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Compound, photosensitive fluorescent resin composition comprising same, color conversion film manufactured therefrom, backlight unit, and display device

Abstract

The present specification relates to a compound represented by Chemical Formula 1, a photoresist fluorescent resin composition including the same, and a color conversion film manufactured using the same, a backlight unit and a display apparatus.

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Background/Summary

(1) This application is a 35 U.S.C. 371 National Phase Entry Application from PCT/KR2020/009177, filed on Jul. 13, 2020, which claims priority to and the benefits of Korean Patent Application No. 10-2019-0087014, filed with the Korean Intellectual Property Office on Jul. 18, 2019, the entire contents of which are incorporated herein by reference.

TECHNICAL FIELD

(2) The present specification relates to a compound, a photoresist fluorescent resin composition including the same, and a color conversion film manufactured using the same, a backlight unit and a display apparatus.

BACKGROUND OF THE INVENTION

(3) Existing light emitting diodes (LED) are obtained by mixing a green phosphorescent substance and a red phosphorescent substance to a blue light emitting diode, or mixing a yellow phosphorescent substance and a blue-green phosphorescent substance to a UV light emitting diode. However, with such a method, it is difficult to control colors, and therefore, color rendering is not favorable. Accordingly, color gamut declines.

(4) In order to overcome such color gamut decline and to reduce production costs, methods of obtaining green and red in a manner of filming quantum dots and binding the dots to a blue LED have been recently tried. However, cadmium series quantum dots have safety problems, and other quantum dots have significantly decreased efficiency compared to cadmium series quantum dots. In addition, quantum dots have reduced stability for oxygen and water, and have a disadvantage in that the performance is significantly degraded when aggregated. Furthermore, unit costs of production are high since, when producing quantum dots, maintaining the sizes to be constant is difficult.

(5) Existing compounds having a BF₂ or B(CN)₂-based bodipy structure provides, as a fluorescent dye having high light efficiency and a narrow full width at half maximum, excellent light properties when used in a color conversion film, but has insufficient light resistance and heat resistance to be commercialized, and development of compounds having high durability has been required.

BRIEF SUMMARY OF THE INVENTION

(6) The present specification is directed to providing a compound, a photoresist fluorescent resin composition including the same, and a color conversion film manufactured using the same, a backlight unit and a display apparatus.

(7) One embodiment of the present specification provides a compound represented by the following Chemical Formula 1.

(8) ##STR00001##

(9) In Chemical Formula 1, A1 to A4 are each independently a substituted or unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group, X1 and X2 are each independently O, NH or NR', R' is -(G1)_{g1}-E or -G2-O-G3-E, or forms a ring with adjacent groups, R1, R2, R4 and R5 are each independently hydrogen, a halogen group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group, R3 and R6 are each independently a polymerizable group, E is a halogen group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heterocyclic group, or a polymerizable group, L1, L2, L4 and L5 are each independently a direct bond, or a substituted or unsubstituted alkylene group, G1 to G3, L3 and L6 are each independently a direct bond, a substituted or unsubstituted alkylene group, a substituted or unsubstituted cycloalkylene group, a substituted or unsubstituted arylene group, or a substituted or unsubstituted divalent heterocyclic group, a and b are each an integer of 0 to 3, g1 and I1 to I6 are each an integer of 1 to 3, and when a, b, g1 and I1 to I6 are each 2 or greater, structures in the parentheses are the

same as or different from each other.

(10) Another embodiment of the present specification provides a photoresist fluorescent resin composition including a binder resin; a multifunctional monomer; and the compound described above.

(11) Another embodiment of the present specification provides a color conversion film including the compound bonding to a binder resin.

(12) Another embodiment of the present specification provides a backlight unit including the color conversion film described above.

(13) Another embodiment of the present specification provides a display apparatus including the backlight unit described above.

Advantageous Effects

(14) A compound according to one embodiment of the present specification is capable of high color reproduction.

(15) A compound according to one embodiment of the present specification has high solubility.

(16) A compound according to one embodiment of the present specification has high light resistance.

(17) A compound according to one embodiment of the present specification has an advantage of being not dyed.

Description

BRIEF DESCRIPTION OF DRAWINGS

(1) FIG. 1 is a mimetic diagram of using a color conversion film according to one embodiment of the present specification in a backlight unit.

(2) FIG. 2 is a mimetic diagram illustrating a structure of a display apparatus according to one embodiment of the present specification.

DETAILED DESCRIPTION OF THE INVENTION

(3) Hereinafter, the present specification will be described in detail.

(4) One embodiment of the present specification provides a compound represented by Chemical Formula 1.

(5) Existing perylene derivatives have a limitation in high color reproduction since absorption and emission wavelengths thereof are short wavelengths. In addition, existing perylene derivatives have disadvantages of being dyed and having weak light resistance.

(6) Meanwhile, the compound according to one embodiment of the present specification is capable of high color reproduction by absorption and emission wavelengths moving to long wavelengths compared to existing perylene derivatives. Specifically, the compound according to one embodiment of the present specification is capable of high color reproduction by absorption and emission wavelengths moving to long wavelengths and thereby accomplishing a wider range of color coordinates compared to existing perylene derivatives.

(7) The compound according to one embodiment of the present specification has superior light resistance compared to existing perylene derivatives. Specifically, the compound according to one embodiment of the present specification has superior light resistance by having an electron withdrawing group at the imide position compared to existing perylene derivatives.

(8) The compound according to one embodiment of the present specification has a reaction group polymerizable with a binder in the molecule and thereby has an advantage of being not dyed due to the bond with a binder.

(9) In the present specification, a certain part “including” certain constituents means capable of further including other constituents, and does not exclude other constituents unless particularly stated on the contrary.

(10) In the present specification, one member being placed “on” another member includes not only a case of the one member being in contact with the another member but a case of still another member being present between the two members.

(11) In the present specification, an “adjacent” group may mean a substituent substituting an atom directly linked to an atom substituted by the corresponding substituent, a substituent sterically most closely positioned to the corresponding substituent, or another substituent substituting an atom substituted by the corresponding substituent. For example, two substituents substituting ortho positions in a benzene ring, and two substituents substituting the same carbon in an aliphatic ring may be interpreted as groups “adjacent” to each other.

(12) Examples of substituents in the present specification are described below, however, the substituents are not limited thereto.

(13) The term “substitution” means a hydrogen atom bonding to a carbon atom of a compound being changed to another substituent, and the position of substitution is not limited as long as it is a position at which the hydrogen atom is substituted, that is, a position at which a substituent can substitute, and when two or more substituents substitute, the two or more substituents may be the same as or different from each other.

(14) The term “substituted or unsubstituted” in the present specification means being substituted with one, two or more substituents selected from the group consisting of deuterium; a halogen group; a cyano group; a nitro group; a hydroxyl group; an imide group; an amide group; an ester group; a substituted or unsubstituted amine group; a substituted or unsubstituted silyl group; a substituted or unsubstituted alkyl group; a substituted or unsubstituted cycloalkyl group; a substituted or unsubstituted haloalkyl group; a substituted or unsubstituted alkoxy group; a substituted or unsubstituted aryloxy group; a substituted or unsubstituted alkenyl group; a substituted or unsubstituted alkynyl group; a substituted or unsubstituted aryl group and a substituted or unsubstituted heterocyclic group, or being substituted with a substituent linking two or more substituents among the substituents illustrated above, or having no substituents.

(15) In the present specification, examples of the halogen group may include fluorine, chlorine, bromine or iodine.

(16) In the present specification, the number of carbon atoms of the imide group is not particularly limited, but is preferably from 1 to 30. Specifically, compounds having structures as below may be included, however, the imide group is not limited thereto.

(17) ##STR00002##

(18) In the present specification, in the amide group, nitrogen of the amide group may be substituted with hydrogen, a linear, branched or cyclic alkyl group having 1 to 30 carbon atoms, or an aryl group having 6 to 30 carbon atoms. Specifically, compounds having the following structural formulae may be included, however, the amide group is not limited thereto.

(19) ##STR00003##

(20) In the present specification, in the ester group, the oxygen of the ester group may be substituted with a linear, branched or cyclic alkyl group having 1 to 25 carbon atoms or an aryl group having 6 to 30 carbon atoms. Specifically, compounds having the following structural formulae may be included, however, the ester group is not limited thereto.

(21) ##STR00004##

(22) In the present specification, the amine group may be selected from the group consisting of —NH.sub.2; a monoalkylamine group; a dialkylamine group; an N-alkylarylamine group; a monoarylamine group; a diarylamine group; an N-arylheteroarylamine group; an N-alkylheteroarylamine group, a monoheteroarylamine group and a diheteroarylamine group, and, although not particularly limited thereto, the number of carbon atoms is preferably from 1 to 30.

(23) In the present specification, the N-alkylarylamine group means an amine group in which N of the amine group is substituted with an alkyl group and an aryl group.

(24) In the present specification, the N-arylheteroarylamine group means an amine group in which

N of the amine group is substituted with an aryl group and a heteroaryl group.

(25) In the present specification, the N-alkylheteroarylamine group means an amine group in which N of the amine group is substituted with an alkyl group and a heteroaryl group.

(26) In the present specification, an alkyl group in the alkylamine group, the N-alkylarylamine group and the N-alkylheteroarylamine group is the same as examples of an alkyl group to describe later.

(27) In the present specification, specific examples of the silyl group may include a trimethylsilyl group, a triethylsilyl group, a t-butyl dimethylsilyl group, a vinyl dimethylsilyl group, a propyl dimethylsilyl group, a triphenylsilyl group, a diphenylsilyl group, a phenylsilyl group and the like, but are not limited thereto.

(28) In the present specification, the alkyl group may be linear or branched, and although not particularly limited thereto, the number of carbon atoms is preferably from 1 to 30. Specific examples thereof may include methyl, ethyl, propyl, n-propyl, isopropyl, butyl, n-butyl, isobutyl, tert-butyl, sec-butyl, 1-methyl-butyl, 1-ethyl-butyl, pentyl, n-pentyl, isopentyl, neopentyl, tert-pentyl, hexyl, n-hexyl, 1-methylpentyl, 2-methyl pentyl, 4-methyl-2-pentyl, 3,3-dimethylbutyl, 2-ethylbutyl, heptyl, n-heptyl, 1-methylhexyl, cyclopentylmethyl, cyclohexylmethyl, octyl, n-octyl, tert-octyl, 1-methylheptyl, 2-ethylhexyl, 2-propylpentyl, n-nonyl, 2,2-dimethylheptyl, 1-ethyl-propyl, 1,1-dimethyl-propyl, isohexyl, 4-methylhexyl, 5-methylhexyl and the like, but are not limited thereto.

(29) In the present specification, the cycloalkyl group is not particularly limited, but preferably has 3 to 30 carbon atoms, and specific examples thereof may include cyclopropyl, cyclobutyl, cyclopentyl, 3-methylcyclopentyl, 2,3-dimethylcyclopentyl, cyclohexyl, 3-methylcyclohexyl, 4-methylcyclohexyl, 2,3-dimethylcyclohexyl, 3,4,5-trimethylcyclohexyl, 4-tert-butylcyclohexyl, cycloheptyl, cyclooctyl and the like, but are not limited thereto.

(30) In the present specification, the haloalkyl group represents an alkyl group in which one or more hydrogen atoms of the alkyl group are replaced by the same or a different halogen group. The haloalkyl group may be linear or branched, and although not particularly limited thereto, the number of carbon atoms is preferably from 1 to 10. Specific examples thereof may include —CH₂Cl, —CF₃, —CH₂CF₃, —CF₂CF₃ and the like, but are not limited thereto.

(31) In the present specification, the alkoxy group may be linear, branched or cyclic. The number of carbon atoms of the alkoxy group is not particularly limited, but is preferably from 1 to 30.

(32) In the present specification, the aryloxy group is a monovalent substituent represented by RO—, and R is an aryl group. Examples thereof may include phenyloxy, naphthyloxy, biphenyloxy and the like, but are not limited thereto.

(33) In the present specification, the alkenyl group may be linear or branched, and although not particularly limited thereto, the number of carbon atoms is preferably from 2 to 30.

(34) In the present specification, the alkynyl group may be linear or branched, and although not particularly limited thereto, the number of carbon atoms is preferably from 2 to 30. Specific examples thereof may include alkynyl groups such as ethynyl, propynyl, 2-methyl-2-propynyl, 2-butynyl, 2-pentynyl and the like, but are not limited thereto.

(35) In the present specification, the aryl group is not particularly limited, but preferably has 6 to 30 carbon atoms, and the aryl group may be monocyclic or polycyclic.

(36) When the aryl group is a monocyclic aryl group, the number of carbon atoms is not particularly limited, but is preferably from 6 to 30. Specific examples of the monocyclic aryl group may include a phenyl group, a biphenyl group, a terphenyl group and the like, but are not limited thereto.

(37) When the aryl group is a polycyclic aryl group, the number of carbon atoms is not particularly limited, but is preferably from 10 to 30. Specific examples of the polycyclic aryl group may include a naphthyl group, an anthracenyl group, a phenanthryl group, a triphenyl group, a pyrenyl group, a

perylene group, a chrysenyl group, a fluorenyl group and the like, but are not limited thereto.

(38) In the present specification, the fluorenyl group may be substituted, and adjacent groups may bond to each other to form a ring.

(39) When the fluorenyl group is substituted,

(40) ##STR00005##

and the like may be included. However, the structure is not limited thereto.

(41) In the present specification, the heterocyclic group is a group including one or more atoms that are not carbon, that is, heteroatoms, and specifically, the heteroatom may include one or more atoms selected from the group consisting of O, N, Se, S and the like. The number of carbon atoms is not particularly limited, but is preferably from 2 to 30, and the heterocyclic group may be monocyclic or polycyclic. Examples of the heterocyclic group may include a thiophenyl group, a furanyl group, a pyrrole group, an imidazolyl group, a thiazolyl group, an oxazolyl group, an oxadiazolyl group, a pyridyl group, a bipyridyl group, a pyrimidyl group, a triazinyl group, a triazolyl group, an acridyl group, a pyridazinyl group, a pyrazinyl group, a quinolinyl group, a quinazolinyl group, a quinoxalinyl group, a phthalazinyl group, a pyridopyrimidyl group, a pyridopyrazinyl group, a pyrazinopyrazinyl group, an isoquinolinyl group, an indolyl group, a carbazolyl group, a benzoxazolyl group, a benzimidazolyl group, a benzothiazolyl group, a benzocarbazolyl group, a benzothiophenyl group, a dibenzothiophenyl group, a benzofuranyl group, a phenanthrolinyl group, an isoxazolyl group, a thiadiazolyl group, a phenothiazinyl group, a dibenzofuranyl group and the like, but are not limited thereto.

(42) In the present specification, descriptions on the heterocyclic group may be applied to the heteroaryl group except that it is an aromatic heterocyclic group.

(43) In one embodiment of the present specification, the polymerizable group may have at least one selected from the group consisting of a substituted or unsubstituted ethylenically unsaturated group, a substituted or unsubstituted siloxane group and a substituted or unsubstituted epoxy group.

(44) The polymerizable group may be any one of the following structures.

(45) ##STR00006##

(46) In the structures, Z1 and Z2 are each independently hydrogen, a halogen group, or a substituted or unsubstituted alkyl group, Z3 to Z5 are each independently a substituted or unsubstituted alkyl group, and * represents a bonding position.

(47) In one embodiment of the present specification, Chemical Formula 1 may be represented by the following Chemical Formula 2.

(48) ##STR00007##

(49) In Chemical Formula 2, A1 to A4, X1, X2, R1, R3, R5, R6, L1, L3, L5, L6, I1, I3, I5, I6, a and b have the same definitions as in Chemical Formula 1.

(50) In one embodiment of the present specification, Chemical Formula 1 may be represented by any one of the following Chemical Formulae 3 to 7.

(51) ##STR00008##

(52) In Chemical Formulae 3 to 7, R11 and R12 are each independently -(G1).sub.g1-E or -G2-O-G3-E, A1 to A4, R1, R3, R5, R6, L1, L3, L5, L6, G1 to G3, E, g1, I1, I3, I5, I6, a and b have the same definitions as in Chemical Formula 1, R13 to R18 are each independently a polymerizable group, L11 to L20 are each independently a direct bond, or a substituted or unsubstituted alkylene group, I11 to I20 are each an integer of 1 to 3, when I11 to I20 are each 2 or greater, structures in the parentheses are the same as or different from each other, and X4 and X5 are each independently O or NH.

(53) In one embodiment of the present specification, R1, R2, R4 and R5 are each independently hydrogen, a halogen group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group.

(54) In one embodiment of the present specification, R1, R2, R4 and R5 are each independently

hydrogen, a halogen group, an alkyl group, a haloalkyl group, a cycloalkyl group, an alkoxy group, an aryl group or a heterocyclic group.

(55) In one embodiment of the present specification, R1, R2, R4 and R5 are each independently hydrogen, a halogen group, an alkyl group, a haloalkyl group, a substituted or unsubstituted cyclopentyl group, a substituted or unsubstituted cyclohexyl group, a substituted or unsubstituted cycloheptyl group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted phenyl group, a substituted or unsubstituted naphthyl group, a substituted or unsubstituted furanyl group, a substituted or unsubstituted thiophenyl group, a substituted or unsubstituted dibenzofuranyl group, a substituted or unsubstituted pyridyl group, or a substituted or unsubstituted quinolinyl group.

(56) In one embodiment of the present specification, R1, R2, R4 and R5 are each independently hydrogen, a halogen group, an alkyl group, a haloalkyl group, a cyclopentyl group unsubstituted or substituted with an alkyl group, a cyclohexyl group unsubstituted or substituted with an alkyl group, a cycloheptyl group unsubstituted or substituted with an alkyl group, an alkoxy group unsubstituted or substituted with an alkyl group, a phenyl group unsubstituted or substituted with an alkyl group, a naphthyl group unsubstituted or substituted with an alkyl group, a furanyl group unsubstituted or substituted with an alkyl group, a thiophenyl group unsubstituted or substituted with an alkyl group, a dibenzofuranyl group unsubstituted or substituted with an alkyl group, a pyridyl group unsubstituted or substituted with an alkyl group, or a quinolinyl group unsubstituted or substituted with an alkyl group.

(57) In one embodiment of the present specification, L1, L2, L4 and L5 are each independently a direct bond, or a substituted or unsubstituted alkylene group.

(58) In one embodiment of the present specification, L1, L2, L4 and L5 are each independently a direct bond, or a linear or branched alkylene group.

(59) In one embodiment of the present specification, G1 to G3, L3 and L6 are each independently a direct bond, a substituted or unsubstituted alkylene group, a substituted or unsubstituted cycloalkylene group, a substituted or unsubstituted arylene group, or a substituted or unsubstituted divalent heterocyclic group.

(60) In one embodiment of the present specification, G1 to G3, L3 and L6 are each independently a direct bond, an alkylene group, a cyclohexylene group unsubstituted or substituted with an alkyl group, a cyclopentylene group unsubstituted or substituted with an alkyl group, a phenylene group unsubstituted or substituted with an alkyl group, a divalent pyridine group unsubstituted or substituted with an alkyl group, a divalent thiophene group unsubstituted or substituted with an alkyl group, or a divalent furan group unsubstituted or substituted with an alkyl group.

(61) In one embodiment of the present specification, E is a halogen group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heterocyclic group, or a polymerizable group.

(62) In one embodiment of the present specification, E is a halogen group, an alkyl group, a haloalkyl group, a cyclopentyl group unsubstituted or substituted with an alkyl group, a cyclohexyl group unsubstituted or substituted with an alkyl group, a cycloheptyl group unsubstituted or substituted with an alkyl group, an alkoxy group unsubstituted or substituted with an alkyl group, a phenyl group unsubstituted or substituted with an alkyl group, a naphthyl group unsubstituted or substituted with an alkyl group, a furanyl group unsubstituted or substituted with an alkyl group, a thiophenyl group unsubstituted or substituted with an alkyl group, a dibenzofuranyl group unsubstituted or substituted with an alkyl group, a pyridyl group unsubstituted or substituted with an alkyl group, a quinolinyl group unsubstituted or substituted with an alkyl group, or a polymerizable group.

(63) In one embodiment of the present specification, A1 to A4 are each independently a substituted or unsubstituted aryl group, or a substituted or unsubstituted heteroaryl group.

(64) In one embodiment of the present specification, A1 to A4 are each independently a substituted or unsubstituted aryl group.

(65) In one embodiment of the present specification, A1 to A4 are each independently a substituted or unsubstituted phenyl group; or a substituted or unsubstituted biphenyl group.

(66) In one embodiment of the present specification, A1 to A4 are each independently a phenyl group unsubstituted or substituted with a group selected from the group consisting of a halogen group, a cyano group, an alkyl group, a haloalkyl group, an ester group, an alkoxy group, an aryloxy group and an aryl group; or a biphenyl group unsubstituted or substituted with a group selected from the group consisting of a halogen group, a cyano group, an alkyl group, a haloalkyl group, an ester group, an alkoxy group, an aryloxy group and an aryl group.

(67) In one embodiment of the present specification, A1 to A4 are the same as each other.

(68) In one embodiment of the present specification, the compound represented by Chemical Formula 1 is point symmetric, line symmetric or surface symmetric.

(69) The compound represented by Chemical Formula 1 is represented by any one of the following compounds.

(70) ##STR00009## ##STR00010## ##STR00011## ##STR00012## ##STR00013##
##STR00014## ##STR00015## ##STR00016## ##STR00017## ##STR00018## ##STR00019##
##STR00020## ##STR00021## ##STR00022## ##STR00023## ##STR00024## ##STR00025##
##STR00026## ##STR00027## ##STR00028## ##STR00029## ##STR00030## ##STR00031##
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(71) ##STR00132## ##STR00133## ##STR00134## ##STR00135## ##STR00136##
##STR00137## ##STR00138## ##STR00139## ##STR00140## ##STR00141## ##STR00142##
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##STR00263## ##STR00264## ##STR00265## ##STR00266## ##STR00267## ##STR00268##
##STR00269## ##STR00270## ##STR00271##

(72) ##STR00272## ##STR00273## ##STR00274## ##STR00275## ##STR00276##
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##STR00289## ##STR00290## ##STR00291## ##STR00292## ##STR00293## ##STR00294##
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##STR00415## ##STR00416## ##STR00417## ##STR00418## ##STR00419## ##STR00420##
##STR00421##

(73) In the compounds, Ph is a phenyl group.

(74) One embodiment of the present specification provides a photoresist fluorescent resin composition including a binder resin; a multifunctional monomer; and the compound described above.

(75) A content of the compound may be from 0.005% by weight to 70% by weight based on a total solid weight of the photoresist fluorescent resin composition, but is not limited thereto.

(76) A content of the compound may be from 0.001% by weight to 15% by weight based on a total weight of the photoresist fluorescent resin composition, but is not limited thereto.

(77) The compound may have a maximum absorption wavelength ($\lambda_{\text{sub.max}}$) of 570 nm to 590 nm, and specifically 580 nm to 590 nm.

(78) As the binder resin, a copolymer resin of a monomer providing mechanical strength and a monomer providing alkali solubility may be used.

(79) The monomer providing mechanical strength of the film may be any one or more of unsaturated carboxylic acid esters; aromatic vinyls; unsaturated ethers; unsaturated imides; and

acid anhydrides.

(80) Specific examples of the unsaturated carboxylic acid esters may be selected from the group consisting of benzyl (meth)acrylate, methyl (meth)acrylate, ethyl (meth)acrylate, butyl (meth)acrylate, dimethylaminoethyl (meth)acrylate, isobutyl (meth)acrylate, t-butyl (meth)acrylate, cyclohexyl (meth)acrylate, isobornyl (meth)acrylate, ethylhexyl (meth)acrylate, 2-phenoxyethyl (meth)acrylate, tetrahydrofurfuryl (meth)acrylate, hydroxyethyl (meth)acrylate, 2-hydroxypropyl (meth)acrylate, 2-hydroxy-3-chloropropyl (meth)acrylate, 4-hydroxybutyl (meth)acrylate, acyloctyloxy-2-hydroxypropyl (meth)acrylate, glycerol (meth)acrylate, 2-methoxyethyl (meth)acrylate, 3-methoxybutyl (meth)acrylate, ethoxy diethylene glycol (meth)acrylate, methoxy triethylene glycol (meth)acrylate, methoxy tripropylene glycol (meth)acrylate, poly(ethylene glycol)methyl ether (meth)acrylate, phenoxy diethylene glycol (meth)acrylate, p-nonylphenoxy polyethylene glycol (meth)acrylate, p-nonylphenoxy polypropylene glycol (meth)acrylate, glycidyl (meth)acrylate, tetrafluoropropyl (meth)acrylate, 1,1,1,3,3,3-hexafluoroisopropyl (meth)acrylate, octafluoropentyl (meth)acrylate, heptafluorodecyl (meth)acrylate, tribromophenyl (meth)acrylate, methyl α -hydroxynnethyl acrylate, ethyl α -hydroxynnethyl acrylate, propyl α -hydroxynnethyl acrylate and butyl α -hydroxynnethyl acrylate, but are not limited thereto.

(81) Specific examples of the aromatic vinyls may be selected from the group consisting of styrene, α -methylstyrene, (o,m,p)-vinyl toluene, (o,m,p)-methoxystyrene and (o,m,p)-chlorostyrene, but are not limited thereto.

(82) Specific examples of the unsaturated ethers may be selected from the group consisting of vinyl methyl ether, vinyl ethyl ether and allyl glycidyl ether, but are not limited thereto.

(83) Specific examples of the unsaturated imides may be selected from the group consisting of N-phenylmaleimide, N-(4-chlorophenyl)maleimide, N-(4-hydroxyphenyl)maleimide and N-cyclohexylmaleimide, but are not limited thereto.

(84) Specific examples of the acid anhydride may include maleic anhydride, methyl maleic anhydride, tetrahydrophthalic anhydride and the like, but are not limited thereto.

(85) The monomer providing alkali solubility may be a monomer containing an acid group. The monomer containing an acid group may use one or more types selected from the group consisting of (meth)acrylic acid, crotonic acid, itaconic acid, maleic acid, fumaric acid, monomethyl maleic acid, isoprenesulfonic acid, styrenesulfonic acid, 5-norbornene-2-carboxylic acid and the like, but is not limited thereto.

(86) A content of the binder resin may be greater than or equal to 1% by weight and less than or equal to 60% by weight based on a total solid weight of the photoresist fluorescent resin composition, but is not limited thereto.

(87) A content of the binder resin may be greater than or equal to 1% by weight and less than or equal to 30% by weight based on a total weight of the photoresist fluorescent resin composition, but is not limited thereto.

(88) The binder resin may have an acid value of greater than or equal to 50 KOH mg/g and less than or equal to 130 KOH mg/g, and a weight average molecular weight of greater than or equal to 1,000 g/mol and less than or equal to 40,000 g/mol, however, the acid value and the weight average molecular weight are not limited thereto.

(89) The multifunctional monomer means a compound having two or more polymerizable functional groups, and acts as a crosslinking agent in the photoresist fluorescent resin composition. Herein, the polymerizable functional group is not particularly limited as long as it is capable of polymerization, and examples thereof may include an ethylenically unsaturated group, a siloxane group, a hydroxyl group, an epoxy group and the like. Specifically, the multifunctional monomer may include an ethylenically unsaturated bond.

(90) The multifunctional monomer may be one or more types selected from among ethylene glycol di(meth)acrylate, polyethylene glycol di(meth)acrylate having 2 to 14 ethylene groups, trinnethylolpropane di(meth)acrylate, trinnethylolpropane tri(meth)acrylate, pentaerythritol

tri(meth)acrylate, pentaerythritol tetra(meth)acrylate, propylene glycol di(meth)acrylate having 2 to 14 propylene groups, dipentaerythritol penta(meth)acrylate and dipentaerythritol hexa(meth)acrylate, but is not limited thereto.

(91) A content of the multifunctional monomer may be from 1% by weight to 60% by weight based on a total solid weight of the photoresist fluorescent resin composition, but is not limited thereto.

(92) A content of the multifunctional monomer may be from 1% by weight to 30% by weight based on a total weight of the photoresist fluorescent resin composition, but is not limited thereto.

(93) The photoresist fluorescent resin composition may further include a photoinitiator.

(94) In the photoresist fluorescent resin composition according to the present disclosure, the photoinitiator may be any one or more selected from among acetophenone-based compounds; biimidazole-based compounds; triazine-based compounds; and oxime-based compounds.

(95) Examples of the acetophenone-based compound may include 2-hydroxy-2-methyl-1-phenylpropan-1-one, 1-(4-isopropylphenyl)-2-hydroxy-2-methylpropan-1-one, 4-(2-hydroxyethoxy)-phenyl-(2-hydroxy-2-propyl)ketone, 1-hydroxycyclohexylphenyl ketone, benzoin methyl ether, benzoin ethyl ether, benzoin isobutyl ether, benzoin butyl ether, 2,2-dimethoxy-2-phenylacetophenone, 2-methyl-(4-methylthio)phenyl-2-morpholino-1-propan-1-one, 2-benzyl-2-dimethylamino-1-(4-morpholinophenyl)-butan-1-one, 2-methyl-1-[4-(methylthio)phenyl]2-morpholinopropan-1-one or the like, but are not limited thereto.

(96) Examples of the biimidazole-based compound may include 2,2'-bis(2-chlorophenyl)-4,4',5,5'-tetraphenyl biimidazole, 2,2'-bis(o-chlorophenyl)-4,4',5,5'-tetrakis(3,4,5-trimethoxyphenyl)-1,2'-biimidazole, 2,2'-bis(2,3-dichlorophenyl)-4,4',5,5'-tetraphenyl biimidazole, 2,2'-bis(o-chlorophenyl)-4,4',5,5'-tetraphenyl-1,2'-biimidazole or the like, but are not limited thereto.

(97) Examples of the triazine-based compound may include 3-{[2,4-bis(trichloromethyl)-s-triazin-6-yl]phenylthio}propionic acid, 1,1,1,3,3,3-hexafluoroisopropyl-3-{4-[2,4-bis(trichloromethyl)-s-triazin-6-yl]phenylthio}propionate, ethyl-2-{4-[2,4-bis(trichloromethyl)-s-triazin-6-yl]phenylthio}acetate, 2-epoxyethyl-2-{4-[2,4-bis(trichloromethyl)-s-triazin-6-yl]phenylthio}acetate, cyclohexyl-2-{4-[2,4-bis(trichloromethyl)-s-triazin-6-yl]phenylthio}acetate, benzyl-2-{4-[2,4-bis(trichloromethyl)-s-triazin-6-yl]phenylthio}acetate, 3-{chloro-4-[2,4-bis(trichloromethyl)-s-triazin-6-yl]phenylthio}propionic acid, 3-{4-[2,4-bis(trichloromethyl)-s-triazin-6-yl]phenylthio}propionamide, 2,4-bis(trichloromethyl)-6-p-methoxystyryl-s-triazine, 2,4-bis(trichloromethyl)-6-(1-p-dimethylaminophenyl)-1,3-butadienyl-s-triazine, 2-trichloromethyl-4-amino-6-p-methoxystyryl-s-triazine or the like, but are not limited thereto.

(98) Examples of the oxime-based compound may include CGI-242, CGI-124 of Ciba Specialty Chemicals, and the like, but are not limited thereto.

(99) A content of the photoinitiator may be from 0.1% by weight to 20% by weight based on a total solid content of the photoresist fluorescent resin composition, but is not limited thereto.

(100) A content of the photoinitiator may be from 0.1% by weight to 15% by weight based on a total weight of the photoresist fluorescent resin composition, but is not limited thereto.

(101) The photoresist fluorescent resin composition according to one embodiment of the present disclosure may further include a solvent.

(102) The solvent may be one or more types selected from the group consisting of acetone, methyl ethyl ketone, methyl isobutyl ketone, methyl cellosolve, ethyl cellosolve, tetrahydrofuran, 1,4-dioxane, ethylene glycol dimethyl ether, ethylene glycol diethyl ether, propylene glycol dimethyl ether, propylene glycol diethyl ether, diethylene glycol dimethyl ether, diethylene glycol diethyl ether, diethylene glycol methylethyl ether, chloroform, methylene chloride, 1,2-dichloroethane, 1,1,1-trichloroethane, 1,1,2-trichloroethane, 1,1,2-trichloroethene, hexane, heptane, octane, cyclohexane, benzene, toluene, xylene, methanol, ethanol, isopropanol, propanol, butanol, t-butanol, 2-ethoxypropanol, 2-methoxypropanol, 3-methoxybutanol, cyclohexanone, cyclopentanone, propylene glycol methyl ether acetate, propylene glycol ethyl ether acetate, 3-methoxybutyl acetate, ethyl 3-ethoxypropionate, ethyl cellosolve acetate, methyl cellosolve acetate,

butyl acetate, propylene glycol monomethyl ether and dipropylene glycol monomethyl ether, but is not limited thereto.

(103) A content of the total solid may be from 10% by weight to 50% by weight, and a content of the solvent may be from 50% by weight to 90% by weight based on a total weight of the photoresist fluorescent resin composition, however, the content is not limited thereto.

(104) The photoresist composition according to one embodiment of the present disclosure may further include one or more types of additives selected from the group consisting of a dispersant, a curing accelerator, a thermal polymerization inhibitor, a surfactant, a photosensitizer, a plasticizer, an adhesion promoter, a filler and an adhesion aid.

(105) As the photosensitizer, the plasticizer, the adhesion promoter, the filler and the like, all compounds that may be included in existing photoresist fluorescent resin compositions may be used.

(106) The additives may be each independently included in 0.01% by weight to 5% by weight based on a total weight of the photoresist fluorescent resin composition, however, each content is not limited thereto.

(107) The additives may be each independently included in 0.01% by weight to 5% by weight based on a total solid weight of the photoresist fluorescent resin composition, however, each content is not limited thereto.

(108) One embodiment of the present specification provides a color conversion film including the compound described above bonding to a binder resin.

(109) More specifically, a thin-film type photoresist material is formed by coating the photoresist fluorescent resin composition of the present disclosure on a substrate using a proper method.

(110) The coating method is not particularly limited, and a spray method, a roll coating method, a spin coating method and the like may be used, and a spin coating method is generally widely used. In addition, after forming the coated film, some of the residual solvent may be removed under vacuum in some cases.

(111) Examples of a light source for curing the photoresist fluorescent resin composition according to the present disclosure include mercury vapor arc, carbon arc, Xe arc, which emit light with a wavelength of 250 nm to 450 nm, and the like, but are not limited thereto.

(112) When curing the photoresist fluorescent resin composition, the compound represented by Chemical Formula 1 has a polymerizable group capable of binding with a binder resin. In this case, an advantage of having no dyeing in the process is obtained.

(113) The color conversion film of the present specification has a maximum emission peak in a 610 nm to 640 nm region, and specifically, has a maximum emission peak in a 615 nm to 640 nm region and preferably in a 620 nm to 640 nm region. In this case, an advantage of high color reproduction is obtained.

(114) In the color conversion film of the present specification, the maximum emission peak may have a full width at half maximum of 41 nm or less, and specifically greater than or equal to 35 nm and less than or equal to 41 nm. The full width at half maximum means, when converting light absorbed from an external light source to light having another wavelength and emitting the light, a width of the emission peak at half the maximum height in the maximum emission peak of the emitted light, and color gamut is excellent as the full width at half maximum is smaller.

(115) The color conversion film may further include additional fluorescent materials in addition to the compound represented by Chemical Formula 1. When using a light source emitting blue light, the color conversion film preferably includes both a green light emitting fluorescent material and a red light emitting fluorescent material. In addition, when using a light source emitting blue light and green light, the color conversion film may only include a red light emitting fluorescent material. However, the color conversion film is not limited thereto, and even when using a light source emitting blue light, the color conversion film may only include a red light emitting compound when a separate film including a green light emitting fluorescent material is laminated.

On the other hand, even when using a light source emitting blue light, the color conversion film may only include a green light emitting compound when a separate film including a red light emitting fluorescent material is laminated.

(116) The color conversion film may further include an additional layer including a resin matrix; and a compound dispersed into the resin matrix and emitting light in a wavelength different from the wavelength of the compound represented by Chemical Formula 1. The compound emitting light in a wavelength different from the wavelength of the compound represented by Chemical Formula 1 may also be the compound represented by Chemical Formula 1, or may be other known fluorescent materials.

(117) The resin matrix material is preferably a thermoplastic polymer or a thermocurable polymer. Specifically, a poly(meth)acryl-based such as polymethyl methacrylate (PMMA), a polycarbonate (PC)-based, a polystyrene (PS)-based, a polyarylene (PAR)-based, a polyurethane (PU)-based, a styrene-acrylonitrile (SAN)-based, a polyvinylidene fluoride (PVDF)-based, a modified polyvinylidene fluoride (modified-PVDF)-based and the like may be used as the resin matrix material.

(118) According to one embodiment of the present specification, the color conversion film according to the embodiments described above additionally includes light diffusing particles. By dispersing light diffusing particles into the color conversion film instead of a light diffusing film used in the art for enhancing luminance, higher luminance may be exhibited compared to using a separate light diffusing film, and an adhering process may be skipped as well.

(119) As the light diffusing particles, particles having a high refractive index with the resin matrix may be used, and examples thereof may include TiO_2 , silica, borosilicate, alumina, sapphire, air or other gas-filled hollow beads or particles (for example, air/gas-filled glass or polymers); polystyrene, polycarbonate, polymethyl methacrylate, acryl, methyl methacrylate, styrene, a melamine resin, a formaldehyde resin, or polymer particles including melamine and formaldehyde resins, or any suitable combination thereof.

(120) The light diffusing particles may have particle diameters in a range of 0.1 μm to 5 μm , for example, in a range of 0.3 μm to 1 μm . The content of the light diffusing particles may be determined as necessary.

(121) The color conversion film according to the embodiments described above may have a thickness of 2 μm to 200 μm . Particularly, the color conversion film may exhibit high luminance even with a small thickness of 2 μm to 20 μm . This is due to the fact that the content of the fluorescent material molecules included in the unit volume is higher compared to quantum dots.

(122) The color conversion film according to the embodiments described above may have a substrate provided on one surface. This substrate may function as a support when preparing the color conversion film. Types of the substrate are not particularly limited, and the material or thickness is not limited as long as it is transparent and is capable of functioning as the support. Herein, being transparent means having visible light transmittance of 70% or higher. For example, a PET film may be used as the substrate.

(123) One embodiment of the present specification provides a backlight unit including the color conversion film. The backlight unit may have backlight unit constitutions known in the art except for including the color conversion film. FIG. 1 illustrates a mimetic diagram of a backlight unit structure according to one embodiment. According to FIG. 1, the color conversion film including the compound represented by Chemical Formula 1 is provided on a surface opposite to a surface facing a reflecting plate of a light guide plate. FIG. 1 illustrates a constitution including a light source and a reflecting plate surrounding the light source, however, the constitution is not limited to such a structure, and may vary depending on the backlight unit structure known in the art. In addition, as the light source, a direct type as well as a side chain type may be used, and the reflecting plate or the reflective layer may not be included or may be replaced with other constituents as necessary, and as necessary, additional films such as a light diffusing film, a light

concentrating film and a luminance enhancing film may be further provided. Preferably, a prism sheet, a multilayer reflective polarizer film, a light concentrating film or a luminance enhancing film is further provided on the color conversion film.

(124) In the constitution of the backlight unit as in FIG. 1, a scattering pattern may be provided as necessary on an upper surface or a lower surface of the light guide plate. Light introduced into the light guide plate has non-uniform light distribution due to repetition of optical processes such as reflection, total reflection, refraction or transmission, and the scattering pattern may be used to induce the non-uniform light distribution to uniform brightness.

(125) One embodiment of the present specification provides a display apparatus including the backlight unit. The display apparatus is not particularly limited as long as it includes the backlight unit. For example, the display apparatus includes a display module and a backlight unit. FIG. 2 illustrates a structure of the display apparatus. However, the structure is not limited thereto, and between the display module and the backlight unit, additional films such as a light diffusing film, a light concentrating film and a luminance enhancing film may be further provided as necessary.

(126) Hereinafter, the present specification will be described in more detail with reference to examples. However, the following examples are for illustrative purposes only, and are not to limit the present specification.

(127) The compound according to one embodiment of the present application may be prepared using preparation methods to describe later.

(128) For example, the core structure of the compound having the structure of Chemical Formula 1 may be prepared through the following Reaction Formula 1. Substituents may bond using methods known in the art, and types, positions and the number of the substituents may vary depending on technologies known in the art.

(129) [Reaction Formula 1]

(130) <Step 1>

(131) ##STR00422##

(132) Herein, A1 to A4, L1, I1, L2, I2, L4, I4, L5, I5, R1, R2, R4 and R5 have the same definitions as in Chemical Formula 1, and X3, L7, I7, E2 and c have the same definitions as in the following Chemical Formula 8.

(133) After dissolving 1 equivalent of Compound 1 and a catalytic amount of dimethylformamide (DMF) in a dichloromethane (DCM) solvent in a reaction container, 4 equivalents of oxalyl chloride was slowly introduced thereto in an ice bath. The result was stirred at room temperature under nitrogen. Then, dichloromethane was evaporated using a rotary evaporator. An acyl chloride in which a hydroxyl group is replaced with a chlorine group in the carboxyl group of Compound 1 was synthesized.

(134) After dissolving 4 equivalents of an amine or an alcohol represented by the following Chemical Formula 8 and 10 equivalents of triethylamine (TEA) in a dichloromethane solvent in another reaction container, the synthesized acyl chloride was dissolved in dichloromethane in an ice bath, and then the solution described above was slowly introduced thereto. The mixture was stirred at room temperature under nitrogen. After the reaction was completed, the result was extracted using dichloromethane and water, and water was removed from the separated organic layer using anhydrous magnesium sulfate (MgSO₄). The water-removed organic layer was concentrated through vacuum distillation, and then recrystallized using dichloromethane and hexane to obtain Compound 2 by suction filtration. Compound 2 was dried under a vacuum condition at 80° C.

(135) [Chemical Formula 8]

E1-(X3-(L7).sub.I7).sub.c-E2

(136) In Chemical Formula 8, X3, L7, I7 and c respectively have the same definitions as X1, L3, I3 and a of Chemical Formula 1, E1 is hydrogen, and E2 is a hydroxyl group, a halogen group, a carboxyl group, an amine group, a vinyl group, —C(=O)NH₂ or a polymerizable group.

(137) In Compound 2, when E2 is not a polymerizable group, that is, when E2 is a hydroxyl group, a halogen group, a carboxyl group, an amine group, a vinyl group or —C(=O)NH .sub.2, the polymerizable group may react through the following Step 2.

(138) <Step 2>

(139) ##STR00423##

(140) Herein, A1 to A4, L1, I1, L2, I2, L4, I4, L5, I5 and R1 to R6 have the same definitions as in Chemical Formula 1, and X3, L7, I7, E2 and c have the same definitions as in Chemical Formula 8.

(141) After dissolving 1 equivalent of Compound 2 and 6 equivalents of triethylamine (TEA) in a dichloromethane (DCM) solvent in a reaction container, the result was stirred in an ice bath. In this reaction container, a compound, which has a polymerizable group and capable of reacting with E2 of Compound 2, dissolved in dichloromethane was slowly introduced thereto, then 4-dimethylaminopyridine (DMAP) was introduced thereto, and the result was stirred at room temperature under nitrogen. After the reaction was completed, the result was extracted using dichloromethane and water, and water was removed from the separated organic layer using anhydrous magnesium sulfate (MgSO_4). The water-removed organic layer was concentrated through vacuum distillation, and then recrystallized using methyl tertiary-butyl ether and hexane to obtain Compound 3 by suction filtration. Compound 3 was dried under a vacuum condition at 80° C.

EXAMPLE

[Preparation Example 1] Synthesis of Compound A

(142) ##STR00424## ##STR00425##

A. Synthesis of Compound A-2

(143) After dissolving 1 equivalent of Compound A-1 and a catalytic amount of dimethylformamide (DMF) in a dichloromethane (DCM) solvent in a reaction container, 4 equivalents of oxalyl chloride was slowly introduced thereto in an ice bath. The result was stirred at room temperature under nitrogen, and dichloromethane was evaporated using a rotary evaporator. An acyl chloride in which a hydroxyl group is replaced with a chlorine group in the carboxyl group of Compound A-1 was synthesized.

(144) After dissolving 4 equivalents of 1,4-benzenediol and 10 equivalents of triethylamine (TEA) in a dichloromethane solvent in another reaction container, the synthesized acyl chloride was dissolved in dichloromethane in an ice bath, and the above-described solution was slowly introduced thereto. The mixture was stirred at room temperature under nitrogen. After the reaction was completed, the result was extracted using dichloromethane and water, and water was removed from the separated organic layer using anhydrous magnesium sulfate (MgSO_4). The water-removed organic layer was concentrated through vacuum distillation, and then recrystallized with dichloromethane and hexane to obtain Compound A-2 by suction filtration. Compound A-2 was dried under a vacuum condition at 80° C.

B. Synthesis of Compound A

(145) After dissolving 1 equivalent of Compound A-2 and 6 equivalents of triethylamine in a dichloromethane solvent in a reaction container, the result was stirred in an ice bath. In this reaction container, 6 equivalents of epichlorohydrin dissolved in dichloromethane was slowly introduced. 4-Dimethylaminopyridine was further introduced thereto, and the result was stirred at room temperature under nitrogen. After the reaction was completed, the result was extracted using dichloromethane and water, and water was removed from the separated organic layer using anhydrous magnesium sulfate (MgSO_4). The water-removed organic layer was concentrated through vacuum distillation, and then recrystallized with methyl tertiary-butyl ether and hexane to obtain Compound A by suction filtration. Compound A was dried under a vacuum condition at 80° C.

(146) HR LC/MS/MS m/z calculated for $\text{C}_{82}\text{H}_{70}\text{N}_2\text{O}_{22}$ (M^+): 1434.4420; found: 1434.4421.

[Preparation Example 2] Synthesis of Compound B

(147) ##STR00426## ##STR00427##

(148) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound B-1 and 2,2'-oxybisethanol were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound B-2 and 2-methylene-butyryl chloride were used instead of Compound A-2 and epichlorohydrin in Synthesis of Compound A, and Compound B was synthesized therethrough.

(149) HR LC/MS/MS m/z calculated for C₇₈H₆₈F₆N₂O₂₂ (M⁺): 1498.4168; found: 1498.4164.

[Preparation Example 3] Synthesis of Compound C

(150) ##STR00428## ##STR00429##

(151) Synthesis was conducted in the same manner as in Synthesis of Compound A-2 except that Compound C-1 and 2-hydroxyethyl methacrylate (HEMA) were used instead of Compound A-1 and 1,4-benzenediol, and Compound C was synthesized therethrough.

(152) HR LC/MS/MS m/z calculated for C₉₄H₉₀N₂O₁₆ (M⁺): 1502.6290; found: 1502.6280.

[Preparation Example 4] Synthesis of Compound D

(153) ##STR00430##

(154) Synthesis was conducted in the same manner as in Synthesis of Compound A-2 except that Compound D-1 and 2-(trimethoxysilyl)ethanol were used instead of Compound A-1 and 1,4-benzenediol, and Compound D was synthesized therethrough.

(155) HR LC/MS/MS m/z calculated for C₇₆H₆₈N₄O₁₈Si₂ (M⁺): 1380.4067; found: 1380.4067.

[Preparation Example 5] Synthesis of Compound E

(156) ##STR00431##

(157) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound E-1 and bromoethanol were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound E-2 and methacrylamide were used instead of Compound A-2 and epichlorohydrin in Synthesis of Compound A, and Compound E was synthesized therethrough.

(158) HR LC/MS/MS m/z calculated for C₉₆H₈₀N₄O₁₄ (M⁺): 1512.5671; found: 1516.5671.

[Preparation Example 6] Synthesis of Compound F

(159) ##STR00432## ##STR00433##

(160) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound F-1 and 3-hydroxypropanamide were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound F-2 was used instead of Compound A-2 in Synthesis of Compound A, and Compound F was synthesized therethrough.

(161) HR LC/MS/MS m/z calculated for C₈₄H₈₈N₄O₁₆ (M⁺): 1408.6195; found: 1408.6199.

[Preparation Example 7] Synthesis of Compound G

(162) ##STR00434## ##STR00435##

(163) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound G-1 and 2-(2-aminoethoxy)ethan-1-ol were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound G-2 and methacryloyl chloride were used instead of Compound A-2 and epichlorohydrin in Synthesis of Compound A, and Compound G was synthesized therethrough.

(164) HR LC/MS/MS m/z calculated for C₁₁₄H₁₃₂N₄O₁₆ (M⁺): 1812.9638; found: 1812.9640.

[Preparation Example 8] Synthesis of Compound H

(165) ##STR00436##

(166) Synthesis was conducted in the same manner as in Synthesis of Compound A-2 except that Compound H-1 and 2-aminoethyl 2-chloroacrylate were used instead of Compound A-1 and 1,4-benzenediol, and Compound H was synthesized therethrough.

(167) HR LC/MS/MS m/z calculated for C₉₀H₈₄C₁₂N₆O₁₄ (M⁺): 1542.5423; found: 1542.5424.

[Preparation Example 9] Synthesis of Compound I

(168) ##STR00437## ##STR00438##

(169) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound I-1 and 3-aminopropionic acid were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound I-2 was used instead of Compound A-2 in Synthesis of Compound A, and Compound I was synthesized therethrough.

(170) HR LC/MS/MS m/z calculated for C₉₄H₁₀₄N₄O₁₆(M⁺): 1544.7447; found: 1544.7447.

[Preparation Example 10] Synthesis of Compound J

(171) ##STR00439##

(172) Synthesis was conducted in the same manner as in Synthesis of Compound A-2 except that Compound J-2 and oxiran-2-ylmethanamine were used instead of Compound A-1 and 1,4-benzenediol, and Compound J was synthesized therethrough.

(173) HR LC/MS/MS m/z calculated for C₇₀H₆₄N₄O₁₂ (M⁺): 1152.4521; found: 1152.4525.

[Preparation Example 11] Synthesis of Compound K

(174) ##STR00440## ##STR00441##

(175) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound K-1 and 2-aminoethanol were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound K-2 was used instead of Compound A-2 in Synthesis of Compound A, and Compound K was synthesized therethrough.

(176) HR LC/MS/MS m/z calculated for C₈₀H₇₀N₆O₁₄ (M⁺): 1338.4950; found: 1338.4950.

[Preparation Example 12] Synthesis of Compound L

(177) ##STR00442## ##STR00443##

(178) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound L-1 and ethylenediamine were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound L-2 and 12 equivalents of epichlorohydrin were used instead of Compound A-2 and 6 equivalents of epichlorohydrin in Synthesis of Compound A, and Compound L was synthesized therethrough.

(179) HR LC/MS/MS m/z calculated for C₈₆H₇₈N₆O₁₄ (M⁺): 1418.5576; found: 1418.5572.

[Preparation Example 13] Synthesis of Compound M

(180) ##STR00444## ##STR00445##

(181) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound M-1 and diethanolamine were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound M-2 and 12 equivalents of methacryloyl chloride were used instead of Compound A-2 and 6 equivalents of epichlorohydrin in Synthesis of Compound A, and Compound M was synthesized therethrough.

(182) HR LC/MS/MS m/z calculated for C₁₀₆H₁₀₈N₄O₁₈ (M⁺): 1724.7659; found: 1724.7660.

[Preparation Example 14] Synthesis of Compound N

(183) ##STR00446## ##STR00447##

(184) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound N-1 and 2-chloro-N-ethyl-ethanamine were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound N-2 and methacrylamide were used instead of Compound A-2 and epichlorohydrin in Synthesis of Compound A, and Compound N was synthesized therethrough.

(185) HR LC/MS/MS m/z calculated for C₈₆H₇₈N₆O₁₂ (M⁺): 1386.5678; found: 1386.5678.

[Preparation Example 15] Synthesis of Compound O

(186) ##STR00448## ##STR00449##

(187) Synthesis was conducted in the same manner as in Synthesis of Compound A-2, except that Compound O-1 and diallylamine were used instead of Compound A-1 and 1,4-benzenediol, and Compound O-2 was synthesized therethrough.

(188) After dissolving 1 equivalent of Compound O-2 and 10 equivalents of meta-chloroperoxybenzoic acid (m-CPBA) in dichloromethane, the reaction was progressed at room temperature under nitrogen, and Compound O was synthesized therethrough.

(189) HR LC/MS/MS m/z calculated for C78H76N4O14 (M⁺): 1292.5358; found: 1292.5358.

[Preparation Example 16] Synthesis of Compound P

(190) ##STR00450## ##STR00451##

(191) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound P-1 and N-(2-chloroethyl)aniline were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound P-2 and oxiran-2-ylmethanamine were used instead of Compound A-2 and epichlorohydrin in Synthesis of Compound A, and Compound P was synthesized therethrough.

(192) HR LC/MS/MS m/z calculated for C90H90N6O12 (M⁺): 1446.6617; found: 1446.6618.

[Preparation Example 17] Synthesis of Compound Q

(193) ##STR00452## ##STR00453##

(194) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound Q-1 and 4,4'-iminobis-butanoic acid were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound Q-2 and 12 equivalents of epichlorohydrin were used instead of Compound A-2 and 6 equivalents of epichlorohydrin in Synthesis of Compound A, and Compound Q was synthesized therethrough.

(195) HR LC/MS/MS m/z calculated for C96H104N4O22 (M⁺): 1664.7142; found: 1664.7142.

[Preparation Example 18] Synthesis of Compound R

(196) ##STR00454## ##STR00455##

(197) Synthesis was conducted in the same manner as in Preparation Example 1 except that Compound R-1 and 1-piperazineethanol were used instead of Compound A-1 and 1,4-benzenediol in Synthesis of Compound A-2, and Compound R-2 and methacryloyl chloride were used instead of Compound A-2 and epichlorohydrin in Synthesis of Compound A, and Compound R was synthesized therethrough.

(198) HR LC/MS/MS m/z calculated for C102H106N6O14 (M⁺): 1664.7142; found: 1664.7142.

[Comparative Preparation Example 1] Synthesis of Compound S

(199) ##STR00456##

(200) After dissolving 1 equivalent of Compound S-1, 8 equivalents of phenol and 6 equivalents of potassium carbonate in a methylpyrrolidone (NMP) solvent in a reaction container, the result was stirred at 110° C. After the reaction was completed, a compound was obtained using water and then suction filtration. The obtained compound was extracted using dichloromethane and water, and then water was removed from the separated organic layer using anhydrous magnesium sulfate. The water-removed organic layer was concentrated through vacuum distillation, and then recrystallized using dichloromethane and ethanol to obtain Compound S by suction filtration. Compound S was dried under a vacuum condition at 80° C.

(201) HR LC/MS/MS m/z calculated for C72H58N2O8 (M⁺): 1078.4193; found: 1078.4195.

[Comparative Preparation Example 2] Synthesis of Compound T

(202) ##STR00457##

(203) After dissolving 1 equivalent of Compound T-1 and 10 equivalents of ammonium acetate in a propionic acid solvent in a reaction container, the result was refluxed for 24 hours. After the reaction was completed, precipitates were collected using water. The precipitates were obtained by suction filtration, and used in a next reaction without separate purification. After dissolving 1 equivalent of the precipitates in a dimethylformamide (DMF) solvent, 1 equivalent of sodium methoxide was introduced thereto, and the result was stirred for 4 hours. After that, 6 equivalents of 3-bromo-1-propyne was introduced thereto, and the result was stirred for 24 hours. After the reaction was completed, the result was extracted using water, and water was removed from the separated organic layer using anhydrous magnesium sulfate. The water-removed organic layer was concentrated through vacuum distillation, and then recrystallized using dichloromethane and ethanol to obtain Compound T by suction filtration. Compound T was dried under a vacuum condition at 80° C.

(204) HR LC/MS/MS m/z calculated for C58H38N2O8 (M⁺): 890.2628; found: 890.2628.

Example 1

(205) A solution was prepared by dissolving 1.5 parts by weight of Compound C (maximum absorption wavelength 583 nm and maximum emission wavelength 611 nm in toluene solution) prepared in Preparation Example 3, 33.9 parts by weight of an acryl-based binder (VS12A80, LG Chem.), 59.3 parts by weight of a multifunctional monomer (pentaerythritol triacrylate, Nippon Kayaku), 2.3 parts by weight of an adhesive aid and surfactant (KBM 503, Shinetsu) and 3.0 parts by weight of a photoinitiator (Tinuvin® 477, BASF) in a propylene glycol monomethyl ether acetate (PGMEA) solvent so that the solid content became 21% by weight. The mixed solution was sufficiently stirred, and coated as a thin film on a glass substrate, and then dried to prepare a color conversion film.

(206) ##STR00458##

(207) Herein, a to g are each independently the number of repeating units in the parentheses, and for example, a to g are each independently an integer of 2 to 10,000.

Example 2

(208) Preparation was made in the same manner as in Example 1 except that Compound E (maximum absorption wavelength 584 nm and maximum emission wavelength 611 nm in toluene solution) was used instead of Compound C.

Example 3

(209) Preparation was made in the same manner as in Example 1 except that Compound F (maximum absorption wavelength 581 nm and maximum emission wavelength 609 nm in toluene solution) was used instead of Compound C.

Example 4

(210) Preparation was made in the same manner as in Example 1 except that Compound H (maximum absorption wavelength 583 nm and maximum emission wavelength 612 nm in toluene solution) was used instead of Compound C.

Example 5

(211) Preparation was made in the same manner as in Example 1 except that Compound M (maximum absorption wavelength 586 nm and maximum emission wavelength 614 nm in toluene solution) was used instead of Compound C.

Example 6

(212) Preparation was made in the same manner as in Example 1 except that Compound R (maximum absorption wavelength 583 nm and maximum emission wavelength 612 nm in toluene solution) was used instead of Compound C.

Comparative Example 1

(213) Preparation was made in the same manner as in Example 1 except that Compound S (maximum absorption wavelength 572 nm and maximum emission wavelength 601 nm in toluene solution) was used instead of Compound C.

Comparative Example 2

(214) Preparation was made in the same manner as in Example 1 except that Compound T (maximum absorption wavelength 570 nm and maximum emission wavelength 599 nm in toluene solution) was used instead of Compound C.

Experimental Example 1

(215) 1) Measurement of Absorption and Emission Spectra in Thin Film State

(216) A luminance spectrum of each of the color conversion films prepared in Examples 1 to 6 and Comparative Examples 1 and 2 was measured using a spectroradiometer (SR series of TOPCON Corporation). Specifically, the prepared color conversion film was laminated on one surface of a light guide plate of a backlight unit including an LED blue backlight (maximum emission wavelength 450 nm) and the light guide plate, and after laminating a prism sheet and a double brightness enhance film (DBEF) on the color conversion film, an initial value was set so that the

brightness of the blue LED light was 600 nit based on the film.

(217) 2) Measurement of Absorption and Emission Spectra in Solution State

(218) In order to measure absorption and emission wavelengths, the sample was dissolved to a concentration of 10. μ M using toluene as a solvent, and absorption and emission spectra thereof were measured.

(219) 3) Checking of Degree of Dyeing

(220) A photoresist fluorescent resin composition was prepared by dissolving, based on 100 wt % of the photoresist fluorescent resin composition, 0.63 wt % (3.0 wt % in solid content) of a dye subject to measurement (compound of Table 1), 7.37 wt % of a binder (VS12A80, LG Chem.) and 13 wt % of a polyfunctional monomer (dipentaerythritol hexaacrylate) in 79 wt % of propylene glycol monomethyl ether acetate (PGMEA).

(221) The prepared photoresist fluorescent resin composition was spin coated on 5 cm \times 5 cm glass (Corning Incorporated), and pre-baked for 70 seconds at 110 $^{\circ}$ C. to form a coating film. Then, the distance between the coating film and a photo mask was set to 200 μ m, and an exposure dose of 40 mJ/cm² was irradiated using an exposure device (Hoya-Schott). The exposed coating film was developed for 60 seconds using a developing solution (KOH, 0.04%) to form a pattern layer having a pattern width and a space width of 90 μ m and 180 μ m, respectively.

(222) After forming the pattern layer, first post-bake (PB) was conducted for 20 minutes at 30 $^{\circ}$ C. in an oven. After that, a solution obtained by dissolving 33 wt % of a photocurable epoxy acrylic resin in a solvent mixture of PGMEA, methyl-3-methoxy propionate (MMP) and methyl ethyl di glycol (MEDG), was overcoated on the pattern layer using a negative type coating method, and second post-bake (PB) was conducted for 30 minutes at 30 $^{\circ}$ C. in an oven to complete the color conversion film. A colorimetric value of a pattern portion of the pattern layer without the overcoating layer and a colorimetric value of a pattern portion of the pattern layer after forming the overcoating layer were measured, and a degree of dyeing was checked through a difference between the two measured values (ΔE_{ab}).

(223) Properties of the compounds used in Examples 1 to 6 and Comparative Examples 1 and 2 in the solution, and absorption and emission wavelengths in the thin film when used in the color conversion film, and a ΔE_{ab} value are as shown in Table 1.

(224) TABLE-US-00001 TABLE 1 Solution Thin Film Com- $\lambda_{sub,max}$ $\lambda_{sub,max}$ $\lambda_{sub,max}$
 $\lambda_{sub,max}$ Example pound (UV) (PL) (UV) (PL) ΔE_{ab} 1 C 583 611 584 625 2.23 2 E 584 611 584
623 2.54 3 F 581 609 585 621 2.98 4 H 583 612 585 625 2.12 5 M 586 614 586 627 1.91 6 R 583
612 585 625 1.95 Compar- S 572 601 575 612 4.81 ative Example 1 Compar- T 570 599 572 610
3.99 ative Example 2

(225) Through Table 1, it was identified that the compound according to the disclosure of the present application had longer absorption and emission wavelengths in the solution and in the thin film compared to the comparative examples, and the ΔE_{ab} value was 3 or less, and as a result, it was seen that there was less dyeing compared to the comparative examples.

Claims

1. A compound represented by the following Chemical Formula 1: ##STR00459## wherein, in the Chemical Formula 1, A1 to A4 are each independently a substituted or unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group; X1 and X2 are each independently O, NH or NR'; R' is -(G1).sub.g1-E or -G2-O-G3-E, or forms a ring with adjacent groups; R1, R2, R4 and R5 are each independently hydrogen, a halogen group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or unsubstituted alkoxy group, a substituted or unsubstituted aryl group, or a substituted or unsubstituted heterocyclic group; R3 and R6 are each independently a polymerizable group; E is a halogen group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted cycloalkyl group, a substituted or

unsubstituted alkoxy group, a substituted or unsubstituted aryl group, a substituted or unsubstituted heterocyclic group, or a polymerizable group; L1, L2, L4 and L5 are each independently a direct bond, or a substituted or unsubstituted alkylene group; G1 to G3, L3 and L6 are each independently a direct bond, a substituted or unsubstituted alkylene group, a substituted or unsubstituted cycloalkylene group, a substituted or unsubstituted arylene group, or a substituted or unsubstituted divalent heterocyclic group; a and b are each an integer of 0 to 3; g1 and 11 to 16 are each an integer of 1 to 3; and when a, b, g1 and 11 to 16 are each 2 or greater, structures in the parentheses are the same as or different from each other, and wherein the polymerizable group is a group having at least one selected from the group consisting of a substituted or unsubstituted ethylenically unsaturated group, a substituted or unsubstituted siloxane group and a substituted or unsubstituted epoxy group.

2. The compound of claim 1, wherein the polymerizable group is any one of the following groups: ##STR00460## wherein, Z1 and Z2 are each independently hydrogen, a halogen group, or a substituted or unsubstituted alkyl group; Z3 to Z5 are each independently a substituted or unsubstituted alkyl group; and * represents a bonding position.

3. The compound of claim 1, wherein the Chemical Formula 1 is represented by the following Chemical Formula 2: ##STR00461## in the Chemical Formula 2, A1 to A4, X1, X2, R1, R3, R5, R6, L1, L3, L5, L6, 11, 13, 15, 16, a and b have the same definitions as in the Chemical Formula 1.

4. The compound of claim 1, wherein the Chemical Formula 1 is represented by any one of the following Chemical Formulae 3 to 7: ##STR00462## in the Chemical Formulae 3 to 7, R11 and R12 are each independently -(G1).sub.g1-E or -G2-O-G3-E; A1 to A4, R1, R3, R5, R6, L1, L3, L5, L6, G1 to G3, E, g1, 11, 13, 15, 16, a and b have the same definitions as in the Chemical Formula 1; R13 to R18 are each independently a polymerizable group; L11 to L20 are each independently a direct bond, or a substituted or unsubstituted alkylene group; I11 to I20 are each an integer of 1 to 3; when I11 to I20 are each 2 or greater, structures in the parentheses are the same as or different from each other; and X4 and X5 are each independently O or NH.

5. The compound of claim 1, wherein A1 to A4 in the Chemical Formula 1 are each independently a substituted or unsubstituted aryl group.

6. The compound of claim 1, wherein the compound represented by the Chemical Formula 1 is represented by any one of the following compounds: ##STR00463## ##STR00464##

##STR00465## ##STR00466## ##STR00467## ##STR00468## ##STR00469## ##STR00470##
##STR00471## ##STR00472## ##STR00473## ##STR00474## ##STR00475## ##STR00476##
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##STR00855## ##STR00856## ##STR00857## ##STR00858## ##STR00859## ##STR00860##
##STR00861## ##STR00862## wherein, Ph is a phenyl group.

7. A photoresist fluorescent resin composition comprising: a binder resin; a multifunctional monomer; and the compound of claim 1.

8. A color conversion film comprising the compound of claim 1, wherein the compound is bound to

a binder resin.

9. A backlight unit comprising the color conversion film of claim 8.

10. A display apparatus comprising the backlight unit of claim 9.
