US 20250268047A1

(19) United States
(12) Patent Application Publication
HAN
(10) Pub. No.: US 2025/0268047 A1
(43) Pub. Date: Aug. 21, 2025

(54) **DISPLAY DEVICE**

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(21) Appl. No.: **18/951,153**

(22) Filed: **Nov. 18, 2024**

(30) **Foreign Application Priority Data**

Feb. 15, 2024 (KR) 10-2024-0021500

Publication Classification

(51) **Int. Cl.**

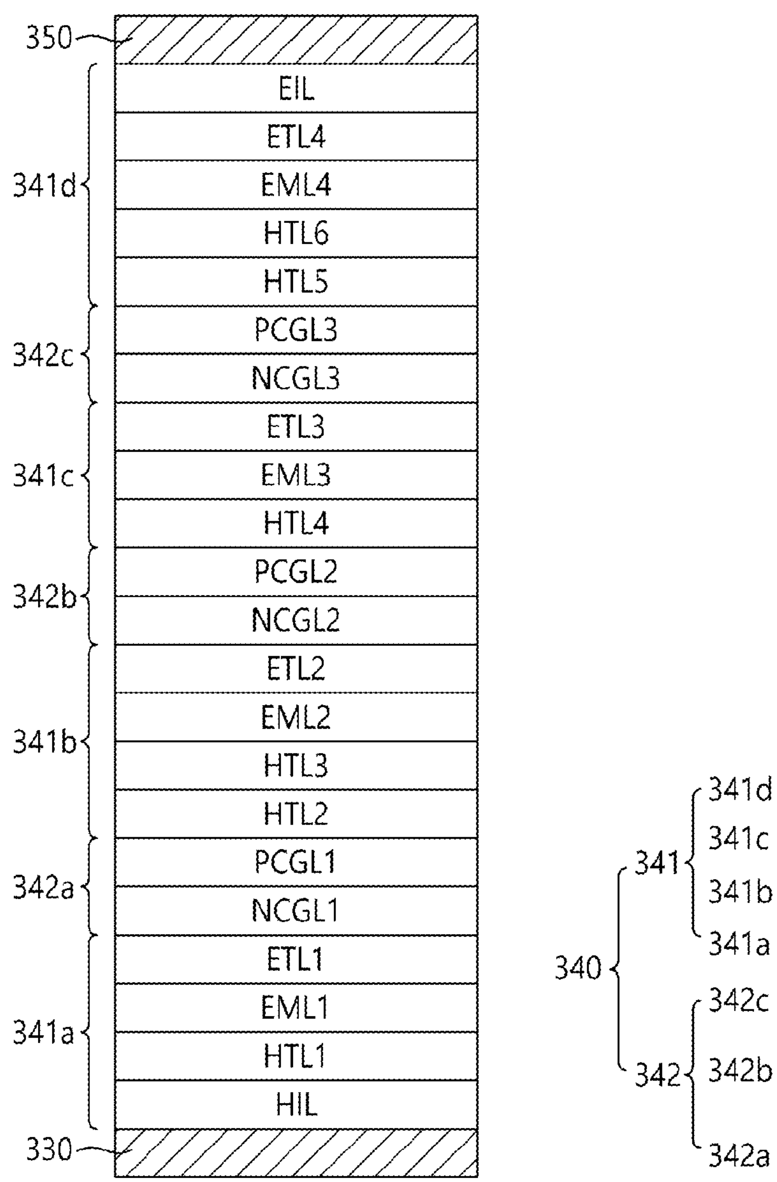
H10K 59/32	(2023.01)
H10K 59/35	(2023.01)
H10K 59/80	(2023.01)

(52) **U.S. Cl.**

CPC ***H10K 59/32*** (2023.02); ***H10K 59/351*** (2023.02); ***H10K 59/805*** (2023.02)

(57) **ABSTRACT**

Embodiments of the present disclosure relates to a display device. The display device includes an auxiliary electrode disposed between the emission areas of adjacent subpixels among the plurality of subpixels and disposed on the overcoat layer. The display device includes an organic layer disposed on the overcoat layer and the auxiliary electrode. The organic layer including at least one charge generation layer. At least a portion of the at least one charge generation layer is in contact with the auxiliary electrode, thereby improving the color gamut of the display device by blocking leakage current flowing between adjacent subpixels.



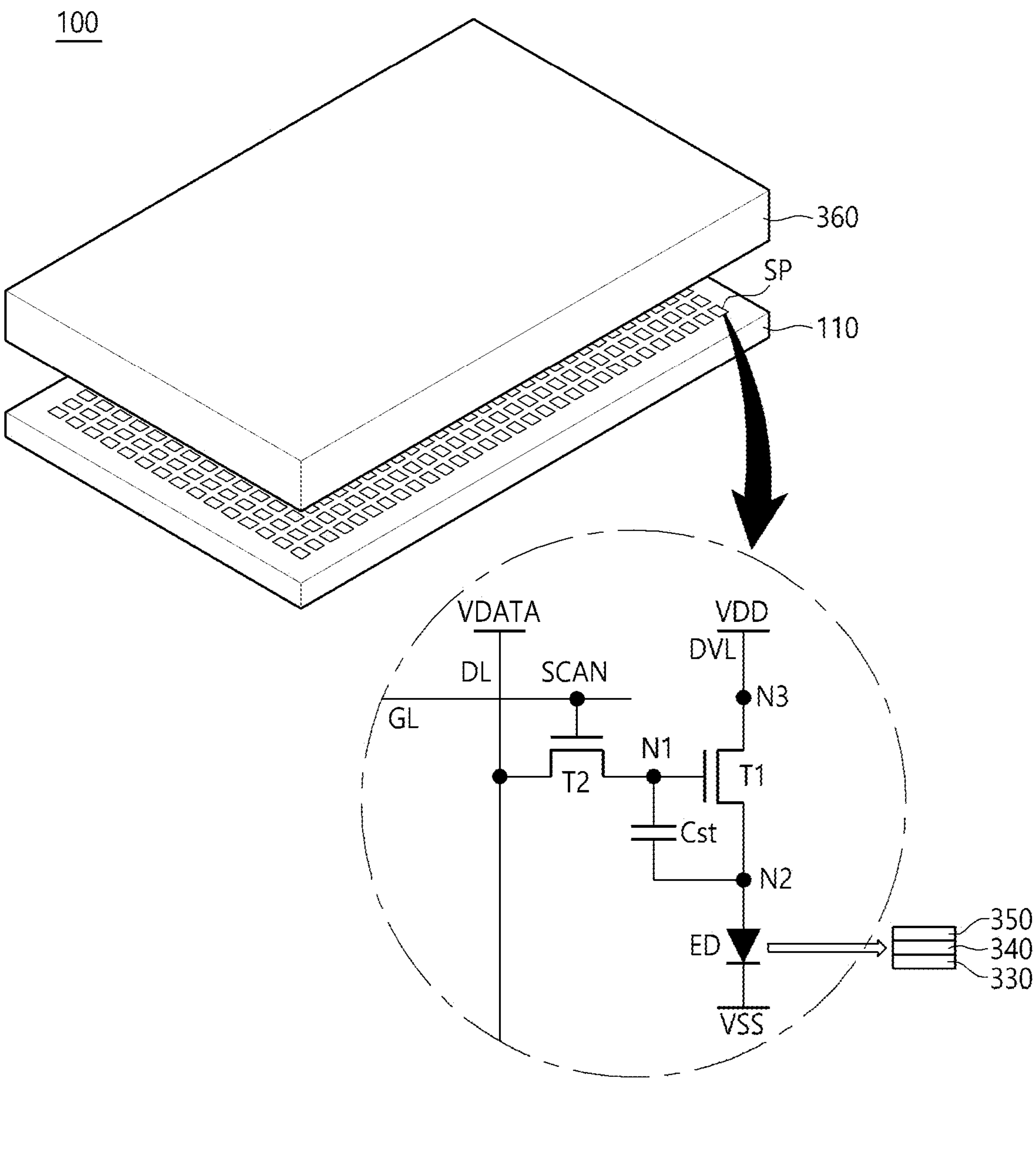

100
360
SP
110
VDATA
VDD
DVL
DL
SCAN
N3
GL
N1
T1
T2
Cst
N2
350
ED
340
330
VSS

FIG.1

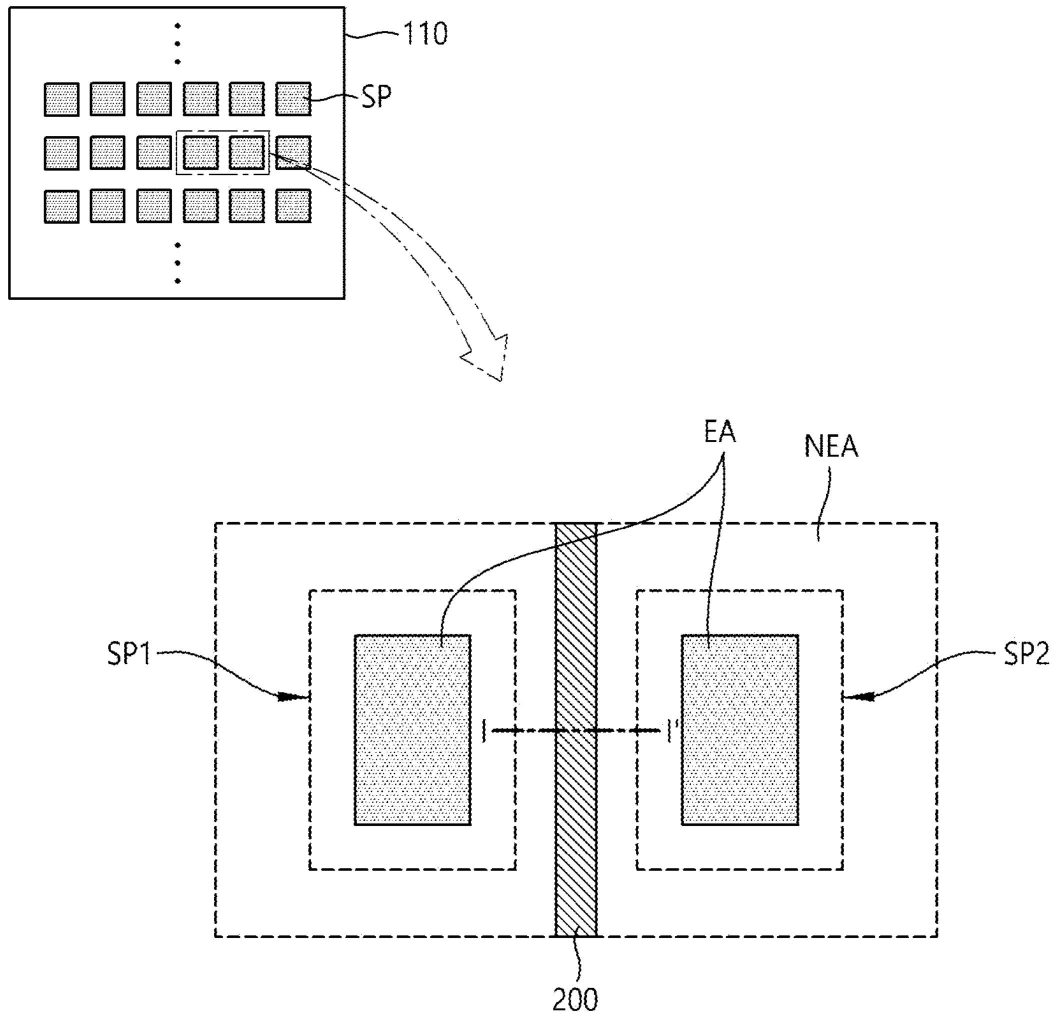


FIG.2

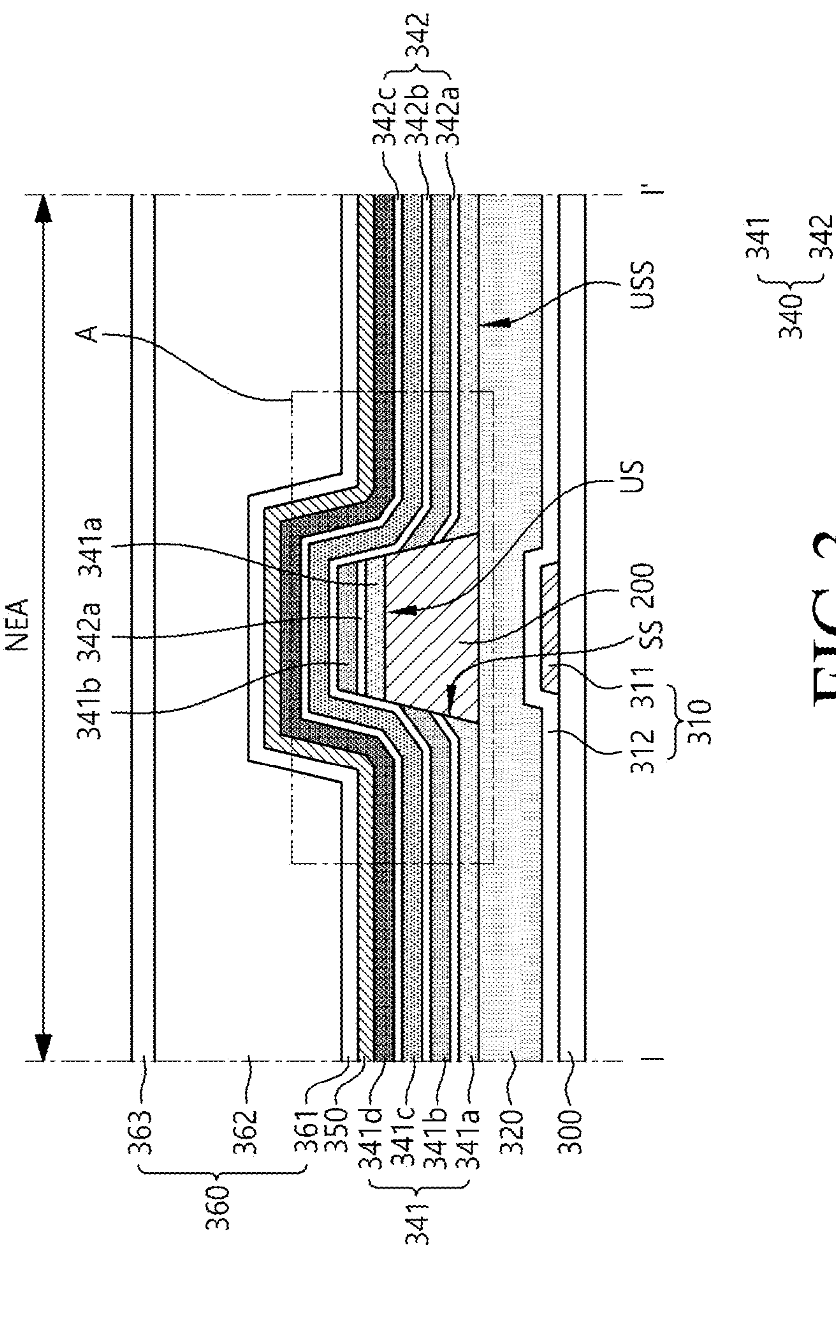

NEA
A
342c
342b
342a
342
I'
USS
341
342
340
US
341a
342a
341b
200
SS
311
312
310
363
362
361
350
341d
341c
341b
341a
320
300
360
341
I

FIG.3

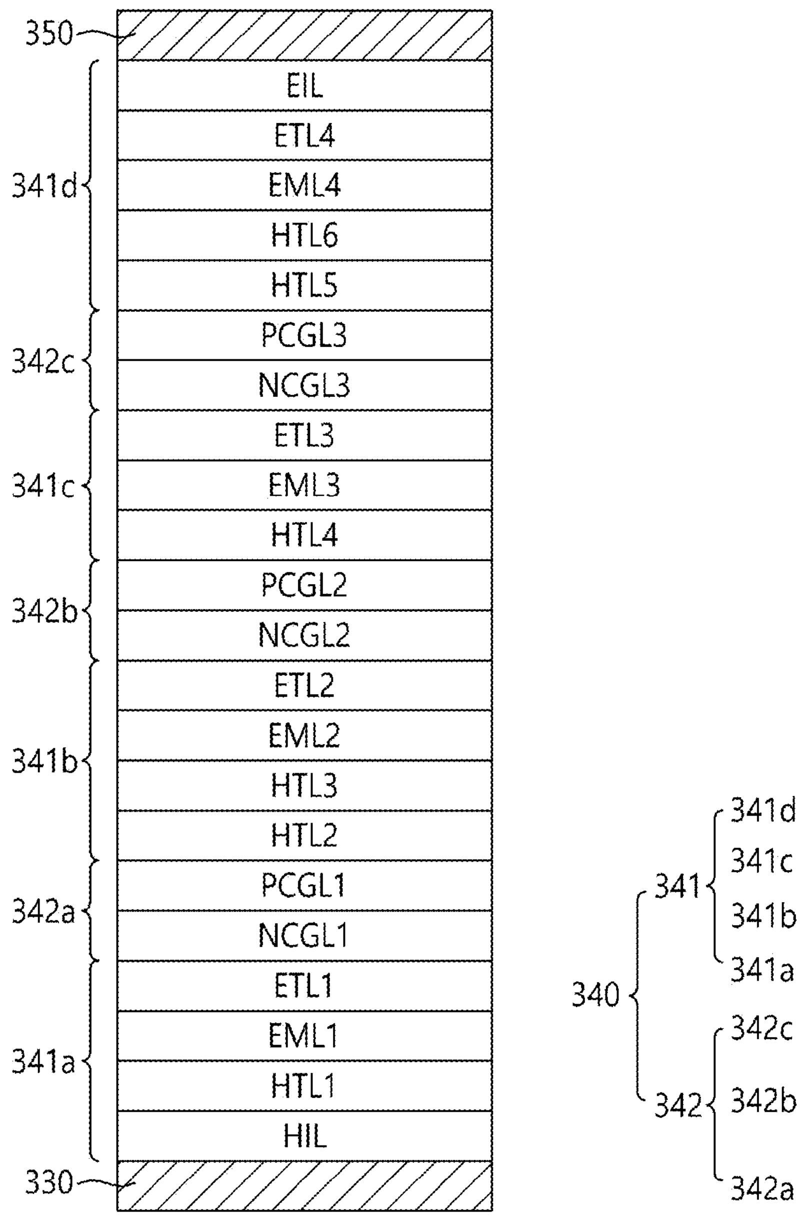

350
EIL
ETL4
341d
EML4
HTL6
HTL5
PCGL3
342c
NCGL3
ETL3
341c
EML3
HTL4
PCGL2
342b
NCGL2
ETL2
EML2
341b
HTL3
HTL2
PCGL1
342a
NCGL1
ETL1
EML1
341a
HTL1
HIL
330
341d
341c
341
341b
341a
340
342c
342
342b
342a

FIG.4

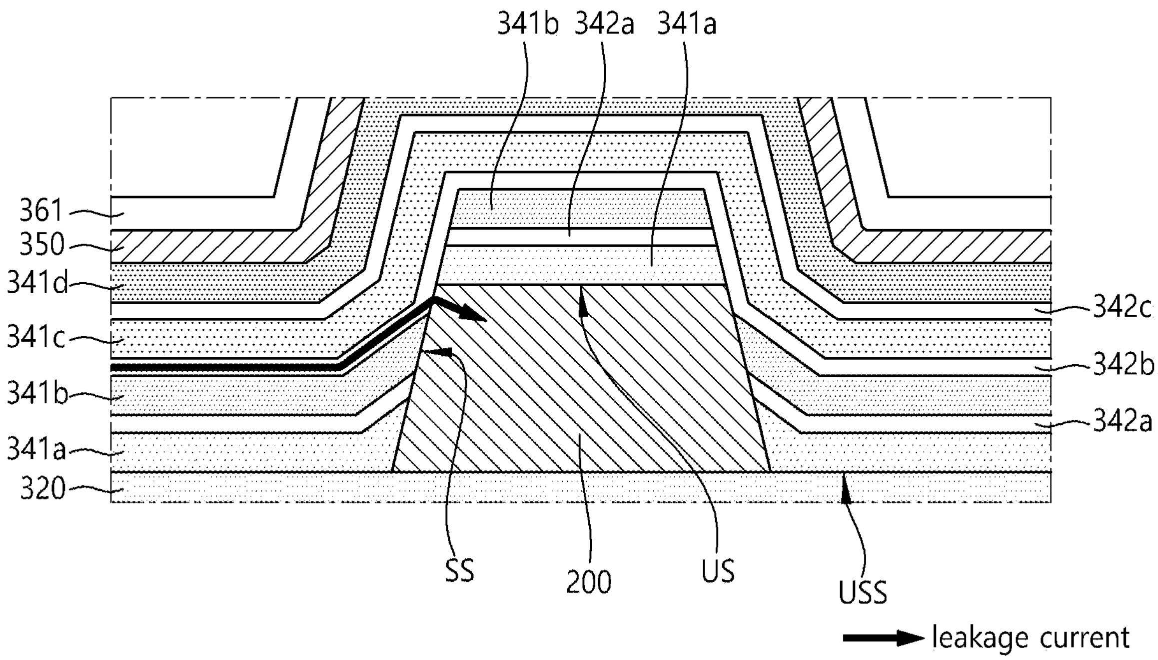

341b 342a 341a
361
350
341d
341c
341b
341a
320
342c
342b
342a
SS
200
US
USS
leakage current

FIG.5

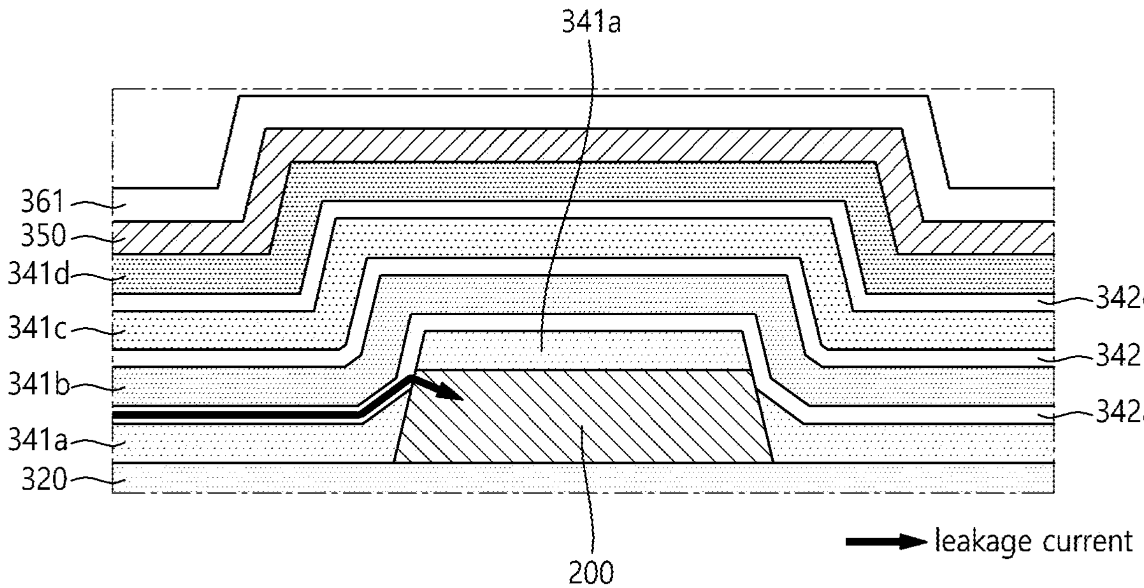

341a
361
350
341d
341c
341b
341a
320
342c
342b
342a
200
leakage current

FIG.6

	Comparative Example 1	Comparative Example 2	Embodiment
Color Gamut(%)	51~57% (Average 54%)	58~79% (Average 70.5%)	75.8~79% (Average 77%)

FIG.7

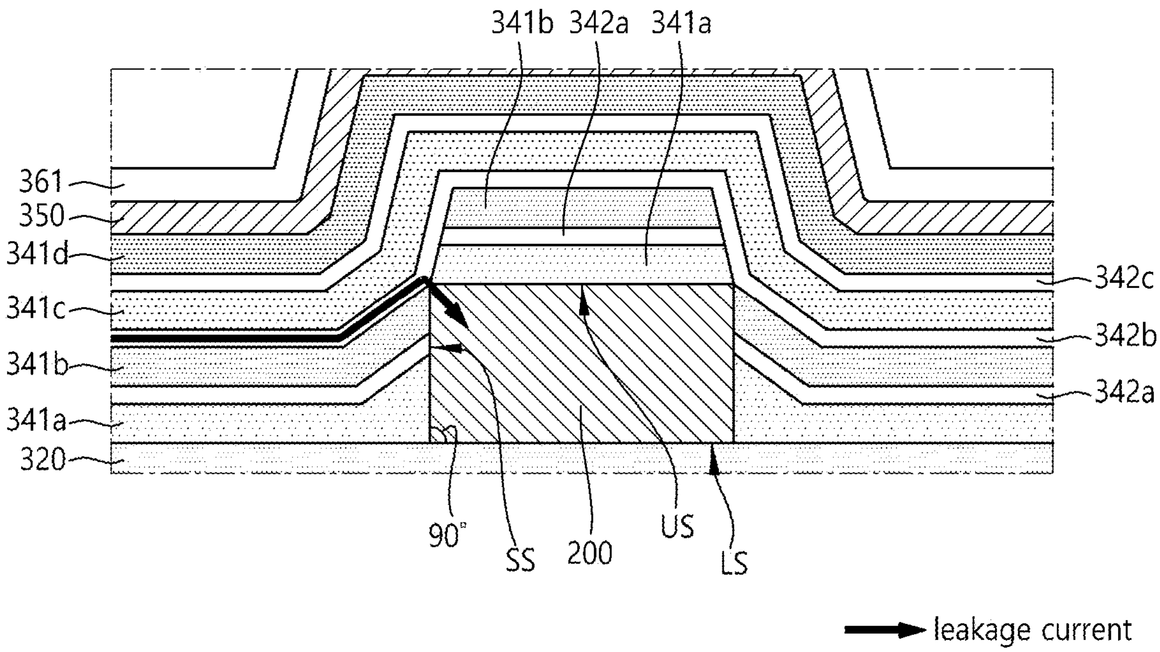

341b 342a 341a
361
350
341d
341c
341b
341a
320
342c
342b
342a
90°
SS
200
US
LS
leakage current

FIG.8

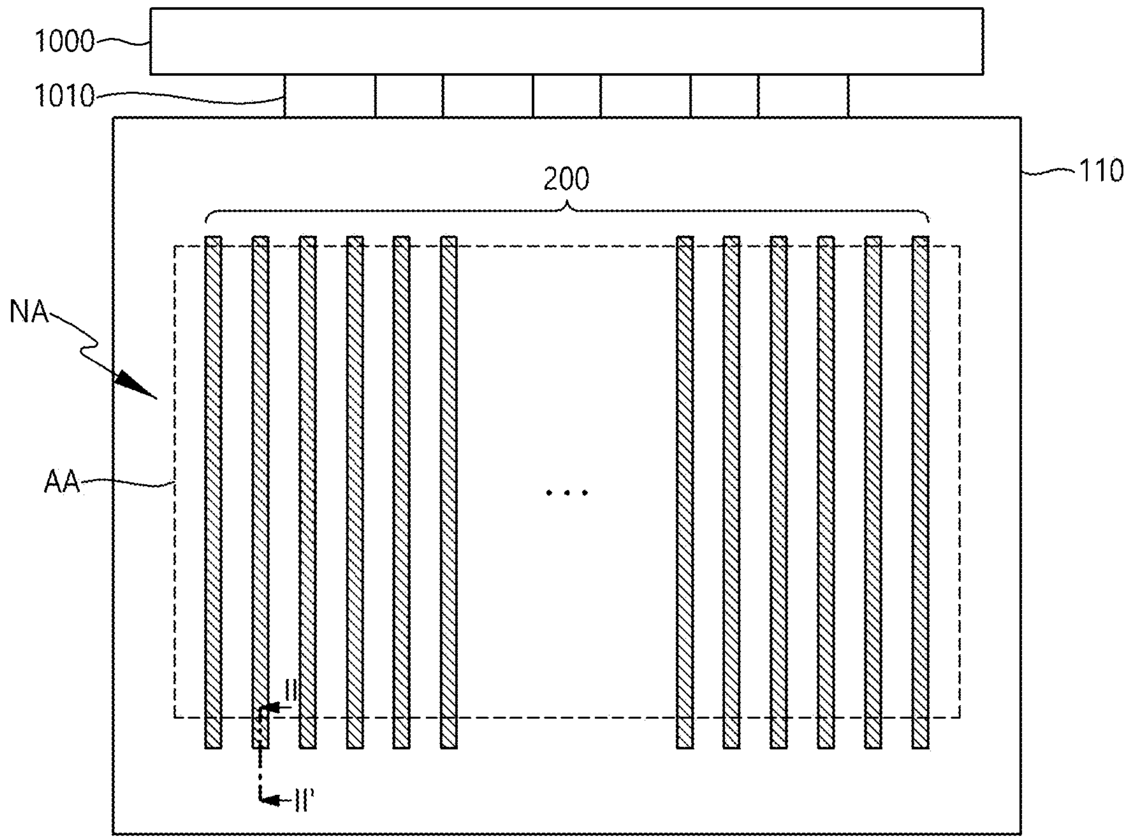


FIG.9

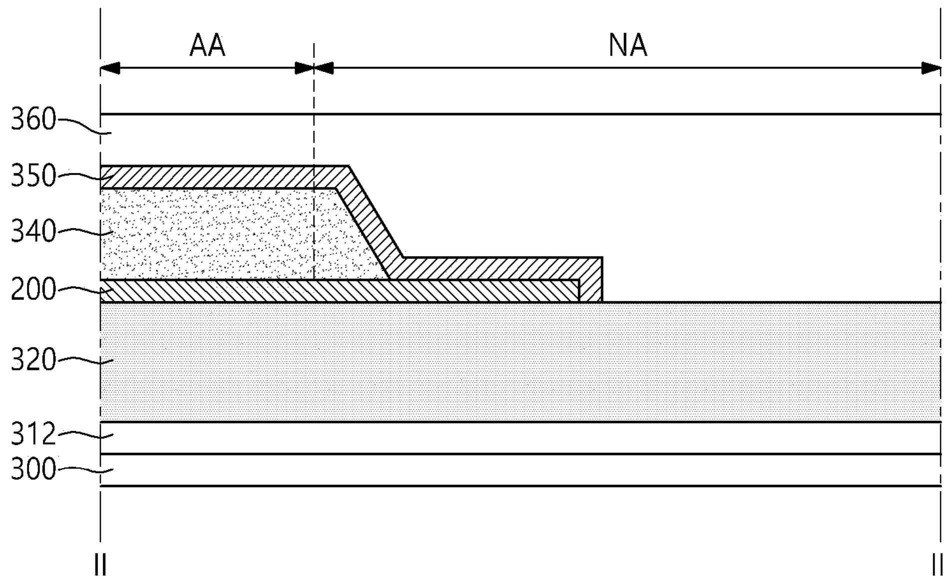


FIG.10

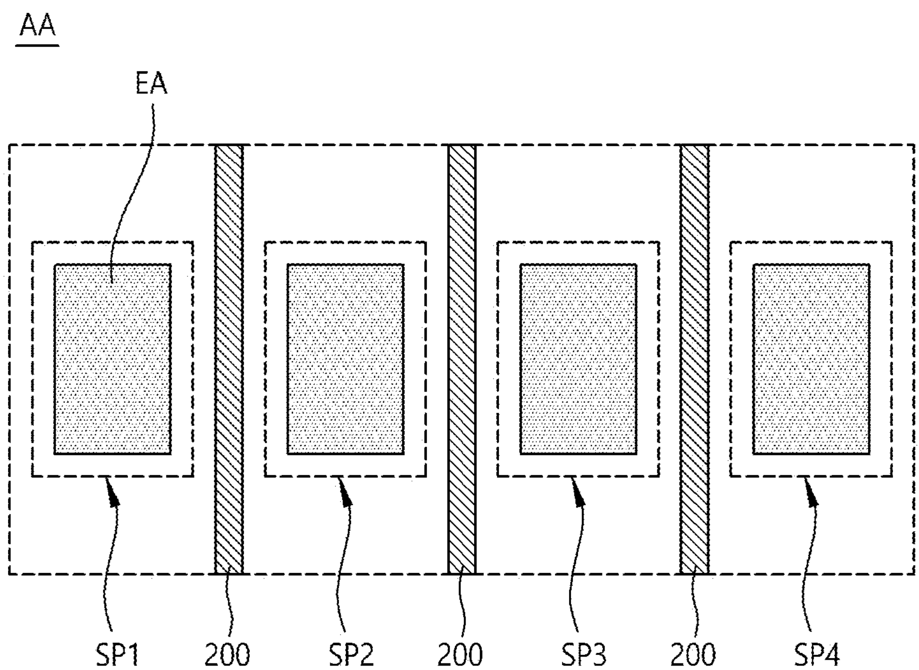


FIG.11

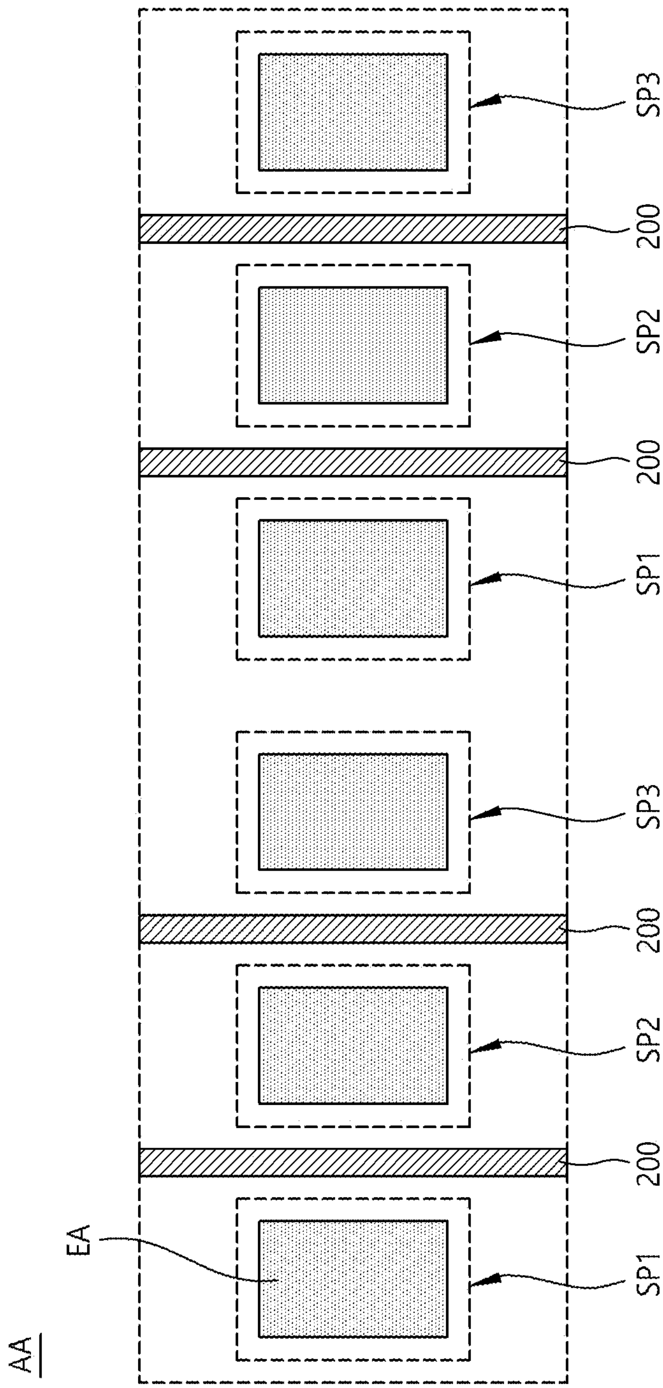


FIG.12

DISPLAY DEVICE

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from Korean Patent Application No. 10-2024-0021500, filed on Feb. 15, 2024, which is hereby incorporated by reference for all purposes as if fully set forth herein.

BACKGROUND

Technical Field

[0002] The present disclosure relates to a display device.

Description of the Related Art

[0003] As technology advances, a display device for displaying image is becoming more integrated and thinner.

[0004] A display device may include a display panel including various elements, transistors, etc., to display images. The display panel may include a plurality of subpixels which implement different colors to display an image.

[0005] In this case, as display devices become more integrated, multiple subpixels may be arranged more densely, so the gap between adjacent subpixels may narrow.

BRIEF SUMMARY

[0006] If the gap between adjacent subpixels in the display device of the related art becomes narrow, interference may occur between subpixels, making it difficult to independently control the light emission of the subpixels. This may also deteriorate the color gamut characteristics of the display device. Various embodiments of the present disclosure address the technical problems in the related art, including the problem identified above.

[0007] Embodiments of the present disclosure may provide a display device capable of improving the color gamut by blocking leakage current flowing between adjacent subpixels.

[0008] Embodiments of the present disclosure may provide a display device including a substrate including a plurality of subpixels, each of the plurality of subpixels including an emission area, an overcoat layer on the substrate, an auxiliary electrode disposed between the emission areas of adjacent subpixels among the plurality of subpixels and disposed on the overcoat layer, and an organic layer disposed on the overcoat layer and the auxiliary electrode, including at least one charge generation layer, and at least a portion of the at least one charge generation layer contacting the auxiliary electrode.

[0009] Embodiments of the present disclosure may provide a display device including a substrate including a plurality of subpixels, each of the plurality of subpixels including an emission area, an overcoat layer on the substrate, an auxiliary electrode disposed between emission areas of adjacent subpixels among the plurality of subpixels and disposed on the overcoat layer, and an organic layer disposed on the overcoat layer and the auxiliary electrode, at least a portion of the organic layer contacting a side surface of the auxiliary electrode.

[0010] According to embodiments of the present disclosure, there may provide a display device capable of improving the color gamut by blocking leakage current flowing between adjacent subpixels.

[0011] According to embodiments of the present disclosure, there may provide a display device capable of blocking leakage current flowing between adjacent subpixels, thereby enabling low power consumption by preventing unnecessary power consumption.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0012] FIG. **1** illustrates an example of the structure of a display device and a circuit structure included in a subpixel according to embodiments of the present disclosure.

[0013] FIG. **2** illustrates an example of a planar structure of a subpixel.

[0014] FIG. **3** illustrates an example of the cross-sectional structure of portion I-I' of FIG. **2**.

[0015] FIG. **4** illustrates an example of the organic layer shown in FIG. **3**.

[0016] FIG. **5** is an enlarged view of part A of FIG. **3**.

[0017] FIG. **6** illustrates another example of the cross-sectional structure shown in FIG. **5**.

[0018] FIG. **7** is a table illustrating the color gamut of a display device according to embodiments of the present disclosure.

[0019] FIG. **8** illustrates another example of the cross-sectional structure shown in FIG. **5**.

[0020] FIG. **9** illustrates an example of a planar structure of a display panel according to embodiments of the present disclosure.

[0021] FIG. **10** illustrates an example of the cross-sectional structure of portion II-II' of FIG. **9**.

[0022] FIGS. **11** and **12** illustrate another example of a planar structure of a subpixel.

DETAILED DESCRIPTION

[0023] In the following description of examples or embodiments of the present disclosure, reference will be made to the accompanying drawings in which it is shown by way of illustration specific examples or embodiments that can be implemented, and in which the same reference numerals and signs can be used to designate the same or like components even when they are shown in different accompanying drawings from one another. Further, in the following description of examples or embodiments of the present disclosure, detailed descriptions of well-known functions and components incorporated herein will be omitted when it is determined that the description may make the subject matter in some embodiments of the present disclosure rather unclear. The terms such as "including," "having," "containing," "constituting" "make up of," and "formed of" used herein are generally intended to allow other components to be added unless the terms are used with the term "only." As used herein, singular forms are intended to include plural forms unless the context clearly indicates otherwise.

[0024] Terms, such as "first," "second," "A," "B," "(A)," or "(B)" may be used herein to describe elements of the present disclosure. Each of these terms is not used to define essence, order, sequence, or number of elements, etc., but is used merely to distinguish the corresponding element from other elements.

[0025] When it is mentioned that a first element "is connected or coupled to," "contacts or overlaps," etc., a second element, it should be interpreted that, not only can the first element "be directly connected or coupled to" or "directly contact or overlap" the second element, but a third element can also be "interposed" between the first and second elements, or the first and second elements can "be connected or coupled to," "contact or overlap," etc., each other via a fourth element. Here, the second element may be included in at least one of two or more elements that "are connected or coupled to," "contact or overlap," etc., each other.

[0026] When time relative terms, such as "after," "subsequent to," "next," "before," and the like, are used to describe processes or operations of elements or configurations, or flows or steps in operating, processing, manufacturing methods, these terms may be used to describe non-consecutive or non-sequential processes or operations unless the term "directly" or "immediately" is used together.

[0027] The shapes, sizes, dimensions (e.g., length, width, height, thickness, radius, diameter, area, etc.), ratios, angles, number of elements, and the like illustrated in the accompanying drawings for describing the embodiments of the present disclosure are merely examples, and the present disclosure is not limited thereto.

[0028] A dimension including size and a thickness of each component illustrated in the drawing are illustrated for convenience of description, and the present disclosure is not limited to the size and the thickness of the component illustrated, but it is to be noted that the relative dimensions including the relative size, location, and thickness of the components illustrated in various drawings submitted herewith are part of the present disclosure.

[0029] In addition, when any dimensions, relative sizes, etc., are mentioned, it should be considered that numerical values for an elements or features, or corresponding information (e.g., level, range, etc.) include a tolerance or error range (e.g., 10%) that may be caused by various factors (e.g., process factors, internal or external impact, noise, etc.) even when a relevant description is not specified. Further, the term "may" fully encompasses all the meanings of the term "can".

[0030] Hereinafter, embodiments will be described in detail with reference to the accompanying drawings.

[0031] FIG. **1** illustrates an example of the structure of a display device and a circuit structure included in a subpixel according to embodiments of the present disclosure.

[0032] Referring to FIG. **1**, a plurality of subpixels SP may be disposed in a display panel **110** included in a display device **100**.

[0033] Each of the plurality of subpixels SP may include a light emitting device ED and a subpixel circuit unit configured to drive the light emitting device ED.

[0034] The subpixel circuit unit may include a driving transistor T**1** for driving the light emitting device ED, a scan transistor T**2** for transferring the data voltage VDATA to a first node N**1** of the driving transistor T**1**, and a storage capacitor Cst for maintaining a constant voltage during one frame.

[0035] The driving transistor T**1** may include a first node N**1** to which a data voltage is applied, a second node N**2** electrically connected to the light emitting device ED, and a third node N**3** to which the driving voltage VDD is applied from a driving voltage line DVL. In the driving transistor T**1**, the first node N**1** may be a gate node, the second node N**2** may be a source node or a drain node, and the third node N**3** may be a drain node or a source node. Hereinafter, for convenience of explanation, there illustrates a case in which the first node N**1** is a gate node, the second node N**2** is a source node, and the third node N**3** is a drain node in the driving transistor T**1**, as an example.

[0036] The light emitting device ED may include an anode electrode **330**, an organic layer **340**, and a cathode electrode **350**. The anode electrode **330** may be a pixel electrode disposed in each subpixel SP, and may be electrically connected to the second node N**2** of the driving transistor T**1** of each subpixel SP. The cathode electrode **350** may be a common electrode commonly disposed in the plurality of subpixels SP, and a base voltage VSS may be applied thereto.

[0037] Alternatively, the anode electrode **330** may be a common electrode, and the cathode electrode **350** may be a pixel electrode. Hereinafter, for convenience of explanation, it is assumed that anode electrode **330** is a pixel electrode and the cathode electrode **350** is a common electrode.

[0038] The light emitting device ED may have a specific emission area, and the emission area of the light emitting device ED may be defined as an area where the anode electrode **330**, the organic layer **340**, and the cathode electrode **350** overlap.

[0039] The light emitting device ED may be an organic light emitting diode (OLED), an inorganic light emitting diode, or a quantum dot light emitting device. In the case that the light emitting device ED is an organic light emitting diode, the organic layer **340** in the light emitting device ED may include an organic emission layer containing an organic material.

[0040] The scan transistor T**2** may be controlled on-off by a scan signal SCAN, which is a gate signal applied through a gate line GL, and the scan transistor T**2** may be electrically connected between the first node N**1** of the driving transistor T**1** and the data line DL.

[0041] The storage capacitor Cst may be electrically connected between the first node N**1** and the second node N**2** of the driving transistor T**1**.

[0042] The subpixel circuit unit may have a 2T1C structure including two transistors DT and ST and one capacitor Cst, and in some cases, may further include one or more transistors. Alternatively, the subpixel circuit unit may further include one or more capacitors.

[0043] The storage capacitor Cst may be an external capacitor intentionally designed outside the driving transistor T**1** rather than a parasitic capacitor (e.g., Cgs, Cgd) which is an internal capacitor existing between the first node N**1** and the second node N**2** of the driving transistor T**1**. Each of the driving transistor T**1** and the scan transistor T**2** may be an n-type transistor or a p-type transistor.

[0044] Circuit elements within each subpixel, in particular, light emitting devices EDs implemented with organic light emitting diodes OLEDs containing organic materials may be vulnerable to external moisture or oxygen. Accordingly, an encapsulation layer **360** may be disposed on the display panel **110** to prevent oxygen from penetrating into the circuit elements (particularly, the light emitting devices ED). The encapsulation layer **360** may be disposed to cover the light emitting device ED.

[0045] FIG. **2** illustrates an example of a planar structure of a subpixel.

[0046] Referring to FIG. **2**, a display panel **110** may include a plurality of subpixels SP.

[0047] The plurality of subpixels SP may include a first subpixel SP**1** and a second subpixel SP**2**.

[0048] The first subpixel SP**1** and the second subpixel SP**2** may be one of a red subpixel, a green subpixel, and a blue subpixel, respectively. Alternatively, the first subpixel SP**1** and the second subpixel SP**2** may be one of a red subpixel, a green subpixel, a blue subpixel, and a white subpixel, respectively, however is not limited thereto.

[0049] Each subpixel SP**1** and SP**2** may include a light emitting area or an emission area EA.

[0050] As described above, the emission area EA may be an area where an anode electrode, an organic layer, and a cathode electrode overlap.

[0051] Red, green, or blue light may be emitted from the emission area EA of the first subpixel SP**1** and the second subpixel SP**2**. Alternatively, red, green, blue, or white light may be emitted.

[0052] A non-emission area NEA may be an area other than the emission area EA, and may refer to an area where the light is not emitted and is dark compared to the emission area EA.

[0053] The non-emission area NEA may surround the emission area EA. The area between the emission area EA of the first subpixel SP**1** and the emission area EA of the second subpixel SP**2** may be a non-emission area NEA. A circuit for driving a light emitting device may be disposed in the non-emission area NEA.

[0054] An auxiliary electrode **200** may be disposed in the non-emission area NEA between the emission areas EA of adjacent subpixels SP**1** and SP**2**. Although not shown, the auxiliary electrode **200** may be disposed between anode electrodes included in adjacent subpixels SP**1** and SP**2**, respectively.

[0055] The auxiliary electrode **200** may be made of a transparent conductive material capable of transmitting light. For example, the auxiliary electrode **200** may be formed of at least one of indium tin oxide (ITO) and indium zinc oxide (IZO), however, is not limited thereto.

[0056] The auxiliary electrode **200** may extend in a direction perpendicular to the direction extending from the first subpixel SP**1** to the second subpixel SP**2**, and may extend to a non-display area where subpixels SPs are not disposed, however, is not limited thereto.

[0057] In FIG. **2**, the auxiliary electrode **200** is shown to be disposed only between the first subpixel SP**1** and the second subpixel SP**2**, but is not limited thereto, and the auxiliary electrode **200** may also be disposed between other adjacent subpixels.

[0058] FIG. **3** illustrates an example of the cross-sectional structure of portion I-I' of FIG. **2**. FIG. **4** illustrates an example of the organic layer shown in FIG. **3**.

[0059] Referring to FIG. **3**, the display device may include a substrate **300** on which a plurality of subpixels SP are disposed.

[0060] The substrate **300** may support various components of the display device. The substrate **300** may be made of a flexible plastic material, but is not limited thereto.

[0061] A circuit element layer **310** may be disposed on the substrate **300**.

[0062] The circuit element layer **310** may include various circuit elements for driving subpixels, such as a driving transistor, a sensing transistor, a storage capacitor, a line **311**, and a buffer layer **312**.

[0063] The line **311** may be disposed on the substrate **300**, and may be a data line, a driving voltage line, or a sensing line.

[0064] The line **311** may be disposed in the non-emission area NEA.

[0065] A buffer layer **312** may be disposed on the substrate **300**, and may be disposed to cover the line **311**. The buffer layer **312** may prevent ions or impurities from diffusing from the substrate **300** and block moisture penetration. In addition, the buffer layer **312** may improve the surface flatness. The buffer layer **312** may include an inorganic material such as oxide or nitride, an organic material, or an organic-inorganic composite, and may be formed in a single-layer or multi-layer structure. For example, the buffer layer **312** may have a triple layer or more structure composed of silicon oxide, silicon nitride, and silicon oxide.

[0066] The circuit element layer **310** may include an active layer (not shown), a gate insulating layer (not shown), and a plurality of electrodes (not shown).

[0067] The active layer may be disposed on the buffer layer **312**. The active layer may be formed of a silicon-based semiconductor material or an oxide-based semiconductor material. The active layer may include a source area, a drain area, and a channel area between the source area and the drain area.

[0068] The gate insulating layer may be disposed on the active layer.

[0069] A plurality of electrodes may be disposed on the gate insulating layer. The plurality of electrodes may include a gate electrode, a source electrode, and a drain electrode.

[0070] A color filter may be disposed on the buffer layer **312**. The color filter may be disposed between the buffer layer **312** and an overcoat layer **320**, and may be disposed to overlap the emission area EA of the subpixel SP.

[0071] The overcoat layer **320** may be disposed on the buffer layer **312**.

[0072] The overcoat layer **320** may include an organic material such as polyimide, benzocyclobutene series resin, or acrylate, but is not limited thereto.

[0073] The overcoat layer **320** may prevent gas generated within the display device from being delivered to the light emitting device ED.

[0074] Although FIG. **3** exemplarily illustrates a case where the overcoat layer **320** is made of a single layer, the overcoat layer **320** is not limited thereto, and may be formed of a double layer or a triple layer.

[0075] On the overcoat layer **320**, an anode electrode may be disposed in an area overlapping with an area where the subpixel SP is disposed.

[0076] In the case that the overcoat layer **320** is formed of a double layer, the overcoat layer **320** may include a first overcoat layer and a second overcoat layer. The second overcoat layer may be open in at least a portion of the first overcoat layer, and an anode electrode of the subpixel SP may be disposed on the second overcoat layer.

[0077] The anode electrode may be made of a transparent conductive material transmitting light. For example, the anode electrode may be formed of at least one of indium tin oxide (ITO) and indium zinc oxide (IZO). However, it is not limited thereto.

[0078] On the overcoat layer **320**, an auxiliary electrode **200** may be disposed between the subpixels SP.

[0079] The auxiliary electrode **200** may be located in the non-emission area NEA.

[0080] A thickness of the auxiliary electrode **200** may be 800 Å or less, however, is not limited thereto.

[0081] The organic layer **340** may be disposed on the overcoat layer **320** and the auxiliary electrode **200**.

[0082] The organic layer **340** may include a plurality of intermediate layers **341** and a plurality of charge generation layers **342**. The organic layer **340** may be in the form of a plurality of intermediate layers **341** and a plurality of charge generation layers **342** alternately stacked.

[0083] Referring to FIG. **4**, the organic layer **340** may be disposed between each anode electrode **330** and the cathode electrode **350** corresponding to the subpixel.

[0084] The plurality of intermediate layers **341** may include a first intermediate layer **341***a*, a second intermediate layer **341***b* on the first intermediate layer **341***a*, a third intermediate layer **341***c* on the second intermediate layer **341***b*, and a fourth intermediate layer **341***d* on the third intermediate layer **341***c*.

[0085] In FIGS. **3** and **4**, the organic layer **340** is shown as having four intermediate layers **341**, but it is not limited thereto, and the organic layer **340** may have two or three intermediate layers **341**.

[0086] The plurality of charge generation layers **342** may include a first charge generation layer **342***a*, a second charge generation layer **342***b* on the first charge generation layer **342***a*, and a third charge generation layer **342***c* on second charge generation layer **342***b*.

[0087] In FIGS. **3** and **4**, the organic layer **340** is shown as having three charge generation layers **342**, but the organic layer **340** is not limited thereto, and may have one or two charge generation layers **342**.

[0088] Specifically, the first intermediate layer **341***a* may be disposed on the anode electrode **330**. The first intermediate layer **341***a* may have a structure in which a hole injection layer HIL, a first hole transport layer HTL**1**, and a first emission layer EML**1** which emits light of a first color, a first electron transport layer ETL**1** are sequentially stacked, but is not necessarily limited thereto. The first emission layer EML**1** may be any one of a red emission layer emitting red light, a green emission layer emitting green light, a blue emission layer emitting blue light, and a yellow emission layer emitting yellow light, however is not necessarily limited thereto.

[0089] The first charge generation layer **342***a* may be disposed on the first intermediate layer **341***a*. The first charge generation layer **342***a* may have a stacked structure in which an N-type charge generation layer NCGL**1** for providing electrons to the first intermediate layer **341***a* and a P-type charge generation layer PCGL**1** for providing holes to the second intermediate layer **341***b* are stacked.

[0090] The second intermediate layer **341***b* may be disposed on the first charge generation layer **342***a*. The second intermediate layer **341***b* may have a structure in which a second hole injection layer HTL**2**, a third hole injection layer HTL**3**, a second emission layer EML**2** which emits light of a second color, and a second electron transport layer ETL**2** are sequentially stacked, but is not necessarily limited thereto. The second emission layer EML**2** may emit light of a different color than the first emission layer EML**1**. For example, the first emission layer EML**1** may be a red emission layer emitting red light, and the second emission layer EML**2** may be a blue emission layer emitting blue light, but are not limited thereto.

[0091] The second charge generation layer **342***b* may be disposed on the second intermediate layer **341***b*. The second charge generation layer **342***b* may have a stacked structure in which an N-type charge generation layer NCGL**2** for providing electrons to the second intermediate layer **341***b* and a P-type charge generation layer PCGL**2** for providing holes to the third intermediate layer **341***c* are stacked.

[0092] The third intermediate layer **341***c* may be disposed on the second charge generation layer **342***b*. The third intermediate layer **341***c* may have a structure in which a fourth hole transport layer HTL**4**, a third emission layer EML**3** that emits light of a third color, and a third electron transport layer ETL**3** are sequentially stacked, but is not necessarily limited thereto. The third emission layer EML**3** may be a green emission layer, but is not limited thereto.

[0093] The third charge generation layer **342***c* may be disposed on the third intermediate layer **341***c*. The third charge generation layer **342***c* may have a stacked structure in which an N-type charge generation layer NCGL**3** for providing electrons to the third intermediate layer **341***c* and a P-type charge generation layer PCGL**3** for providing holes to the fourth intermediate layer **341***d* are stacked.

[0094] The fourth intermediate layer **341***d* may be disposed on the third charge generation layer **342***c*. The fourth intermediate layer **341***d* may have a structure in which a fifth hole transport layer HTL**5**, a sixth hole transport layer HTL**6**, a fourth emission layer EML**4** that emits light of a fourth color, a fourth electron transport layer ETL**4**, and an electron injection layer EIL are sequentially stacked, but the structure is not necessarily limited thereto. The fourth emission layer EML**4** may be a blue emission layer, but is not limited thereto.

[0095] A cathode electrode **350** may be disposed on the fourth intermediate layer **341***d*.

[0096] The cathode electrode **350** may be a reflective electrode which reflects light, and may be made of an opaque conductive material. For example, the cathode electrode **350** may be formed of at least one of silver (Ag), aluminum (Al), gold (Au), molybdenum (Mo), tungsten (W), chromium (Cr), or alloys thereof. but is not limited thereto.

[0097] Referring again to FIG. **3**, an encapsulation layer **360** may be disposed on the cathode electrode **350**.

[0098] The encapsulation layer **360** may prevent moisture or oxygen from penetrating into the light emitting device ED. The encapsulation layer **360** may have an organic encapsulation layer and an inorganic encapsulation layer alternately stacked.

[0099] The encapsulation layer **360** may include a first encapsulation layer **361**, a second encapsulation layer **362**, and a third encapsulation layer **363**. Here, the first encapsulation layer **361** and the third encapsulation layer **363** may be inorganic encapsulation layers, and the second encapsulation layer **362** may be an organic encapsulation layer, but are not limited thereto.

[0100] FIG. **5** is an enlarged view of part A of FIG. **3**.

[0101] Referring to FIG. **5**, an organic layer **340** may be disposed on the auxiliary electrode **200**. The auxiliary electrode **200** may be located between the organic layer **340** and the overcoat layer **320**.

[0102] The organic layer **340** may cover a side surface SS and an upper surface US of the auxiliary electrode **200**.

[0103] The portion of the organic layer **340** located on an upper surface US of the auxiliary electrode **200** may be positioned higher in a vertical direction than a portion of the organic layer **340** located on an upper surface USS of the overcoat layer **320**. That is, a vertical distance from the portion of the organic layer **340** located on the upper surface US of the auxiliary electrode **200** to the substrate **300** may be greater than a vertical distance from the portion of the organic layer **340** located on the upper surface USS of the overcoat layer **320** to the substrate **300**.

[0104] A thickness of the organic layer **340** may be 4700 Å, but is not limited thereto.

[0105] At least a portion of the organic layer **340** may be disconnected around the auxiliary electrode **200** due to the auxiliary electrode **200** formed between the organic layer **340** and the overcoat layer **320**.

[0106] Specifically, as shown in FIG. **5**, the first intermediate layer **341***a*, the first charge generation layer **342***a*, and the second intermediate layer **341***b* may be disconnected around the auxiliary electrode **200**.

[0107] Here, a thickness of the auxiliary electrode **200** may be 800 Å or less as described above, but is not limited thereto.

[0108] A portion of the first intermediate layer **341***a*, the first charge generation layer **342***a*, and the second intermediate layer **341***b* may be in contact with both side surfaces SS of the auxiliary electrode **200**.

[0109] Other portions of the first intermediate layer **341***a*, the first charge generation layer **342***a*, and the second intermediate layer **341***b* may be located on the auxiliary electrode **200**.

[0110] Among the portions of the first intermediate layer **341***a*, the first charge generation layer **342***a*, and the second intermediate layer **341***b*, the portion contacting both side surfaces SS of the auxiliary electrode **200** and the portion located on the auxiliary electrode **200** may not be connected to each other.

[0111] At least a portion of the second charge generation layer **342***b* may be in contact with the side surface SS of the auxiliary electrode **200**.

[0112] As described above, the second charge generation layer **342***b* may include an N-type charge generation layer NCGL**2** and a P-type charge generation layer PCGL**2** on the N-type charge generation layer NCGL**2**.

[0113] The N-type charge generation layer NCGL**2** may contact at least a portion of the side surface SS of the auxiliary electrode **200**.

[0114] Since the N-type charge generation layer NCGL**2** contacts at least a portion of the side surface SS of the auxiliary electrode **200**, at least a portion of the current flowing along the N-type charge generation layer NCGL**2** may flow to the auxiliary electrode **200**, as shown in FIG. **5**.

[0115] The current flowing along the N-type charge generation layer NCGL**2** may be a current leaked from one subpixel adjacent to the auxiliary electrode **200**.

[0116] Since the current leaked from one adjacent subpixel may pass through the side of the auxiliary electrode **200** and flow to the auxiliary electrode **200**, the current may not flow to another subpixel adjacent to the auxiliary electrode **200** in a direction different from that of one adjacent subpixel.

[0117] FIG. **6** illustrates another example of the cross-sectional structure shown in FIG. **5**.

[0118] In describing this embodiment, it will be omitted the description of components that are substantially the same as or corresponding to the previous embodiment.

[0119] A thickness of the auxiliary electrode **200** shown in FIG. **6** may be smaller than a thickness of the auxiliary electrode **200** described with reference to FIGS. **3** and **5**.

[0120] If the thickness of the auxiliary electrode **200** is reduced, there may be reduced the number of layers disconnected by the auxiliary electrode **200** among the organic layers **340**.

[0121] Specifically, as shown in FIG. **6**, the first intermediate layer **341***a* may be disconnected around the auxiliary electrode **200**.

[0122] A portion of the first intermediate layer **341***a* may contact both side surfaces SS of the auxiliary electrode **200**.

[0123] Another portion of the first intermediate layer **341***a* may be located on the auxiliary electrode **200**.

[0124] The portion of the first intermediate layer **341***a* contacting both side surfaces SS of the auxiliary electrode **200** and the portion of the first intermediate layer **341***a* located on the auxiliary electrode **200** may not be connected to each other.

[0125] At least a portion of the first charge generation layer **342***a* may be in contact with the side surface SS of the auxiliary electrode **200**.

[0126] As described above, the first charge generation layer **342***a* may include an N-type charge generation layer NCGL**1** and a P-type charge generation layer PCGL**1** on the N-type charge generation layer NCGL**1**.

[0127] The N-type charge generation layer NCGL**1** may contact at least a portion of the side surface SS of the auxiliary electrode **200**.

[0128] Since the N-type charge generation layer NCGL**1** contacts at least a portion of the side surface SS of the auxiliary electrode **200**, as shown in FIG. **6**, at least a portion of the current flowing along the N-type charge generation layer NCGL**1** may flow into the auxiliary electrode **200**.

[0129] The current flowing along the N-type charge generation layer NCGL**1** may be a current leaked from one subpixel adjacent to the auxiliary electrode **200**.

[0130] Referring to FIGS. **5** and **6**, the leakage current flowing along the first charge generation layer **342***a* and the second charge generation layer **342***b* may be a current in which some of the current flowing in the subpixel leaks when supplying the data voltage to the subpixel for driving the subpixel.

[0131] Here, current leaked from one subpixel may flow to another adjacent subpixel through the organic layer **340**.

[0132] In this case, since the charge generation layers **342***a*, **342***b*, and **342***c* of the organic layer **340** have low resistance, most of the leaked current may flow along the charge generation layers **342***a*, **342***b*, and **342***c*.

[0133] Since the leaked current may reach another adjacent subpixel through the charge generation layers **342***a*, **342***b*, and **342***c*, a light emitting device included in another adjacent subpixel may be driven even when the data voltage is not supplied to the other adjacent subpixel.

[0134] Therefore, light may be emitted from other adjacent subpixels which are not required to emit light, which may cause a problem in that it becomes difficult to independently control the emitted light of each subpixel.

[0135] In addition, as light is emitted from other adjacent subpixels which are not required to emit light, a problem may occur in which the color of the emitted subpixel is not properly implemented. That is, there may be deteriorated the color gamut characteristics in low gray levels of subpixels.

[0136] However, as shown in FIGS. **5** and **6**, if the first charge generation layer **342***a* or the second charge generation layer **342***b* contacts the side surface SS of the auxiliary electrode **200**, at least a portion of the leakage current flowing along the first charge generation layer **342***a* or the second charge generation layer **342***b* may flow through the auxiliary electrode **200**. Here, the auxiliary electrode **200** may be connected to a cathode electrode supplied with a base voltage, as will be described later, so the leakage current may not flow to other adjacent subpixels and may be removed in the middle through the auxiliary electrode **200**.

[0137] Therefore, the leakage current flowing between adjacent subpixels may be blocked, so that there may become easier to independently control the light output of each subpixel.

[0138] In addition, a subpixel which does not want to emit light may be blocked from emitting light due to current leaked from an adjacent subpixel emitting light, thereby improving the color gamut of the subpixels in low gray levels.

[0139] FIG. **7** is a table illustrating the color gamut of a display device according to embodiments of the present disclosure.

[0140] Referring to FIG. **7**, a comparative example 1 is data expressing the color gamut in numbers when the organic layer **340** is not disconnected by the auxiliary electrode **200**. The comparative example 2 is data expressing the color gamut in numbers when both the first charge generation layer **342***a* and the second charge generation layer **342***b* of the organic layer **340** are disconnected by the auxiliary electrode **200**. The embodiment is data expressing the color gamut when the first charge generation layer **342***a* of the organic layer **340** is disconnected by the auxiliary electrode **200** and at least a portion of the second charge generation layer **342***b* is in contact with the side surface SS of the auxiliary electrode **200**.

[0141] In order to prevent the entire organic layer **340** including the first charge generation layer **342***a* and the second charge generation layer **342***b* from being disconnected, a thickness of the auxiliary electrode **200** in the case of the comparative example 1 may be smaller than a thickness of the auxiliary electrode **200** in the comparative example 2 and the embodiment.

[0142] Since the organic layer **340** is not disconnected, current leaked from one subpixel may flow to another adjacent subpixel through the first charge generation layer **342***a* and the second charge generation layer **342***b*. In this case, subpixels may have a color gamut value of 51 to 57% (average 54%). Here, as each subpixel fully expresses its color without being interfered with by other subpixels, the color gamut (%) has a higher value.

[0143] That is, in the case of the comparative example 1, all leakage current may flow to other adjacent subpixels, so the color gamut characteristics of other adjacent subpixels may be low.

[0144] In order to enable both the first charge generation layer **342***a* and the second charge generation layer **342***b* of the organic layer **340** to be disconnected, a thickness of the auxiliary electrode **200** in the case of the comparative example 2 may be greater than a thickness of the auxiliary electrode **200** in the comparative example 1 and the embodiment.

[0145] Therefore, current leaked from one subpixel cannot flow to another adjacent subpixel through the first charge generation layer **342***a* and the second charge generation layer **342***b*. In this case, the subpixels may have a relatively high color gamut value of 58 to 79% (average 70.5%) compared to the comparative example 1.

[0146] However, in the case of the comparative example 2, the thickness of the auxiliary electrode **200** is required to be very large in order to disconnect both the first charge generation layer **342***a* and the second charge generation layer **342***b*. For example, the thickness of the auxiliary electrode **200** may be 1250 Å or more.

[0147] If the thickness of the auxiliary electrode **200** is greater than 1250 Å, not only the organic layer **340** but also the cathode electrode may be disconnected. If the cathode electrode is disconnected, various types of moisture or oxygen may penetrate through a gap created at a point where the cathode electrode is disconnected. Accordingly, there may be occurred a subpixel driving failure.

[0148] In the case of the embodiment, in order for the first charge generation layer **342***a* to be disconnected and at least a portion of the second charge generation layer **342***b* to contact the side surface SS of the auxiliary electrode **200**, the thickness of the auxiliary electrode **200** may be larger than that in the comparative example 1, and smaller than that in the comparative example 2. For example, the thickness of the auxiliary electrode **200** may be 800 Å or less as described above.

[0149] If the auxiliary electrode **200** has the thickness as above, the first charge generation layer **342***a* may be disconnected, and at least a portion of the second charge generation layer **342***b* may contact the side surface SS of the auxiliary electrode **200**.

[0150] As described above, current leaked from one subpixel may flow to the auxiliary electrode **200** through the side surface SS of the auxiliary electrode **200**, so the leakage current may be removed through the auxiliary electrode **200**, and may not flow to other adjacent subpixels. In this case, the subpixels may have a color gamut value of 75.8% to 79% (average 77%).

[0151] In addition, if the auxiliary electrode **200** has the above-mentioned thickness, the problem of disconnection of the cathode electrode may not occur, and thus there may be prevented a driving failure due to moisture or oxygen penetration.

[0152] Hereinafter, it will be described another structure of the auxiliary electrode **200** capable of blocking the leakage current.

[0153] FIG. **8** illustrates another example of the cross-sectional structure shown in FIG. **5**.

[0154] In describing this embodiment, it will be omitted the description of components that are substantially the same as or corresponding to the previous embodiment.

[0155] Referring to FIG. **8**, the auxiliary electrode **200** may be disposed on the overcoat layer **320** in the non-emission area NEA.

[0156] A size of the upper surface US of the auxiliary electrode **200** may be the same as a size of the lower surface LS. Alternatively, an angle formed by the side surface SS of the auxiliary electrode **200** and the substrate **300** may be 90 degrees.

[0157] The thickness of the auxiliary electrode **200** may be 800 Å or less, but is not limited thereto.

[0158] As shown in FIG. **8**, the first intermediate layer **341***a*, the first charge generation layer **342***a*, and the second intermediate layer **341***b* may be disconnected around the auxiliary electrode **200**.

[0159] A portion of the first intermediate layer **341***a*, the first charge generation layer **342***a*, and the second intermediate layer **341***b* may contact both side surfaces of the auxiliary electrode **200**.

[0160] Other portions of the first intermediate layer **341***a*, the first charge generation layer **342***a*, and the second intermediate layer **341***b* may be located on the auxiliary electrode **200**.

[0161] In the first intermediate layer **341***a*, the first charge generation layer **342***a*, and the second intermediate layer **341***b*, a portion contacting both side surfaces of the auxiliary electrode **200** and a portion located on the auxiliary electrode **200** may not be connected to each other.

[0162] The second charge generation layer **342***b* may be in contact with a line where an upper surface and a side surface of the auxiliary electrode **200** meet.

[0163] As described above, the second charge generation layer **342***b* may include an N-type charge generation layer NCGL**2** and a P-type charge generation layer PCGL**2** on the N-type charge generation layer NCGL**2**.

[0164] The N-type charge generation layer NCGL**2** may be in contact with a line where the upper surface and the side surface of the auxiliary electrode **200** meet.

[0165] As the N-type charge generation layer NCGL**2** contacts the line where the upper surface and the side surface of the auxiliary electrode **200** meet, at least a portion of the current flowing along the N-type charge generation layer NCGL**2** may flow to the auxiliary electrode **200**, as shown in FIG. **8**.

[0166] In FIG. **8**, there is illustrated a case in which the second charge generation layer **342***b* is in contact with the line where the upper surface and the side surface of the auxiliary electrode **200** meet as an example, but the case is not limited thereto, and the first charge generation layer **342***a* may be in contact with the line where the upper and side surfaces of the auxiliary electrode **200** meet.

[0167] That is, the current leaking from one subpixel and flowing along the first charge generation layer **342***a* or the second charge generation layer **342***b* may flow to the auxiliary electrode **200** through a point where the first charge generation layer **342***a* or the second charge generation layer **342***b* contacts the upper surface and the side surface of the auxiliary electrode **200**. In this case, the current flowing to the auxiliary electrode **200** may flow to the cathode electrode supplied with the base voltage, as will be described later, so the leakage current cannot flow to the adjacent subpixel and can be removed in the middle through the auxiliary electrode **200**.

[0168] Therefore, there may block the leakage current flowing between adjacent subpixels, thereby making it easier to independently control the light output of each subpixel.

[0169] In addition, subpixels that do not want to emit light may be blocked from being driven by current leaked from adjacent subpixels emitting light, thereby improving the color gamut of subpixels in low gray levels.

[0170] FIG. **9** illustrates an example of a planar structure of a display panel according to embodiments of the present disclosure.

[0171] Referring to FIG. **9**, the display panel **110** may be connected to a data driver **1000**. The data driver **1000** may be a circuit for driving a plurality of data lines, and may output data signals through the plurality of data lines.

[0172] The data driver **1000** may receive digital image data DATA from a timing controller, convert the received image data DATA into an analog data signal, and output to a plurality of data lines.

[0173] In FIG. **9**, it is illustrated a case in which the data driver **1000** is connected to the display panel **110** through the film **1010** in a chip-on-film (COF) method, but is not limited thereto, and the data driver **1000** may be connected to the display panel **110** using a tape automated bonding (TAB) method, or may be connected to a bonding pad of the display panel **110** using a chip-on-glass (COG) or a chip-on-panel (COP) method.

[0174] A plurality of auxiliary electrodes **200** may be disposed to at least partially overlap a display area AA of the display panel **110**.

[0175] The display area AA may refer to an area where a plurality of subpixels SP are disposed.

[0176] The auxiliary electrodes **200** may be disposed between the plurality of subpixels SP within the display area AA.

[0177] The auxiliary electrodes **200** may overlap a data line or a reference voltage line, but are not limited thereto.

[0178] The non-display area NA may surround the display area AA outside the display area AA.

[0179] Some of the auxiliary electrodes **200** may be disposed in the non-display area NA. However, the present disclosure is not limited thereto, and the auxiliary electrodes **200** may be disposed only within the display area AA.

[0180] The auxiliary electrodes **200** may be electrically connected to the cathode electrode in the non-display area NA.

[0181] FIG. **10** illustrates an example of the cross-sectional structure of portion II-II' of FIG. **9**.

[0182] Referring to FIG. **10**, a buffer layer **312** may be disposed on the substrate **300**, an overcoat layer **320** may be disposed on the buffer layer **312**, and the auxiliary electrode **200** may be disposed on the overcoat layer **320**.

[0183] An organic layer **340** and a cathode electrode **350** may be disposed on the auxiliary electrode **200**.

[0184] The organic layer **340** may be disposed on the auxiliary electrode **200** in the display area AA.

[0185] The organic layer **340** may include a plurality of intermediate layers **341** and a plurality of charge generation layers **342**, as described above.

[0186] The organic layer **340** may be partially disposed in the non-display area NA.

[0187] The cathode electrode **350** may be disposed on the organic layer **340**.

[0188] In the display area AA, the cathode electrode **350** may be separated from the auxiliary electrode **200**. The organic layer **340** may be disposed between the cathode electrode **350** and the auxiliary electrode **200** in the display area AA.

[0189] In at least a portion of the non-display area NA, the cathode electrode **350** may be electrically connected to the auxiliary electrode **200**.

[0190] In at least a portion of the non-display area NA, an upper surface of the auxiliary electrode **200** may contact a lower surface of the cathode electrode **350**.

[0191] However, the present disclosure is not limited thereto, and the cathode electrode **350** may be electrically connected to the auxiliary electrode **200** in the display area AA.

[0192] A base voltage may be supplied to the cathode electrode **350**. Since the cathode electrode **350** is electrically connected to the auxiliary electrode **200**, the auxiliary electrode **200** may be supplied with the base voltage. That is, leakage current generated in at least one subpixel may be removed by the auxiliary electrode **200** disposed adjacent to the subpixel.

[0193] FIGS. **11** and **12** illustrate another example of a planar structure of a subpixel.

[0194] Referring to FIG. **11**, a number of subpixels SP may be disposed in the display area AA.

[0195] The plurality of subpixels SP may include a white subpixel, a red subpixel, a green subpixel, and a blue subpixel.

[0196] Here, a first subpixel SP**1** may be a red subpixel, a second subpixel SP**2** may be a white subpixel, a third subpixel SP**3** may be a blue subpixel, and a fourth subpixel SP**4** may be a green subpixel.

[0197] An auxiliary electrode **200** may be disposed between each subpixel SP**1**, SP**2**, SP**3** and SP**4**.

[0198] The side surface of the auxiliary electrode **200** may contact at least a portion of a first charge generation layer **342***a* or a second charge generation layer **342***b*, as described with reference to FIGS. **5** to **8**.

[0199] In addition, the auxiliary electrode **200** may be connected to the cathode electrode.

[0200] If the auxiliary electrode **200** is disposed between each of the subpixels as shown in FIG. **11**, the leakage current that may occur between adjacent subpixels can be removed through the auxiliary electrode **200**.

[0201] Therefore, the light emission of subpixels may be controlled independently, and the color gamut of subpixels may be improved.

[0202] Referring to FIG. **12**, a plurality of subpixels SP may include a red subpixel, a green subpixel, and a blue subpixel, respectively.

[0203] Here, a first subpixel SP**1** may be a red subpixel, a second subpixel SP**2** may be a green subpixel, and a third subpixel SP**3** may be a blue subpixel.

[0204] The auxiliary electrode **200** may be disposed on both sides of the second subpixel SP**2**. That is, the auxiliary electrode **200** may be disposed between the emission area EA of the second subpixel SP**2** and the emission area EA of the first subpixel SP**1** and between the emission area EA of the second subpixel SP**2** and the emission areas EA of the third subpixel SP**3**.

[0205] The auxiliary electrode **200** may not be disposed between the emission area EA of the first subpixel SP**1** and the emission area EA of the third subpixel SP**3**.

[0206] The side surface of the auxiliary electrode **200** may be in contact with at least a portion of the first charge generation layer **342***a* or the second charge generation layer **342***b*, as described with reference to FIGS. **5** to **8**, and the auxiliary electrode **200** may be connected to the cathode electrode.

[0207] Since the auxiliary electrode **200** is disposed between the first subpixel SP**1** and the second subpixel SP**2** and between the third subpixel SP**3** and the second subpixel SP**2**, the current leaked from the first subpixel SP**1** or the third subpixel SP**3** and flowing into the second subpixel SP**2** may be removed through the auxiliary electrode **200**.

[0208] In the case that the second subpixel SP**2** is a green subpixel, since the color filter transmittance of green light is higher than the color filter transmittance of light of other colors, even if the same current flows, the amount of light emitted from the green subpixel and passing through the color filter may be greater. That is, even if the same amount of current flows through each subpixel, the amount of light emitted from the green subpixel may be greater.

[0209] Therefore, if the auxiliary electrode **200** is disposed around the second subpixel SP**2**, it is possible to improve the problem of lowering the color gamut of the subpixels due to the emission of the undesired subpixels by the leakage current.

[0210] In addition, the auxiliary electrode **200** may be selectively disposed only around the second subpixel SP**2**, so that it is possible to prevent a decrease in the aperture ratio of the display area AA where the subpixels SP**2** are disposed.

[0211] The embodiments of the present disclosure described above are briefly described as follows.

[0212] According to an embodiment of the present disclosure, there may provide a display device including a substrate including a plurality of subpixels, each of the plurality of subpixels including an emission area, an overcoat layer on the substrate, an auxiliary electrode disposed between the emission areas of adjacent subpixels among the plurality of subpixels and disposed on the overcoat layer, and an organic layer disposed on the overcoat layer and the auxiliary electrode, including at least one charge generation layer, and at least a portion of the at least one charge generation layer contacting the auxiliary electrode.

[0213] In the display device according to an embodiment of the present disclosure, at least a portion of the at least one charge generation layer may be in contact with a line where an upper surface and a side surface of the auxiliary electrode meet.

[0214] In the display device according to an embodiment of the present disclosure, at least a portion of the at least one charge generation layer may be in contact with a side surface of the auxiliary electrode.

[0215] In the display device according to an embodiment of the present disclosure, a distance from a portion of the organic layer located on an upper surface of the auxiliary electrode to the substrate may be greater than a distance from a portion of the organic layer located on an upper surface of the overcoat layer to the substrate.

[0216] In the display device according to an embodiment of the present disclosure, the organic layer may further include at least one intermediate layer, and at least one intermediate layer may be disconnected around the auxiliary electrode.

[0217] In the display device according to an embodiment of the present disclosure, the at least one intermediate layer may be in contact with a side surface of the auxiliary electrode.

[0218] In the display device according to an embodiment of the present disclosure, the organic layer may include a first charge generation layer and a second charge generation layer located on the first charge generation layer, and at least a portion of the first charge generation layer may be in contact with the auxiliary electrode.

[0219] In the display device according to an embodiment of the present disclosure, the organic layer may include a first charge generation layer and a second charge generation layer located on the first charge generation layer, and at least a portion of the second charge generation layer is in contact with the auxiliary electrode.

[0220] In the display device according to an embodiment of the present disclosure, the first charge generation layer may be disconnected around the auxiliary electrode.

[0221] In the display device according to an embodiment of the present disclosure, the substrate may include a display area where the plurality of subpixels are disposed and a non-display area around the display area. The display device may further include a cathode electrode disposed separately from the auxiliary electrode in the display area and electrically connected to at least a portion of the auxiliary electrode in the non-display area.

[0222] In the display device according to an embodiment of the present disclosure, the plurality of subpixels may include a white subpixel, a red subpixel, a blue subpixel, and a green subpixel, and the auxiliary electrode may be disposed between emission areas of adjacent subpixels among the plurality of subpixels.

[0223] In the display device according to an embodiment of the present disclosure, the plurality of subpixels may include a white subpixel, a red subpixel, a blue subpixel, and a green subpixel, and the auxiliary electrode may be disposed between an emission area of the green subpixel and an emission area of the red subpixel, and/or between an emission area of the green subpixel and an emission area the blue subpixel.

[0224] In the display device according to an embodiment of the present disclosure, each of the plurality of subpixels may include an anode electrode, and a thickness of the auxiliary electrode may be different from a thickness of the anode electrode.

[0225] According to an embodiment of the present disclosure, there may provide a display device including a substrate including a plurality of subpixels, each of the plurality of subpixels including an emission area, an overcoat layer on the substrate, an auxiliary electrode disposed between emission areas of adjacent subpixels among the plurality of subpixels and disposed on the overcoat layer, and an organic layer disposed on the overcoat layer and the auxiliary electrode, at least a portion of the organic layer contacting a side surface of the auxiliary electrode.

[0226] In the display device according to an embodiment of the present disclosure, the organic layer may include a first charge generation layer and a second charge generation layer located on the first charge generation layer, and at least a portion of the first charge generation layer may be in contact with the auxiliary electrode.

[0227] In the display device according to an embodiment of the present disclosure, the organic layer may include a first charge generation layer and a second charge generation layer located on the first charge generation layer, and at least a portion of the second charge generation layer may be in contact with the auxiliary electrode.

[0228] In the display device according to an embodiment of the present disclosure, the substrate may include a display area where the plurality of subpixels are disposed and a non-display area around the display area. The display device may further include a cathode electrode disposed separately from the auxiliary electrode in the display area and electrically connected to at least a portion of the auxiliary electrode in the non-display area.

[0229] In the display device according to an embodiment of the present disclosure, the plurality of subpixels may include a white subpixel, a red subpixel, a blue subpixel, and a green subpixel, and the auxiliary electrode may be disposed between emission areas of adjacent subpixels among the plurality of subpixels.

[0230] In the display device according to an embodiment of the present disclosure, the plurality of subpixels may include a white subpixel, a red subpixel, a blue subpixel, and a green subpixel, and the auxiliary electrode may be disposed between an emission area of the green subpixel and an emission area of the red subpixel, and/or between an emission area of the green subpixel and an emission area the blue subpixel.

[0231] The above description has been presented to enable any person skilled in the art to make and use the technical idea of the present disclosure, and has been provided in the context of a particular application and its requirements. Various modifications, additions and substitutions to the described embodiments will be readily apparent to those skilled in the art, and the general principles defined herein may be applied to other embodiments and applications without departing from the spirit and scope of the present disclosure. The above description and the accompanying drawings provide an example of the technical idea of the present disclosure for illustrative purposes only. That is, the disclosed embodiments are intended to illustrate the scope of the technical idea of the present disclosure.

[0232] The various embodiments described above can be combined to provide further embodiments. All of the U.S. patents, U.S. patent application publications, U.S. patent applications, foreign patents, foreign patent applications and non-patent publications referred to in this specification and/or listed in the Application Data Sheet are incorporated herein by reference, in their entirety. Aspects of the embodiments can be modified, if necessary to employ concepts of the various patents, applications and publications to provide yet further embodiments.

[0233] These and other changes can be made to the embodiments in light of the above-detailed description. In general, in the following claims, the terms used should not be construed to limit the claims to the specific embodiments disclosed in the specification and the claims, but should be construed to include all possible embodiments along with the full scope of equivalents to which such claims are entitled. Accordingly, the claims are not limited by the disclosure.

1. A display device comprising:

a substrate including a plurality of subpixels, each of the plurality of subpixels including an emission area;

an overcoat layer on the substrate;

an auxiliary electrode disposed between the emission areas of adjacent subpixels among the plurality of subpixels, the auxiliary electrode on the overcoat layer; and

an organic layer on the overcoat layer and the auxiliary electrode, the organic layer including at least one charge generation layer, and

wherein at least a portion of the at least one charge generation layer contacts the auxiliary electrode.

2. The display device of claim **1**, wherein at least a portion of the at least one charge generation layer is in contact with a line where an upper surface and a side surface of the auxiliary electrode meet.

3. The display device of claim **1**, wherein at least a portion of the at least one charge generation layer is in contact with a side surface of the auxiliary electrode.

4. The display device of claim **1**, wherein a distance from a portion of the organic layer located on an upper surface of the auxiliary electrode to the substrate is greater than a distance from a portion of the organic layer located on an upper surface of the overcoat layer to the substrate.

5. The display device of claim **1**, wherein the organic layer further includes at least one intermediate layer,

wherein the at least one intermediate layer is disconnected around the auxiliary electrode.

6. The display device of claim **5**, wherein the at least one intermediate layer is in contact with a side surface of the auxiliary electrode.

7. The display device of claim **1**, wherein the organic layer includes a first charge generation layer and a second charge generation layer on the first charge generation layer,

wherein at least a portion of the first charge generation layer is in contact with the auxiliary electrode.

8. The display device of claim **1**, wherein the organic layer includes a first charge generation layer and a second charge generation layer on the first charge generation layer,

wherein at least a portion of the second charge generation layer is in contact with the auxiliary electrode.

9. The display device of claim **8**, wherein the first charge generation layer is disconnected around the auxiliary electrode.

10. The display device of claim **1**, wherein the substrate includes a display area where the plurality of subpixels is disposed and a non-display area around the display area,

wherein the display device further includes a cathode electrode disposed separately from the auxiliary electrode in the display area and electrically connected to at least a portion of the auxiliary electrode in the non-display area.

11. The display device of claim **1**, wherein the plurality of subpixels includes a white subpixel, a red subpixel, a blue subpixel, and a green subpixel,

wherein the auxiliary electrode is disposed between emission areas of adjacent subpixels among the plurality of subpixels.

12. The display device of claim **1**, wherein the plurality of subpixels includes a red subpixel, a blue subpixel, and a green subpixel,

wherein the auxiliary electrode is disposed between an emission area of the green subpixel and an emission area of the red subpixel, and/or between an emission area of the green subpixel and an emission area the blue subpixel.

13. The display device of claim **1**, wherein each of the plurality of subpixels includes an anode electrode,

wherein a thickness of the auxiliary electrode is different from a thickness of the anode electrode.

14. A display device comprising:

a substrate including a plurality of subpixels, each of the plurality of subpixels including an emission area;

an overcoat layer on the substrate;

an auxiliary electrode disposed between emission areas of adjacent subpixels among the plurality of subpixels, the auxiliary electrode on the overcoat layer; and

an organic layer on the overcoat layer and the auxiliary electrode, at least a portion of the organic layer contacting a side surface of the auxiliary electrode.

15. The display device of claim **14**, wherein the organic layer includes a first charge generation layer and a second charge generation layer on the first charge generation layer,

wherein at least a portion of the first charge generation layer is in contact with the auxiliary electrode.

16. The display device of claim **14**, wherein the organic layer includes a first charge generation layer and a second charge generation layer on the first charge generation layer,

wherein at least a portion of the second charge generation layer is in contact with the auxiliary electrode.

17. The display device of claim **14**, wherein the substrate includes a display area where the plurality of subpixels is disposed and a non-display area around the display area,

wherein the substrate further includes a cathode electrode disposed separately from the auxiliary electrode in the display area and electrically connected to at least a portion of the auxiliary electrode in the non-display area.

18. The display device of claim **14**, wherein the plurality of subpixels includes a white subpixel, a red subpixel, a blue subpixel, and a green subpixel, and

wherein the auxiliary electrode is disposed between emission areas of adjacent subpixels among the plurality of subpixels.

19. The display device of claim **14**, wherein the plurality of subpixels includes a red subpixel, a blue subpixel, and a green subpixel,

wherein the auxiliary electrode is disposed between an emission area of the green subpixel and an emission area of the red subpixel, and/or between an emission area of the green subpixel and an emission area the blue subpixel.

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