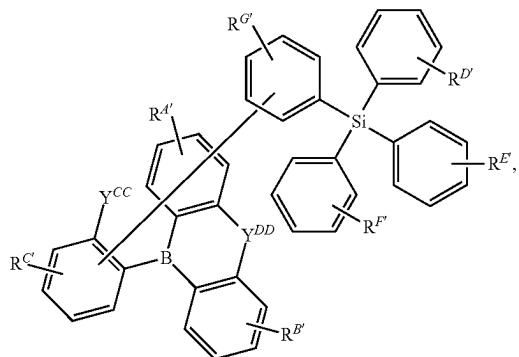
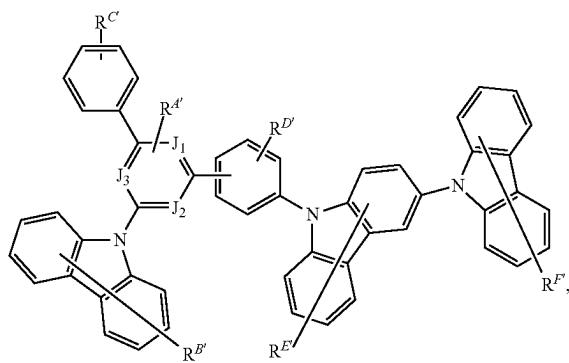
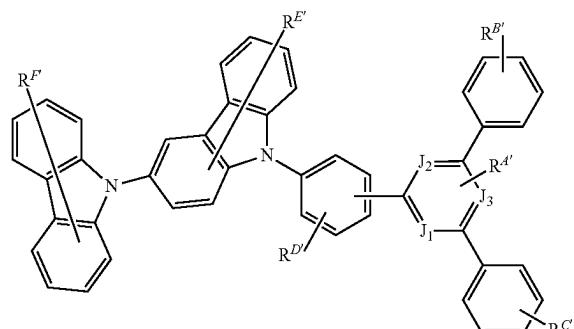
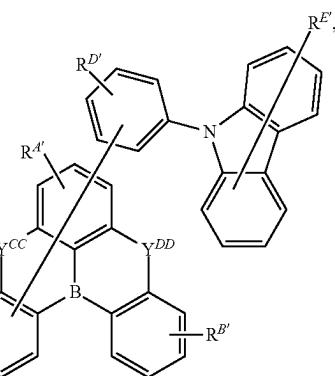
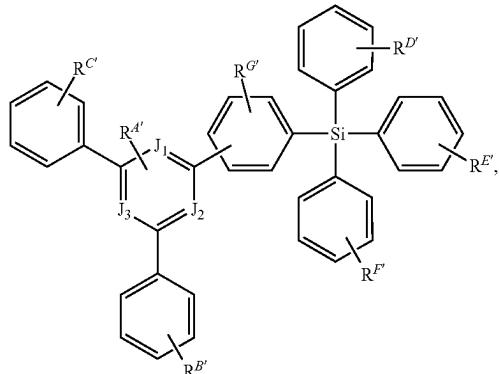
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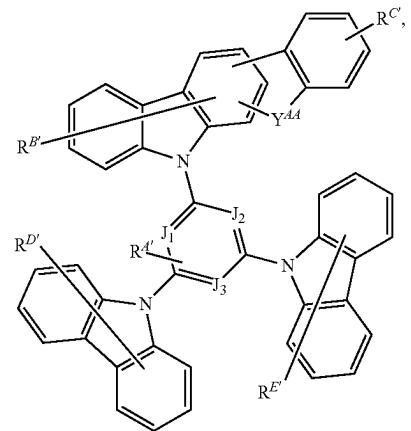
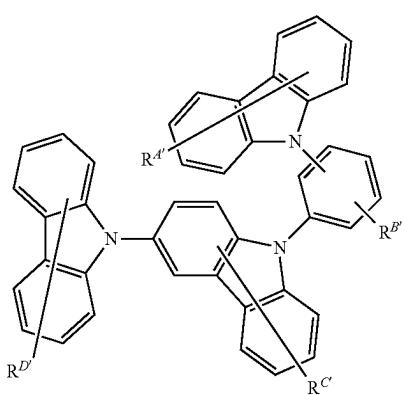
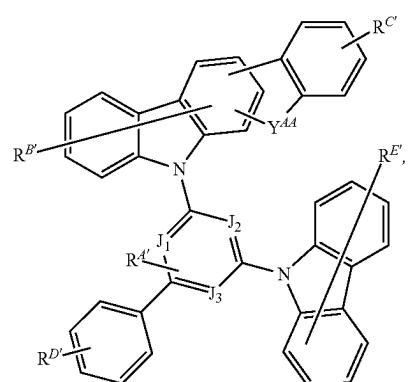
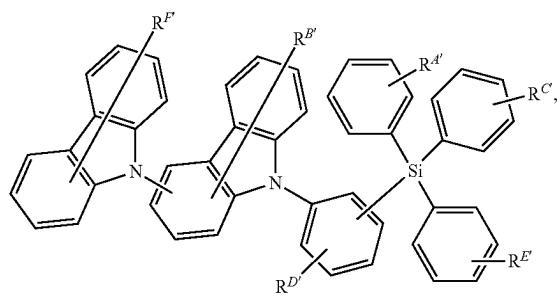
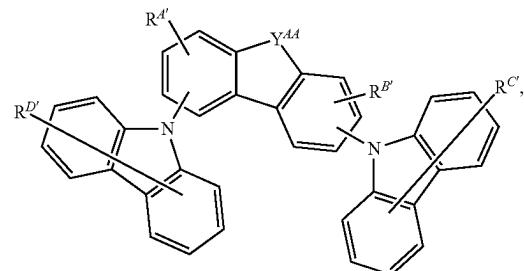
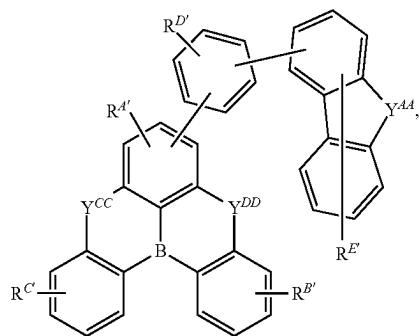
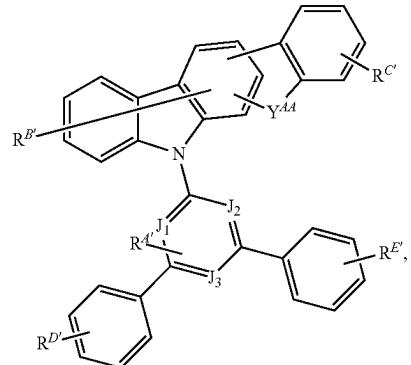
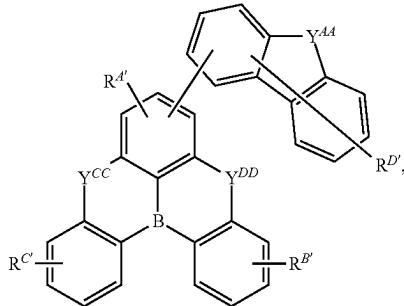


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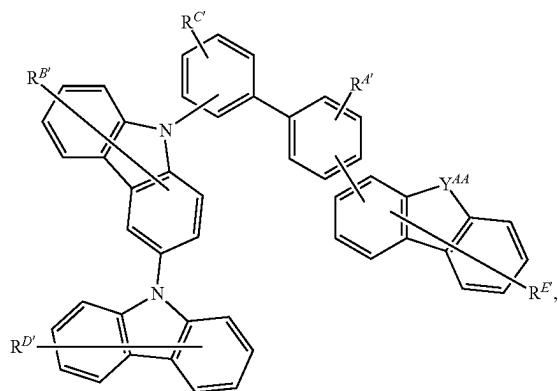


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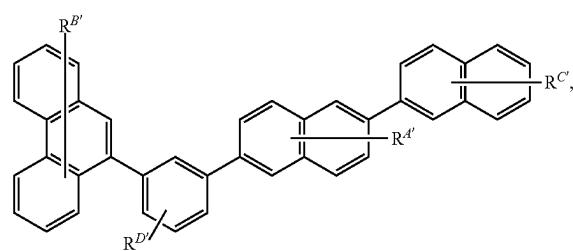
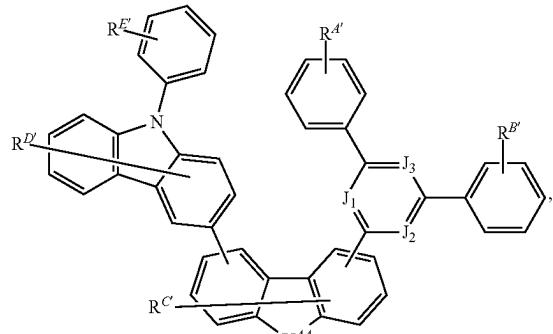
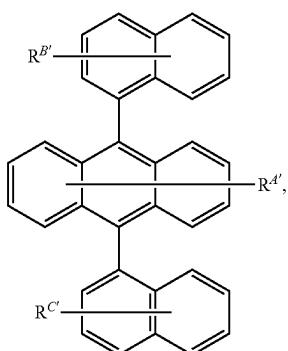
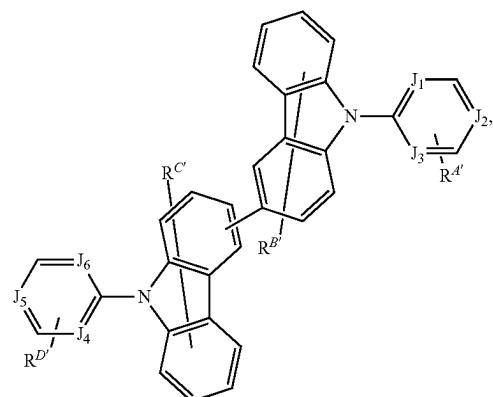
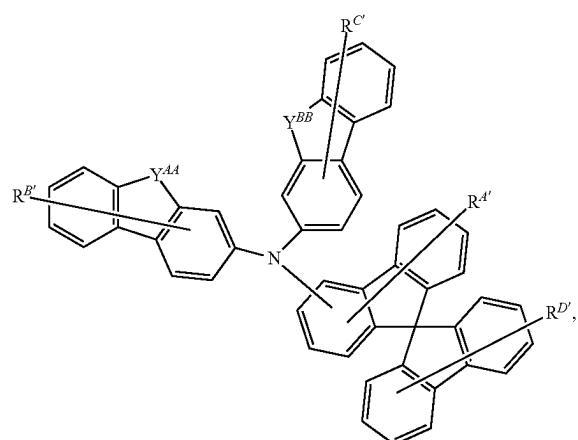
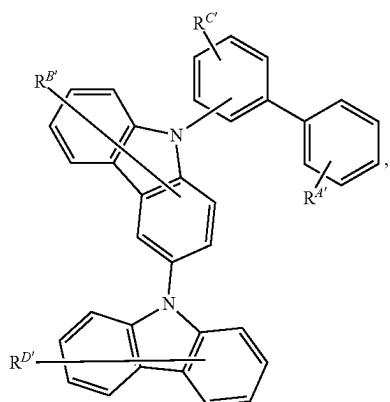
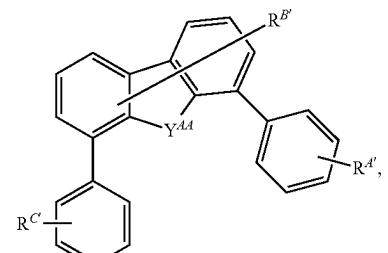
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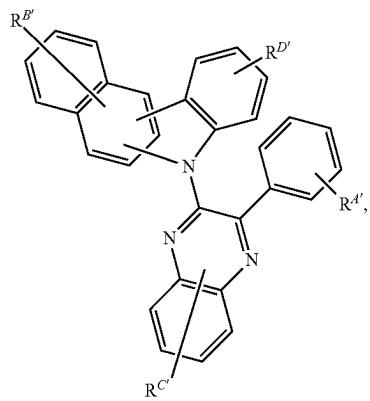
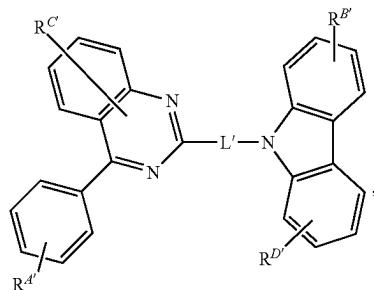
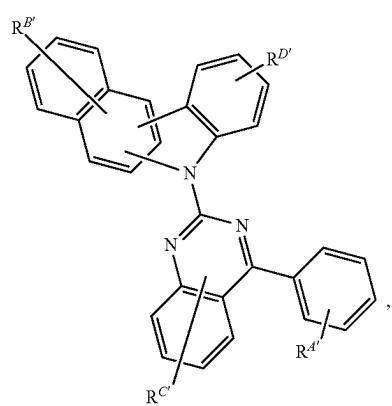
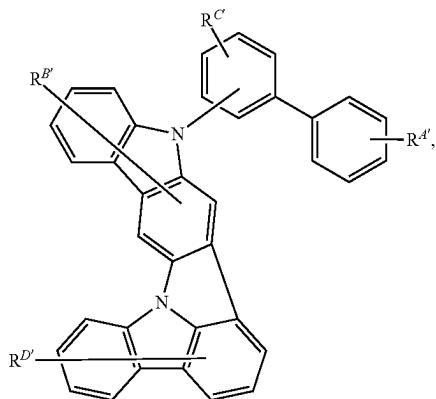
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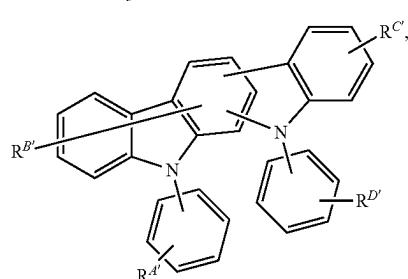
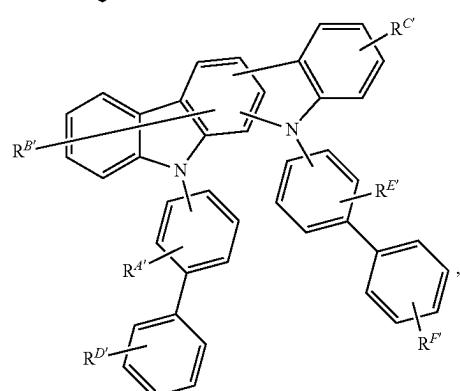
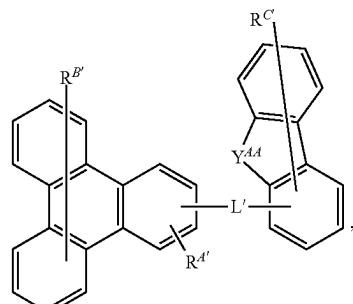
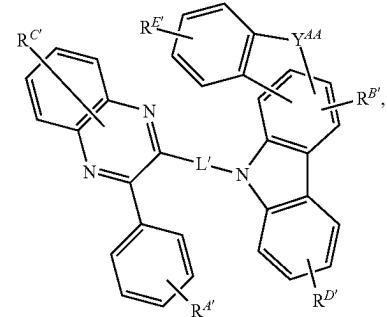
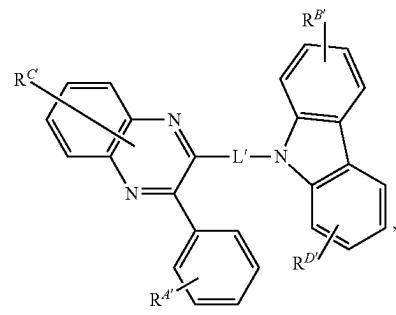
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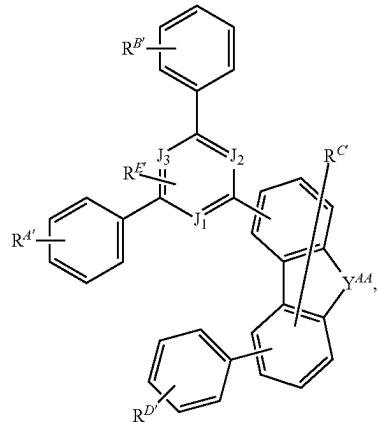
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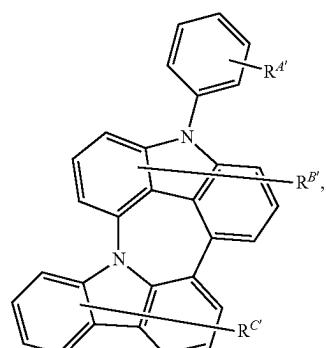
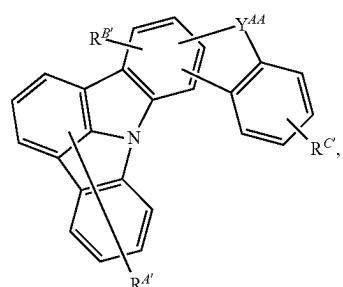
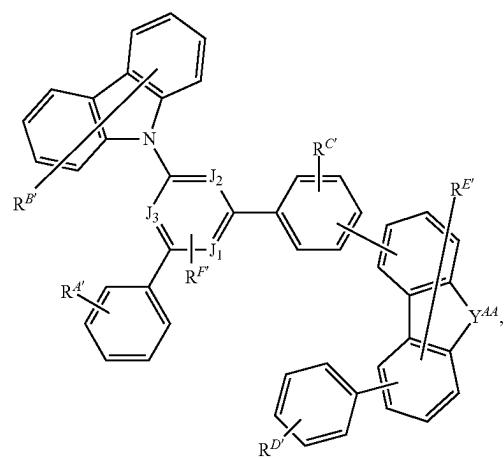
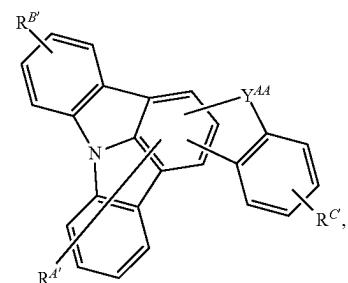
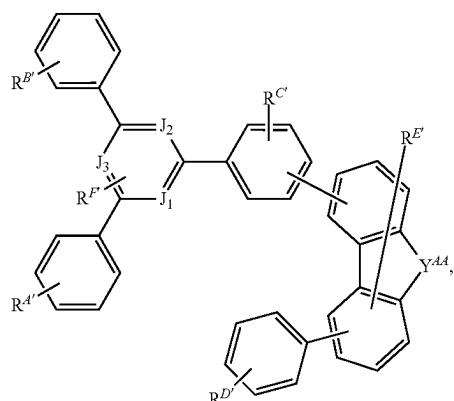
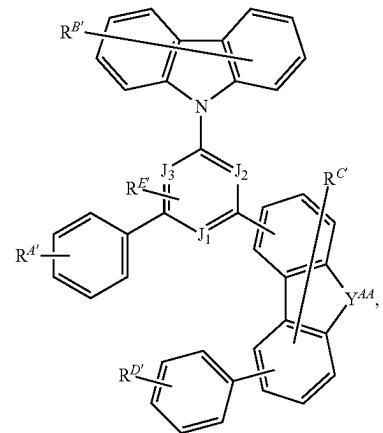
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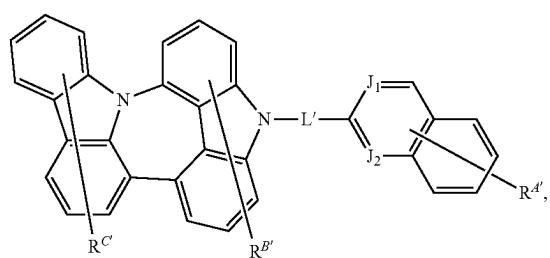
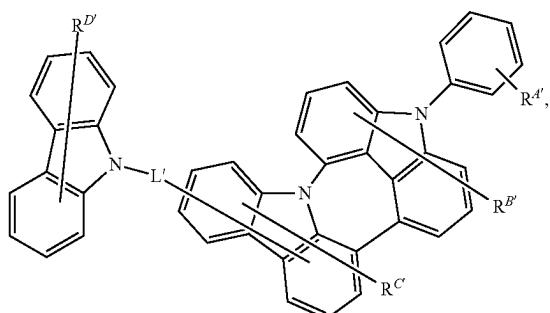
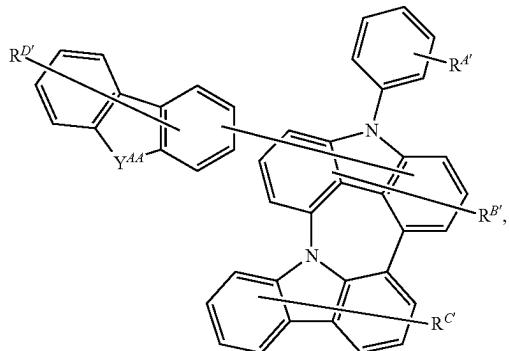
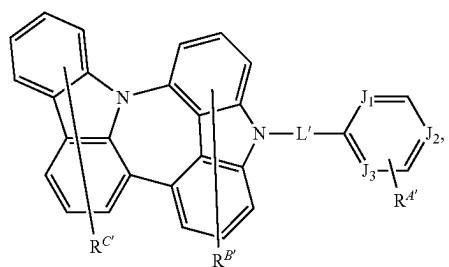
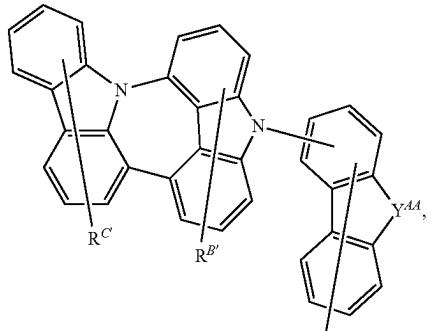
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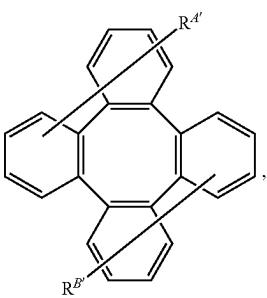
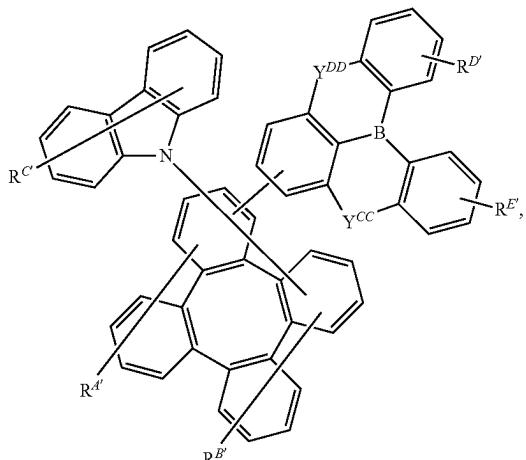
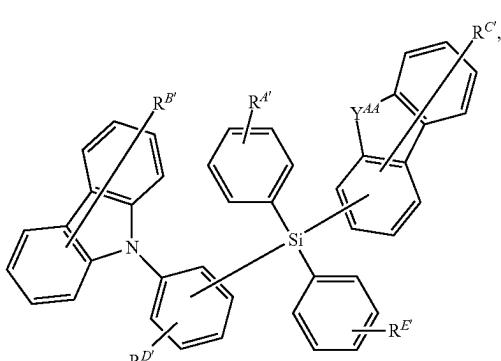
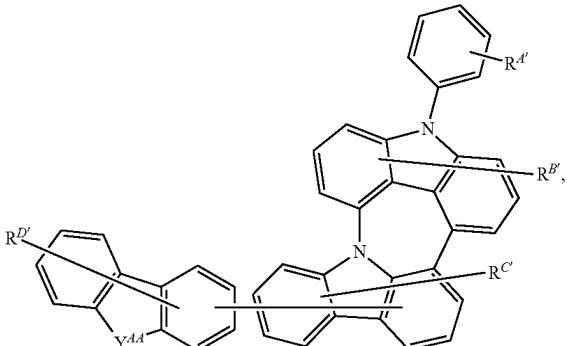
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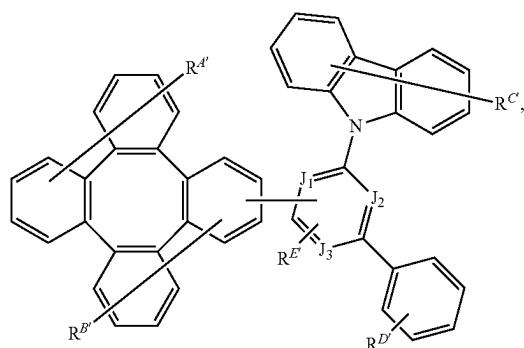
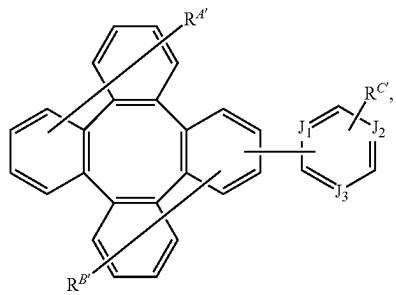
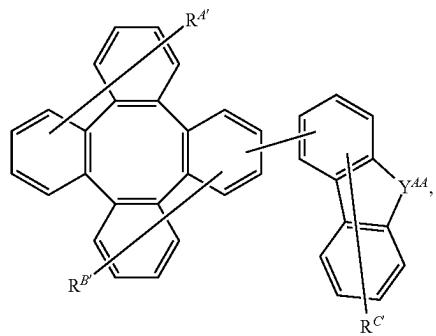
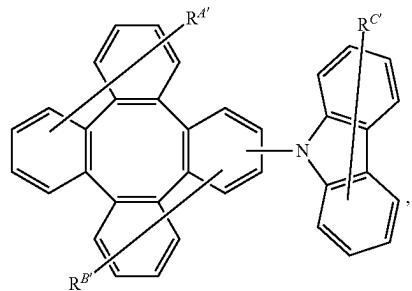
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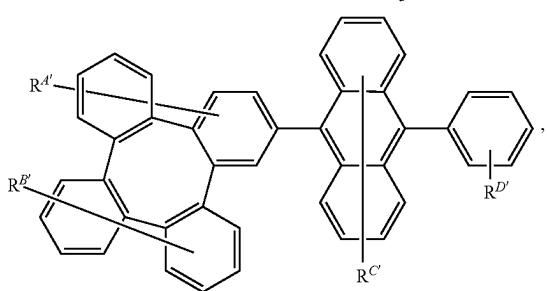
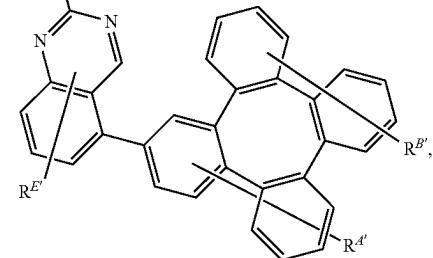
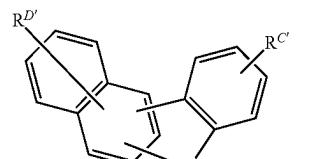
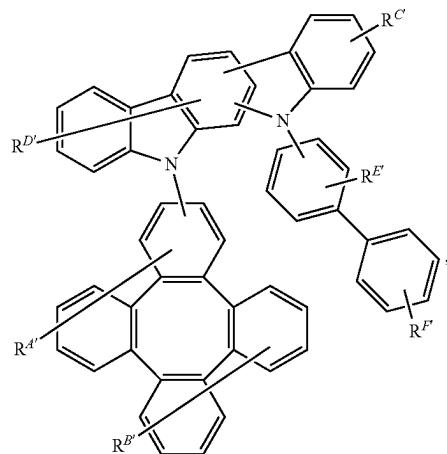
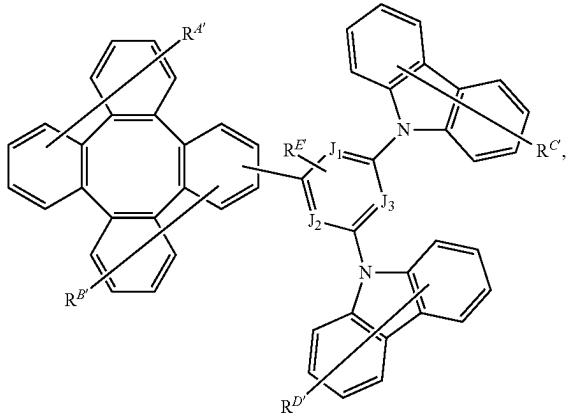
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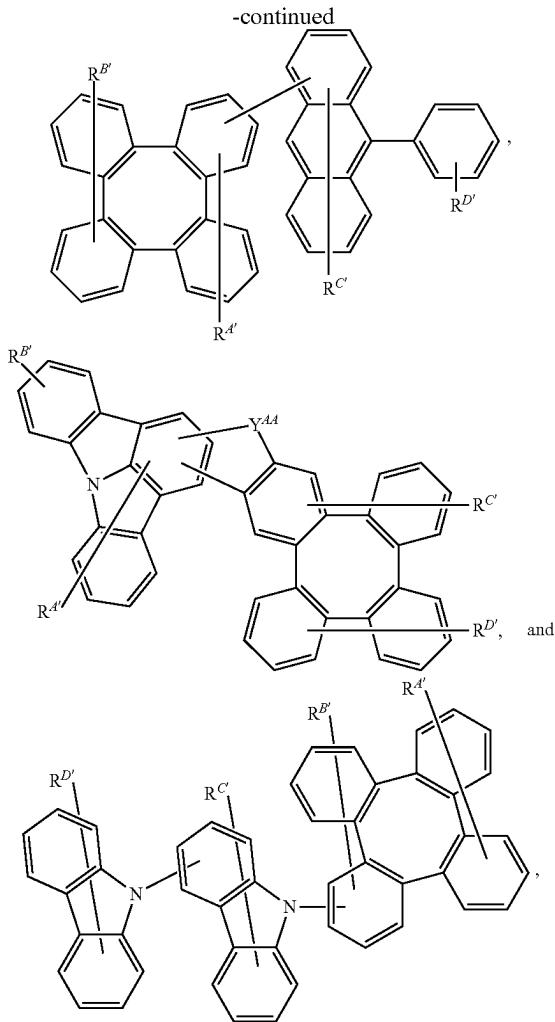
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wherein:

each of J₁ to J₆ is independently C or N;

L' is a direct bond or an organic linker;

each Y^{AA}, Y^{BB}, Y^{CC}, and Y^{DD} is independently selected from the group consisting of absent a bond, direct bond, O, S, Se, CRR', SiRR', GeRR', NR, BR, BRR';each of R^{A'}, R^{B'}, R^{C'}, R^{D'}, R^{E'}, and R^{F'} independently represents mono, up to the maximum substitutions, or no substitutions;each R, R', R^A, R^B, R^C, R^D, R^E, R^F, and R^G is independently a hydrogen or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, germyl, boryl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, selenyl, sulfinyl, sulfonyl, phosphino, and combinations thereof;

any two substituents can be joined or fused to form a ring; and

where possible, each unsubstituted aromatic carbon atom is optionally replaced with N to form an aza-substituted ring.

19. The OLED of claim 17, wherein the compound is a sensitizer, and the OLED further comprises an acceptor selected from the group consisting of a fluorescent emitter, a delayed fluorescence emitter, and combination thereof.

20. A consumer product comprising an organic light-emitting device comprising:

an anode;

a cathode; and

an organic layer disposed between the anode and the cathode, wherein the organic layer comprises a compound according to claim 1.

* * * * *