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Ahn

(54) **ORGANIC LIGHT EMITTING DIODE DISPLAY**

(71) Applicant: **Samsung Display Co., Ltd.**, Yongin-City (KR)

(72) Inventor: **Seon Hong Ahn**, Suwon-si (KR)

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(57) **ABSTRACT**

An exemplary embodiment provides an organic light emitting diode display, including: a first substrate; a switching and driving thin film transistor disposed on the first substrate; a pixel electrode connected to the driving thin film transistor; a pixel defined layer disposed on an edge portion of the pixel electrode and the planarization layer and including an opening through which the pixel electrode is exposed; an organic emission layer disposed on the pixel electrode within the opening; a common electrode formed on the organic emission layer, wherein the pixel defined layer includes at least one of a thermo-chromic pigment, an organic black pigment, and a dye and a base resin.

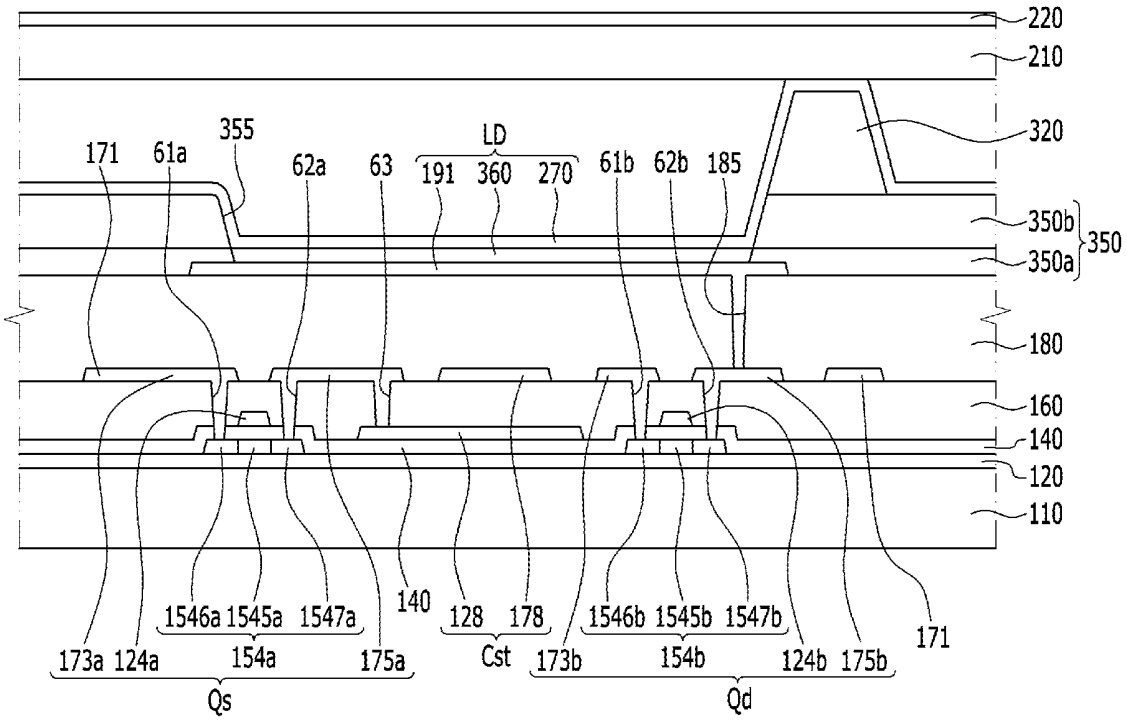


FIG. 1

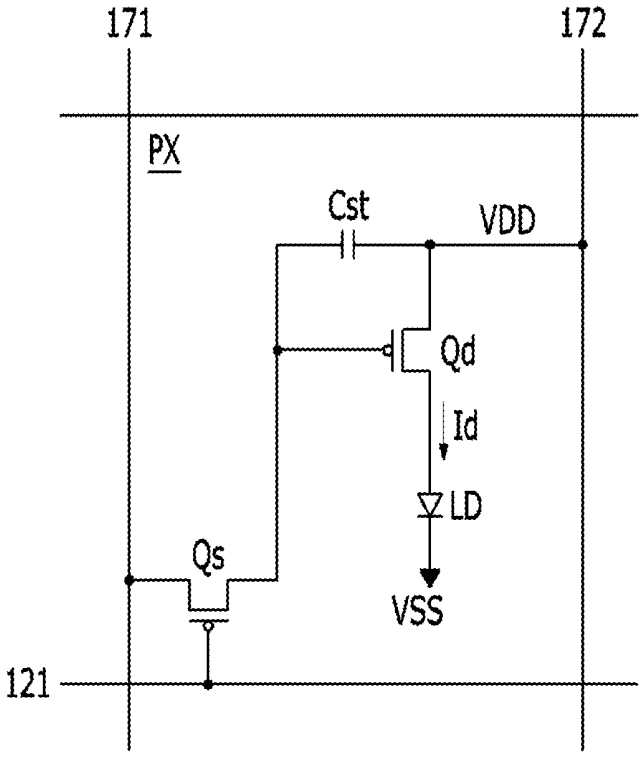


FIG. 2

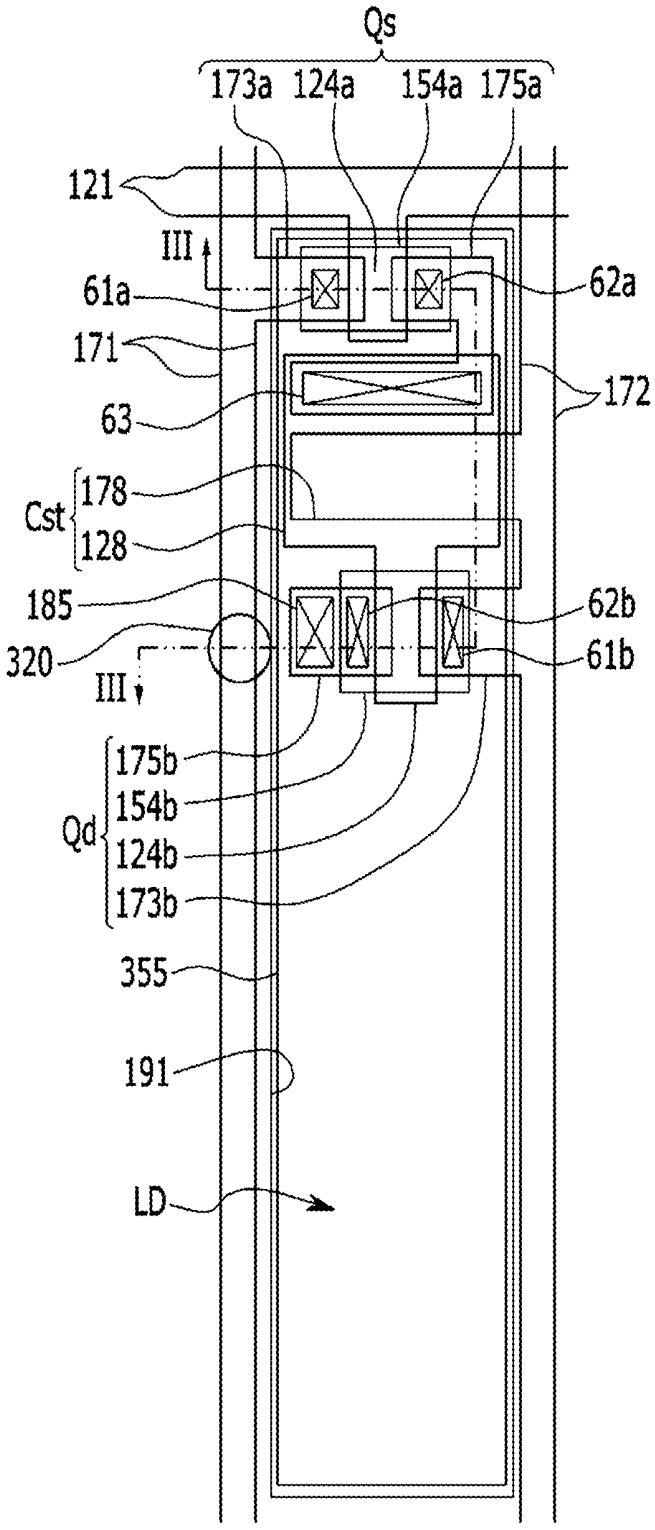
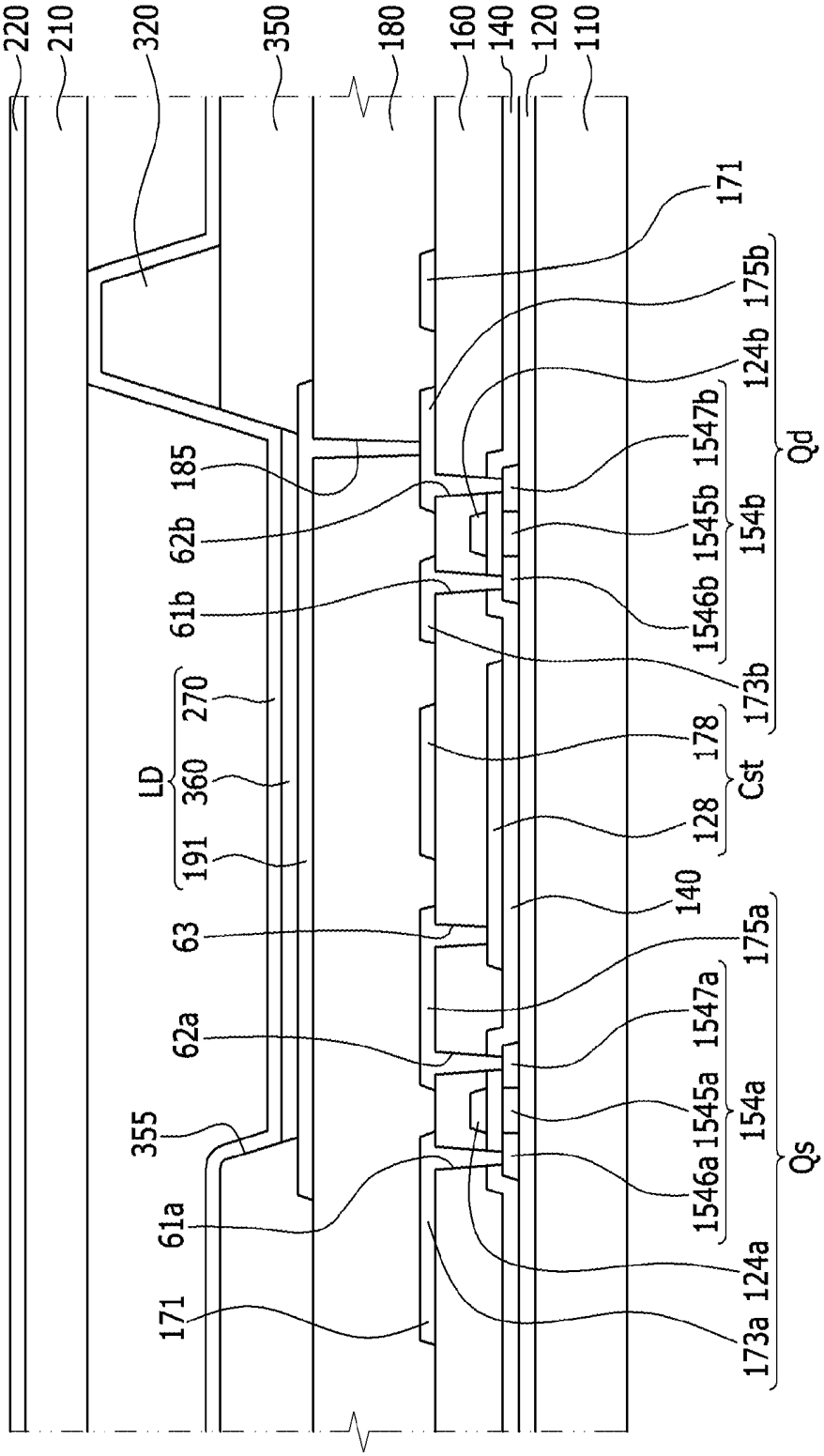

Qs
173a
124a
154a
175a
121
III
61a
62a
171
172
63
Cst
178
128
185
62b
320
61b
III
175b
154b
Qd
124b
173b
355
191
LD

FIG. 3


220
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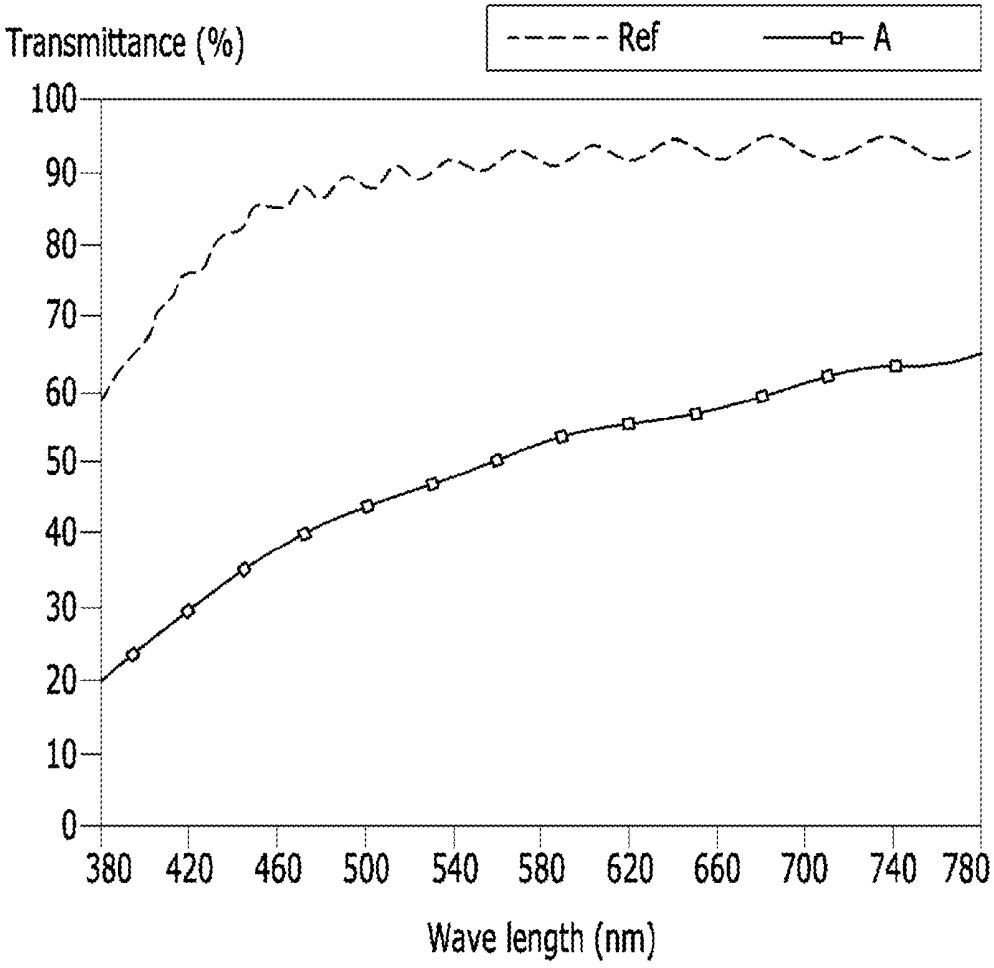
160
140
120
110
171
175b
124b
1547b
185
62b
1545b
154b
Qd
61b
1546b
270
173b
LD
360
178
Cst
191
128
140
63
175a
62a
1547a
355
1545a
154a
Qs
61a
1546a
171
124a
173a

FIG. 4


Transmittance (%)
Ref
A
100
90
80
70
60
50
40
30
20
10
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380
420
460
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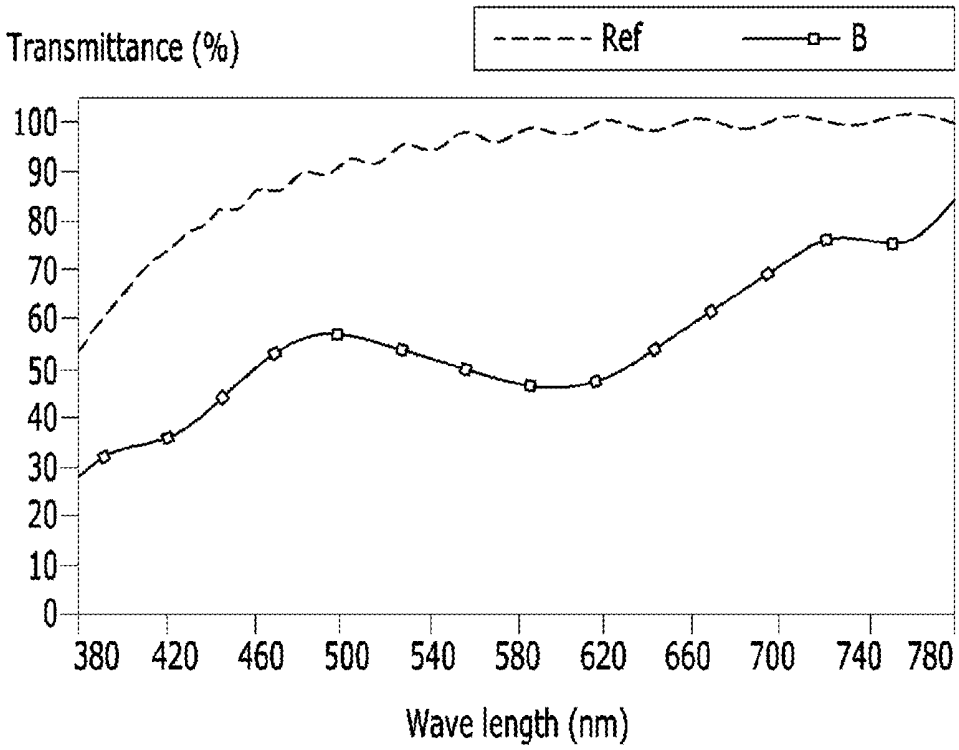
540
580
620
660
700
740
780
Wave length (nm)

FIG. 5


Transmittance (%)
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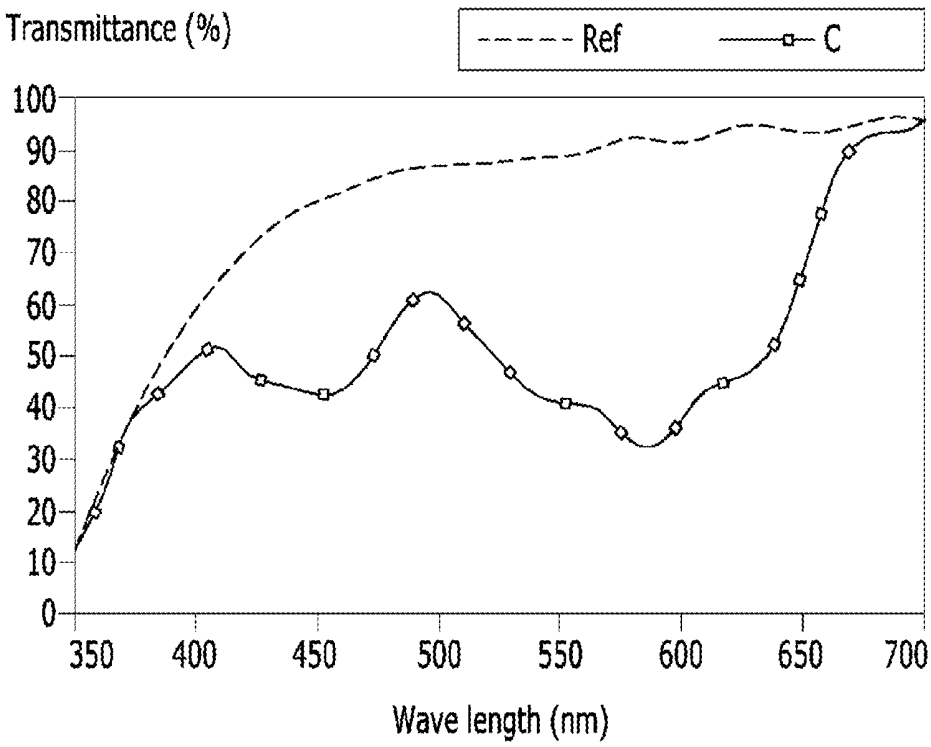
Wave length (nm)

FIG. 6


Transmittance (%)
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80
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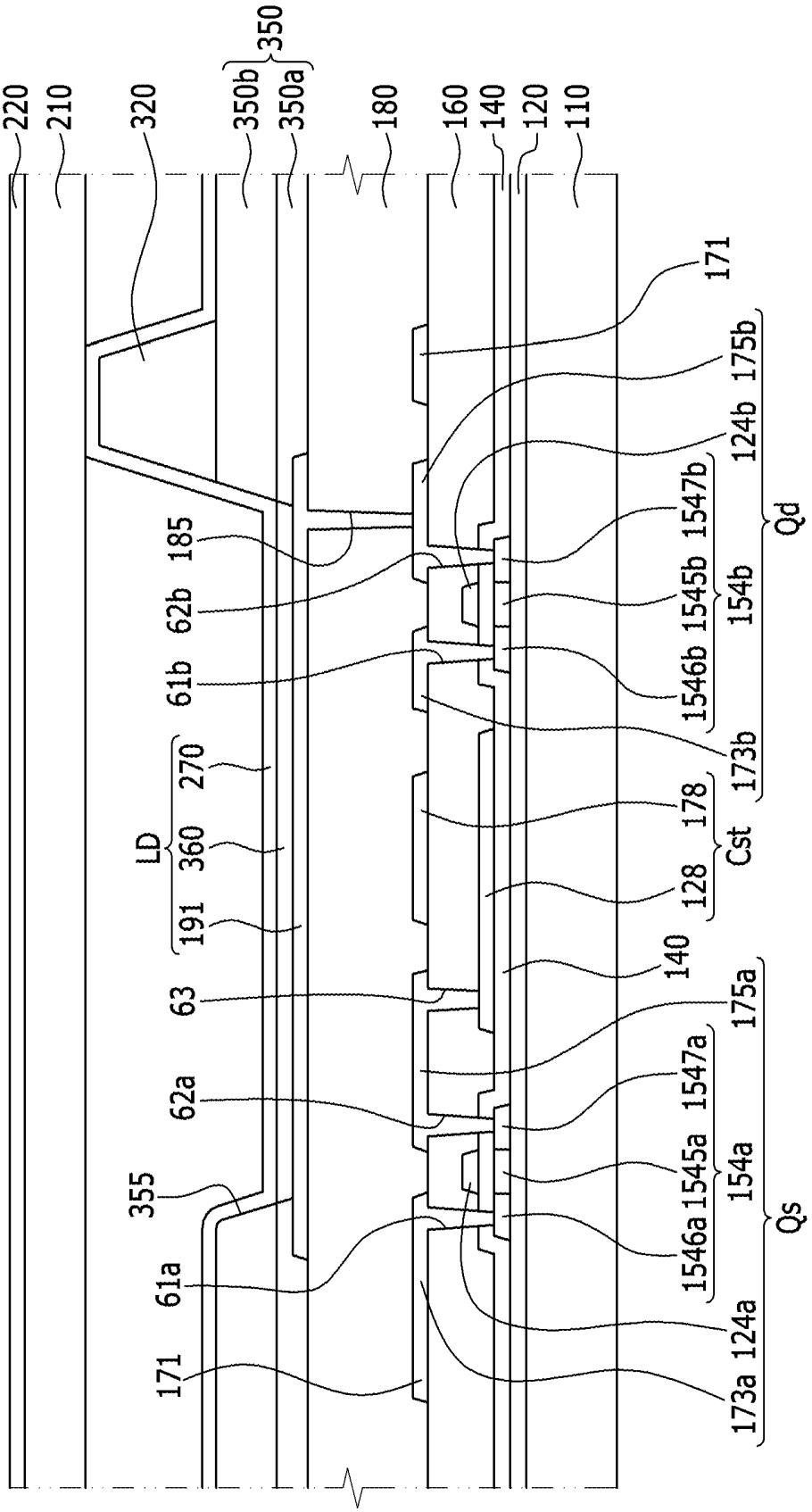
550
600
650
700
Wave length (nm)

FIG. 7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350b
350a
350
180
160
140
120
110
171
175b
124b
1547b
1545b
154b
1546b
Qd
185
62b
61b
270
LD
360
191
63
62a
355
61a
171
173b
178
Cst
128
140
175a
1547a
1545a
154a
1546a
124a
173a
Qs

ORGANIC LIGHT EMITTING DIODE DISPLAY

CROSS-REFERENCE TO RELATED APPLICATION

[0001] Any and all applications for which a foreign or domestic priority claim is identified in the Application Data Sheet as filed with the present application are hereby incorporated by reference under 37 CFR 1.57.

[0002] This application claims priority to and the benefit of Korean Patent Application No. 10-2015-0012145 filed in the Korean Intellectual Property Office on Jan. 26, 2015, the entire contents of which are incorporated herein by reference.

BACKGROUND

[0003] 1. Field

[0004] The present disclosure relates to an organic light emitting diode (OLED) display.

[0005] 2. Description of the Related Technology

[0006] An OLED display includes two electrodes and an organic emission layer disposed therebetween and forms excitons by combining electrons injected from one electrode with holes injected from another electrode at the organic emission layer and emits light by allowing the excitons to emit energy. The organic light emitting device displays a predetermined image using the emission.

[0007] The OLED display has self-luminance characteristics and unlike a liquid crystal display, does not need a separate light source and therefore may have a reduced thickness and weight. Further, the OLED display demonstrates high quality characteristics, such as low power consumption, high luminance, high response speed, and therefore has drawn much attention as a next-generation display device.

[0008] The OLED display includes an organic light emitting diode, in which the organic light emitting diode includes an anode, a cathode, and an organic emission layer which is positioned between the anode and the cathode.

[0009] Meanwhile, external light is incident on the OLED display and the incident light may be reflected from the anode or the cathode. In this case, the reflected light acts as noise and a reduction in a contrast ratio of the OLED display occurs, which leads to reduction in an image quality.

SUMMARY

[0010] The present disclosure has been made in an effort to provide an OLED display capable of preventing light incident on a side of a wiring from the outside from being reflected.

[0011] An exemplary embodiment provides an OLED display, including: a first substrate; a switching and driving thin film transistor disposed on the first substrate; a pixel electrode connected to the driving thin film transistor; a pixel defined layer disposed on an edge portion of the pixel electrode and the planarization layer and including an opening through which the pixel electrode is exposed; an organic emission layer disposed on the pixel electrode within the opening; a common electrode formed on the organic emission layer, wherein the pixel defined layer includes at least one of a thermo-chromic pigment, an organic black pigment, a dye, and a base resin.

[0012] The pixel defined layer may have a dielectric constant of 5 or less and transmittance of about 0% to about 77%.

[0013] The base resin may include at least one of photosensitive polyimide, photosensitive polybenzoxazole, and photosensitive polyacrylate.

[0014] The OLED display may further include: a spacer disposed on the pixel defined layer.

[0015] The spacer and the pixel defined layer may be made of the same material.

[0016] The planarization layer and the pixel defined layer may be made of the same material.

[0017] The pixel defined layer may include a first pixel defined layer and a second pixel defined layer which is disposed on the first pixel defined layer.

[0018] A thickness of the first pixel defined layer may range from 1.5 μm to 3 μm.

[0019] The first pixel defined layer may have a dielectric constant of **5** or less and transmittance of about 0% to about 77%.

[0020] The first pixel defined layer may include at least one of the thermo-chromic pigment, the organic black pigment, the dye, and the base resin.

[0021] The base resin may include at least one of photosensitive polyimide, photosensitive polybenzoxazole, and photosensitive polyacrylate.

[0022] The second pixel defined layer may include at least one of the photosensitive polyimide, the photosensitive polybenzoxazole, and the photosensitive polyacrylate.

[0023] The spacer and the second pixel defined layer may be made of the same material.

[0024] The planarization layer and the first pixel defined layer may be made of the same material.

[0025] According to an exemplary embodiment, it is possible to prevent the light incident from the outside from being reflected by adding at least one of the thermo-chromic pigment, the organic black pigment, and the dye to the pixel defined layer

[0026] Therefore, it is possible to prevent the deterioration in the image quality of the OLED display.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] FIG. **1** is an equivalent circuit diagram of one pixel of an OLED display according to an exemplary embodiment.

[0028] FIG. **2** is a layout view of one pixel of the OLED display according to the exemplary embodiment.

[0029] FIG. **3** is a cross-sectional view of the OLED display of FIG. **2** taken along the line III-III.

[0030] FIG. **4** is a graph illustrating transmittance depending on a wavelength of a first pixel defined layer including a base resin and a thermo-chromic pigment and a wavelength of a layer including only the base resin.

[0031] FIG. **5** is a graph illustrating transmittance depending on a wavelength of a first pixel defined layer including a base resin and an organic black pigment and a wavelength of a layer including only the base resin.

[0032] FIG. **6** is a graph illustrating transmittance depending on a wavelength of a first pixel defined layer including a base resin and a dye and a wavelength of a layer including only the base resin.

[0033] FIG. **7** is a diagram illustrating an example of a section of an OLED display according to another exemplary embodiment.

DETAILED DESCRIPTION

[0034] As the disclosure allows for various changes and numerous embodiments, particular embodiments will be illustrated in the drawings and described in detail in the written description. However, this is not intended to limit the present disclosure to particular modes of practice, and it is to be appreciated that all changes, equivalents, and substitutes that do not depart from the spirit and technical scope of the present disclosure are encompassed in the present disclosure. As used herein, the term "and/or" includes any and all combinations of one or more of the associated listed items.

[0035] Embodiments of the present disclosure will be described below in more detail with reference to the accompanying drawings. Those components that are the same or are in correspondence are rendered the same reference numeral regardless of the figure number, and redundant explanations are omitted.

[0036] It will be understood that although the terms "first", "second", etc. may be used herein to describe various components, these components should not be limited by these terms. These components are only used to distinguish one component from another.

[0037] As used herein, the singular forms "a," "an" and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise.

[0038] It will be further understood that the terms "comprises" and/or "comprising" used herein specify the presence of stated features or components, but do not preclude the presence or addition of one or more other features or components.

[0039] In the drawings, the thickness of layers, films, panels, regions, etc., are exaggerated for explanation. In other words, since sizes and thicknesses of components in the drawings are arbitrarily illustrated for convenience of explanation, the following embodiments are not limited thereto. Like reference numerals designate like elements throughout the specification. It will be understood that when an element such as a layer, film, region, or substrate is referred to as being "on" another element, it can be directly on the other element or intervening elements may also be present. In contrast, when an element is referred to as being "directly on" another element, there are no intervening elements present. Further, throughout the specification, the word "on plane" means viewing an object portion from the top and the word "on section" means viewing a section of an object portion, which is vertically taken along, from a side.

[0040] Next, the organic light emitting device according to an exemplary embodiment will be described with reference to FIGS. **1** to **3**.

[0041] FIG. **1** is an equivalent circuit diagram of one pixel of an OLED display according to an exemplary embodiment. FIG. **2** is a layout view of one pixel of the OLED display according to the exemplary embodiment. FIG. **3** is a cross-sectional view of the OLED display of FIG. **2** taken along the line III-III.

[0042] Referring to FIG. **1**, the OLED display according to the exemplary embodiment includes a plurality of signal lines **121**, **171**, and **172** and pixels PXs which are connected to the signal lines and are arranged in approximately a matrix form.

[0043] The signal line includes a gate line **121** which transfers a gate signal (or scan signal), a data line **171** which transfers a data signal, and a driving voltage line **172** which transfers a driving voltage VDD.

[0044] The gate line **121** approximately extends in a row direction and is approximately parallel with each other and the data line **171** and the driving voltage line **172** approximately extend in a column direction and are approximately parallel with each other.

[0045] The pixel PX includes a switching thin film transistor Qs, a driving thin film transistor Qd, a storage capacitor Cst, and an organic light emitting diode LD.

[0046] The switching thin film transistor Qs includes a control terminal, an input terminal, and an output terminal, in which the control terminal is connected to the gate line **121**, the input terminal is connected to the data line **171**, and the output terminal is connected to the driving thin film transistor Qd. The switching thin film transistor Qs transfers the data signal applied to the data line **171** to the driving thin film transistor Qd in response to the gate signal applied to the gate line **121**.

[0047] The driving thin film transistor Qd also have a control terminal, an input terminal, and an output terminal, in which the control terminal is connected to the switching thin film transistor Qs, the input terminal is connected to the driving voltage line **172**, and the output terminal is connected to the organic light emitting diode LD. The driving thin film transistor Qd transfers an output current Id of which a magnitude varies depending on a voltage applied between the control terminal and the output terminal.

[0048] The storage capacitor Cst is connected between the control terminal and the input terminal of the driving thin film transistor Qd. The storage capacitor Cst charges the data signal applied to the control terminal of the driving thin film transistor Qd and maintains the charged data signal even after the switching thin film transistor Qs is turned off.

[0049] The organic light emitting diode LD has an anode connected to the output terminal of the driving thin film transistor Qd and a cathode connected to a common voltage Vss. The organic light emitting diode LD displays an image by emitting light of which the strength varies depending on the output current Id of the driving thin film transistor Qd.

[0050] The switching thin film transistor Qs and the driving thin film transistor Qd may be an n-channel field effect transistor (FET) or a p channel field effect transistor. Further, a connection relationship among the switching and driving thin film transistors Qs and Qd, the storage capacitor Cst, and the organic light emitting diode LD may be changed.

[0051] Referring to FIGS. **2** and **3**, the OLED display according to the exemplary embodiment includes a plurality of thin film structures which are disposed on the substrate **110**. Hereinafter, the plurality of thin film structures will be described in detail.

[0052] A buffer layer **120** is formed on the substrate **110**. The substrate **110** may be a transparent insulating substrate which is made of glass, quartz, ceramic, plastic, or the like. Further, the substrate **110** may be a metallic substrate made of stainless steel, and the like.

[0053] The buffer layer **120** may have a single layer structure made of silicon nitride (SiNx) or a double layer structure in which silicon nitride (SiNx) and silicon oxide SiO_2 are stacked. The buffer layer **120** serves to planarize a surface while preventing permeation of unnecessary components, such as impurities and moisture.

[0054] The switching semiconductor layer **154***a* and the driving semiconductor layer **154***b* are disposed on the buffer layer **120**, being spaced apart from each other. The switching semiconductor layer **154***a* is made of polycrystalline silicon

and includes a switching channel region **1545***a*, a switching source region **1546***a*, and a switching drain region **1547***a*. The driving semiconductor layer **154***b* is made of polycrystalline silicon and includes a driving channel region **1545***b*, a driving source region **1546***b*, and a driving drain region **1547***b*. Here, the switching source region **1546***a* and the switching drain region **1547***a* are disposed at both sides of the switching channel region **1545***a* and the driving source region **1546***b* and the driving drain region **1547***b* are disposed at both sides of the driving channel region **1545***b*.

[0055] The switching and driving channel region **1545***a* and **1545***b* are made of polycrystalline silicon which is not doped with an impurity, that is, an intrinsic semiconductor and the switching and driving source regions **1546***a* and **1546***b* and the switching and driving drain regions **1547***a* and the **1547***b* made of polycrystalline silicon which is doped with a conductive impurity, that is an impurity semiconductor.

[0056] The gate insulating layer **140** is disposed on the buffer layer **120**, the switching semiconductor layer **154***a*, and the driving semiconductor layer **154***b*. The gate insulating layer **140** may be a single layer or a plurality of layers including at least one of silicon nitride and silicon oxide.

[0057] The gate line **121** and the first storage plate of electricity **128** are disposed on the gate insulating layer **140**.

[0058] The gate line **121** extends in a horizontal direction to transfer the gate signal and includes a switching gate electrode **124***a* which protrudes from the gate line **121** to the switching semiconductor layer **154***a*. Here, the switching gate electrode **124***a* overlaps the switching channel region **1545***a*.

[0059] The first storage plate of electricity **128** includes the driving gate electrode **124***b* which protrudes from the first storage plate of electricity **128** to the driving semiconductor layer **154***b*. Here, the driving gate electrode **124***b* overlaps the driving channel region **1545***b*.

[0060] The interlayer insulating layer **160** is disposed on the gate line **121**, the first storage plate of electricity **128**, and the buffer layer **120**. The interlayer insulating layer **160** may be a single layer or a plurality of layers including at least one of silicon nitride and silicon oxide.

[0061] The interlayer insulating layer **160** and the gate insulating layer **140** are provided with a switching source exposure hole **61***a* and a switching drain exposure hole **62***a* through which the switching source region **1546***a* and the switching drain region **1547***a* are each exposed. Further, the interlayer insulating layer **160** and the gate insulating layer **140** are provided with a driving source exposure hole **61***b* and a driving drain exposure hole **62***b* through which the driving source region **1546***b* and the driving drain region **1547***b* are each exposed. Further, the interlayer insulating layer **160** is provided with a first contact hole **63** through which a portion of the first storage plate of electricity **128** is exposed.

[0062] The data line **171**, the driving voltage line **172**, the switching drain electrode **175***a*, and the driving drain electrode **175***b* are disposed on the interlayer insulating layer **160**.

[0063] The data line **171** includes a switching source electrode **173***a* which transfers the data signal, extends in an intersecting direction with the gate line **121**, and protrudes toward the switching semiconductor layer **154***a* from the data line **171**.

[0064] The driving voltage line **172** transfers the driving voltage, is separated from the data line **171**, and extends in the same direction as the data line **171**. The driving voltage line **172** includes the driving source electrode **173***b* which protrudes toward the driving semiconductor layer **154***b* from the driving voltage line **172** and a second storage plate of electricity **178** which protrudes from the driving voltage line **172** to overlap the first storage plate of electricity **128**. Here, the first storage plate of electricity **128** and the second storage plate of electricity **178** form the storage capacitor Cst using the interlayer insulating layer **160** as a dielectric material.

[0065] The switching drain electrode **175***a* faces the switching source electrode **173***a* and the driving drain electrode **175***b* faces the driving source electrode **173***b*.

[0066] The switching source electrode **173***a* and the switching drain electrode **175***a* are each connected to the switching source region **1546***a* and the switching drain region **1547***a* through the switching source exposure hole **61***a* and the switching drain exposure hole **62***a*. Further, the switching drain electrode **175***a* is electrically connected to the first storage plate of electricity **128** and the driving gate electrode **124***b* through the first contact hole **63** which extends to be formed in the interlayer insulating layer **160**.

[0067] The driving source electrode **173***b* and the driving drain electrode **175***b* are each connected to the driving source region **1546***b* and the driving drain region **1547***b* through the driving source exposure hole **61***b* and the driving drain exposure hole **62***b*.

[0068] The switching semiconductor layer **154***a*, the switching gate electrode **124***a*, the switching source electrode **173***a*, and the switching drain electrode **175***a* form the switching thin film transistor Qs and the driving semiconductor layer **154***b*, the driving gate electrode **124***b*, the driving source electrode **173***b*, and the driving drain electrode **175***b* form the driving thin film transistor Qd.

[0069] A passivation layer **180** is disposed on the interlayer insulating layer **160**, the data line **171**, the driving voltage line **172**, the switching drain electrode **175***a*, and the driving drain electrode **175***b*. The planarization layer **180** may be made of an organic material and an upper surface thereof is planarized. The passivation layer **180** is provided with a second contact hole **185** through which the driving drain electrode **175***b* is exposed.

[0070] The organic light emitting diode LD and the pixel defined layer **350** are disposed on the passivation layer **180**.

[0071] The organic light emitting diode LD includes a pixel electrode **191**, an organic emission layer **360**, and a common electrode **270**.

[0072] The pixel electrode **191** is disposed on the passivation layer **180** and is electrically connected to the driving drain electrode **175***b* of the driving thin film transistor Qd through the second contact hole **185** formed on the planarization layer **180**. The pixel electrode **191** is an anode of the organic light emitting diode LD.

[0073] The pixel electrode **191** may be made of a reflective metal such as lithium (Li), calcium (Ca), lithium fluoride/calcium (LiF/Ca), lithium fluoride/aluminum (LiF/Al), aluminum (Al), silver (Ag), magnesium (Mg), and gold (Au).

[0074] The pixel defined layer **350** is disposed on an edge portion of the pixel electrode **191** and the planarization layer **180**, and comprises an opening **355** exposing the pixel electrode **191**. That is, the edge portion of the pixel electrode **191** is positioned beneath the pixel defined layer **350**.

[0075] The pixel defined layer **350** has a dielectric constant of 5 or less and transmittance of 0 to 70%. The pixel defined layer **350** may reduce the incident quantity of light from the outside. Therefore, the light from the outside which is

reflected by the pixel electrode **191** which is positioned beneath the pixel defined layer **350** may be reduced. Therefore, it is possible to prevent an image quality of the OLED display from deteriorating.

[0076] The pixel defined layer **350** includes a base resin and a thermo-chromic pigment. The base resin includes photosensitive polyimide (PI), photosensitive polybenzoxazole, or photosensitive polyacrylate. The pixel defined layer **350** is formed by applying, exposing, and hardening a mixture of the base resin and the thermo-chromic pigment and has a black color due to a chemical reaction of an electron acceptor with an electron donor included in the thermo-chromic pigment by temperature at the time of hardening. Therefore, the pixel defined layer **350** has low transmittance.

[0077] The pixel defined layer **350** includes a base resin and a thermo-chromic pigment. The base resin includes photosensitive polyimide (PI), photosensitive polybenzoxazole, or photosensitive polyacrylate.

[0078] Further, the pixel defined layer **350** may include a silver base resin and an organic black pigment.

[0079] Further, the pixel defined layer **350** may include the silver base resin and a dye. Here, the dye indicates a generally used dye.

[0080] Meanwhile, the planarization layer **180** may be made of the same material as that of the pixel defined layer **350**. In this case, it is possible to reduce the change of material at the time of the manufacturing process.

[0081] A spacer **320** is disposed on the pixel defined layer **350**. The spacer **320** and the pixel defined layer **350** may be made of the same material. That is, the spacer **320** and the pixel defined layer **350** may be formed using the same mask.

[0082] The organic emission layer **360** is disposed on the pixel electrode **191** within the opening **355** of the pixel defined layer **350**.

[0083] The organic emission layer **360** is formed of a plurality of layers which include at least one of a light emitting layer, a hole-injection layer (HIL), a hole-transporting layer (HTL), an electron-transporting layer (ETL), and an electron-injection layer (EIL). When the organic emission layer **360** includes both of them, the hole injection layer is disposed on the pixel electrode **191** which is the anode and the hole transport layer, the light emitting layer, the electron transport layer, and the electron injection layer may be stacked thereon.

[0084] The organic emission layer **360** may include a red organic emission layer which emits red light, a green organic emission layer which emits green light, and a blue organic emission layer which emits blue light, in which the red organic emission layer, the green organic emission layer, and the blue organic emission layer are each formed in a red pixel, a green pixel, and a blue pixel to implement a color image.

[0085] Further, the organic emission layer **360** may implement the color image by stacking the red organic emission layer, the green organic emission layer, and the blue organic emission layer in all of the red pixel, the green pixel, and the blue pixel and forming a red filter, a green filter, and a blue filter for each pixel. As another example, the color image may be implemented by forming a white organic emission layer which emits white light in all of the red pixel, the green pixel, and the blue pixel and forming the red filter, the green filter, and the blue filter for each pixel. At the time of implementing the color image using the white organic emission layer and the color filters, there is no need to use a deposition mask for depositing the red organic emission layer, the green organic emission layer, and the blue organic emission layer on each pixel, that is, the red pixel, the green pixel, and the blue pixel.

[0086] The white organic emission layer described in another example may be formed of a single organic emission layer and may be configured to emit white light by stacking the plurality of organic emission layers. For example, the white organic emission layer may also include a configuration to emit white light by combining at least one yellow organic emission layer with at least one blue organic emission layer, a configuration to emit white light by combining at least one cyan organic emission layer with at least one red organic emission layer, and a configuration to emit white light by combining at least one magenta organic emission layer with at least one green organic emission layer, and the like.

[0087] The common electrode **270** is disposed on the pixel defined layer **350**, the spacer **320**, and the organic emission layer **360**. The common electrode **270** may be made of transparent conductive materials, such as ITO, IZO, ZnO or In_2O_3. The common electrode **270** is a cathode of the organic light emitting diode LD.

[0088] The second substrate **210** is disposed on the spacer **320**. The second substrate **210** is bonded to the first substrate **110** by a sealant (not illustrated) and serves as an encapsulation substrate. In this case, the spacer **320** serves to maintain an interval between the first substrate **110** and second substrate **210**.

[0089] A polarizer **220** is formed on the second substrate **210**. The polarizer **220** polarizes light emitted from the organic light emitting diode LD.

[0090] Next, characteristics of the first pixel defined layer according to the exemplary embodiment will be described in detail with reference to FIGS. **4** to **6**.

[0091] FIG. **4** is a graph illustrating transmittance depending on a wavelength of a first pixel defined layer including a base resin and a thermo-chromic pigment and a wavelength of a layer including only the base resin.

[0092] It may be appreciated from FIG. **4** that the transmittance of the first pixel defined layer including the base resin and the thermo-chromic pigment is much more reduced than that of the layer including only the base resin.

[0093] FIG. **5** is a graph illustrating transmittance depending on a wavelength of a first pixel defined layer including a base resin and an organic black pigment and a wavelength of a layer including only the base resin.

[0094] It may be appreciated from FIG. **5** that the transmittance of the first pixel defined layer including the base resin and the organic black pigment is much more reduced than that of the layer including only the base resin.

[0095] FIG. **6** is a graph illustrating transmittance depending on a wavelength of a first pixel defined layer including a base resin and a dye and a wavelength of a layer including only the base resin.

[0096] It may be appreciated from FIG. **6** that the transmittance of the first pixel defined layer including the base resin and the dye is much more reduced than that of the layer including only the base resin.

[0097] Next, an OLED display according to another exemplary embodiment will be described with reference to FIG. **7**.

[0098] FIG. **7** is a diagram illustrating an example of a section of an OLED display according to another exemplary embodiment.

[0099] Referring to FIG. **7**, the OLED display according to the exemplary embodiment has the same configuration as the OLED display illustrated in FIG. **2**, except for the configura-

tion of the pixel defined layer and the spacer. Therefore, the description of the same configuration will be omitted.

[0100] The pixel defined layer **350** of the OLED display illustrated in FIG. **7** is configured of two layers, unlike the configuration of the pixel defined layer **350** of the OLED display illustrated in FIG. **2**. The pixel defined layer **350** is provided with an opening **355** through which the pixel electrode **191** is exposed.

[0101] The pixel defined layer **350** includes a first pixel defined layer **350***a* and a second pixel defined layer **350***b* which is disposed on the first pixel defined layer **350***a*.

[0102] The first pixel defined layer **350***a* is disposed on an edge portion of the pixel electrode **191** and the passivation layer **180**. The edge portion of the pixel electrode **191** is positioned beneath the first pixel defined layer **350***a*.

[0103] The first pixel defined layer **350***a* has a dielectric constant of 5 or less, transmittance of 0% to 70%, and a thickness of 1.5 μm to 3 μm. The first pixel defined layer **350***a* may reduce the incident quantity of light from the outside. Therefore, the light from the outside which is reflected by the pixel electrode **191** which is positioned beneath the first pixel defined layer **350***a* may be reduced.

[0104] The first pixel defined layer **350***a* includes the base resin and the thermo-chromic pigment. The base resin includes photosensitive polyimide (PI), photosensitive polybenzoxazole, or photosensitive polyacrylate. The pixel defined layer **350** is formed by applying, exposing, and hardening a mixture of the base resin and the thermo-chromic pigment and has a black color due to a chemical reaction of an electron acceptor with an electron donor included in the thermo-chromic pigment by temperature at the time of hardening. Therefore, the first pixel defined layer **350***a* has low transmittance. Therefore, it is possible to prevent an image quality of the OLED display from deteriorating.

[0105] Further, the first pixel defined layer **350***a* may include a base resin and an organic black pigment.

[0106] Further, the first pixel defined layer **350***a* may include the base resin and a dye. Here, the dye indicates a generally used dye.

[0107] The second pixel defined layer **350***b* includes photosensitive polyimide (PI), photosensitive polybenzoxazole, or photosensitive polyacrylate.

[0108] Meanwhile, the planarization layer **180** may also be made of the same material as that of the first pixel defined layer **350***a*. In this case, it is possible to reduce the change of material at the time of the manufacturing process.

[0109] The spacer **320** is disposed on the pixel defined layer **350**. The spacer **320** and the second pixel defined layer **350***b* may be made of the same material. That is, the spacer **320** and the second pixel defined layer **350***b* may be formed using the same mask.

[0110] It should be understood that the exemplary embodiments described therein should be considered in a descriptive sense only and not for purposes of limitation. Descriptions of features or aspects within each embodiment should typically be considered as available for other similar features or aspects in other embodiments.

[0111] While one or more embodiments of the present disclosure have been described with reference to the figures, it will be understood by those of ordinary skill in the art that various changes in form and details may be made therein without departing from the spirit and scope of the present disclosure as defined by the following claims

What is claimed is:

1. An organic light emitting diode display (OLED), comprising:
- a first substrate;
- a switching and driving thin film transistor disposed on the first substrate;
- a pixel electrode connected to the driving thin film transistor;
- a pixel defined layer disposed on an edge portion of the pixel electrode and the planarization layer and including an opening through which the pixel electrode is exposed;
- an organic emission layer disposed on the pixel electrode within the opening; and
- a common electrode formed on the organic emission layer,
- wherein the pixel defined layer includes at least one of a thermo-chromic pigment, an organic black pigment, and a dye and a base resin.

2. The OLED display of claim **1**, wherein the pixel defined layer has a dielectric constant of 5 or less and transmittance of about 0% to about 77%.

3. The OLED display of claim **2**, wherein the base resin includes at least one of photosensitive polyimide, photosensitive polybenzoxazole, and photosensitive polyacrylate.

4. The OLED display of claim **3**, further comprising a spacer disposed on the pixel defined layer.

5. The OLED display of claim **4**, wherein the spacer and the pixel defined layer are made of the same material.

6. The OLED display of claim **1**, wherein the planarization layer and the pixel defined layer are made of the same material.

7. The OLED display of claim **1**, wherein the pixel defined layer includes a first pixel defined layer and a second pixel defined layer which is disposed on the first pixel defined layer.

8. The OLED display of claim **7**, wherein a thickness of the first pixel defined layer ranges from 1.5 μm to 3 μm.

9. The OLED display of claim **8**, wherein the first pixel defined layer has a dielectric constant of 5 or less and transmittance of about 0% to about 77%.

10. The OLED display of claim **9**, wherein the first pixel defined layer includes at least one of the thermo-chromic pigment, the organic black pigment, and the dye and the base resin.

11. The OLED display of claim **10**, wherein the base resin includes at least one of photosensitive polyimide, photosensitive polybenzoxazole, or photosensitive polyacrylate.

12. The OLED display of claim **11**, wherein the second pixel defined layer includes at least one of the photosensitive polyimide, the photosensitive polybenzoxazole, and the photosensitive polyacrylate.

13. The OLED display of claim **12**, further comprising a spacer disposed on the pixel defined layer.

14. The OLED display of claim **13**, wherein the spacer and the second pixel defined layer are made of the same material.

15. The OLED display of claim **7**, wherein the planarization layer and the first pixel defined layer are made of the same material.

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专利名称(译)	有机发光二极管显示器		
公开(公告)号	US20160218157A1	公开(公告)日	2016-07-28
申请号	US14/749083	申请日	2015-06-24
[标]申请(专利权)人(译)	三星显示有限公司		
申请(专利权)人(译)	三星DISPLAY CO.，LTD.		
当前申请(专利权)人(译)	三星DISPLAY CO.，LTD.		
[标]发明人	AHN SEON HONG		
发明人	AHN, SEON HONG		
IPC分类号	H01L27/32		
CPC分类号	H01L27/3246 H01L27/3232 H01L27/3262 H01L51/5284		
优先权	1020150012145 2015-01-26 KR		
外部链接	Espacenet USPTO		

摘要(译)

示例性实施例提供了一种有机发光二极管显示器，包括：第一基板;开关驱动薄膜晶体管设置在第一基板上;像素电极连接到驱动薄膜晶体管;像素限定层，设置在像素电极和平坦化层的边缘部分上，并包括开口，像素电极通过该开口露出;有机发光层，设置在开口内的像素电极上;形成在有机发光层上的公共电极，其中像素限定层包括热变色颜料，有机黑色颜料，染料和基础树脂中的至少一种。