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(54) **Organic light emitting diode display and method of manufacturing the same**

Organische Leuchtdioden-Anzeige und Verfahren zu deren Herstellung

Affichage à diode électroluminescente organique et son procédé de fabrication

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Description

[0001] The present invention relates to an organic light emitting diode (OLED) display and a method of manufacturing the same. More particularly, example embodiments relate to an OLED display with improved display characteristics achieved by suppressing external light reflection, and a method of manufacturing the same.

[0002] A conventional OLED display may include a plurality of OLEDs, each OLED having a hole injection electrode, an organic emission layer, and an electron injection electrode. An exciton may be formed by combining holes and electrons inside the organic light emitting layer, and light may be emitted by energy generated when the exciton falls from an excited state to a ground state, whereby the OLED display may form an image.

[0003] Accordingly, the OLED display is self-emissive, and may have reduced thickness and weight because a separate light source may not be required. The OLED display may also exhibit high-quality characteristics, e.g., low power consumption, high luminance, and rapid response time. The OLED display may be used in both stationary and portable devices.

[0004] The conventional OLED display, however, may include various electrodes and metal wires reflecting light entering from the outside. Reflection of external light in the OLED display may reduce display characteristics, e.g., because of poor black representation and contrast.

[0005] US2008/246029, US2007/080377 and KR2005 0030296 disclose display devices. Example embodiments are therefore directed to an OLED display and a method of manufacturing the same, which substantially overcome one or more of the shortcomings and disadvantages of the related art.

[0006] It is therefore a feature of an example embodiment to provide an OLED display with a structure capable of suppressing external light reflection.

[0007] It is another feature of an example embodiment to provide a method of manufacturing an OLED display with a structure capable of suppressing external light reflection.

[0008] According to the invention, there is provided an organic light emitting diode display according to claim 1.

[0009] The transmissive film may be directly between the first and second common electrodes. The first and second common electrodes may completely overlap the transmissive film.

[0010] The first common electrode and the second common electrode are in direct contact with each other on the light scattering spacer parts of the pixel defining layer.

[0011] One or more of the first common electrode and the second common electrode may be formed of a semi-transmissive film.

[0012] The semi-transmissive film may be made of at least one metal, the metal being one or more of magnesium (Mg), silver (Ag), calcium (Ca), lithium (Li), chromium (Cr), and aluminum (Al).

[0013] The OLED display may further include a sealing member disposed facing the substrate member with the pixel defining layer interposed therebetween, wherein the light scattering spacer parts of the pixel defining layer may maintain a gap between the substrate member and the sealing member.

[0014] The shape of the light scattering spacer parts of the pixel defining layer may include one or more of a prismoid, a prism, a cone, a cylinder, a hemisphere, and a semi-spheroid.

[0015] According to the invention, there is further provided a method of manufacturing an OLED display according to claim 7.

[0016] The photolithography process may include a half-tone exposure process.

[0017] The first common electrode and the second common electrode are in direct contact with each other on the light scattering spacer parts of the pixel defining layer.

[0018] One or more of the first common electrode and the second common electrode may be formed of a semi-transmissive film.

[0019] The semi-transmissive film may be made of one or more metals among magnesium (Mg), silver (Ag), calcium (Ca), lithium (Li), chromium (Cr), and aluminum (Al).

[0020] The method of manufacturing an OLED display further includes disposing the sealing member to face the substrate member, with the pixel defining layer interposed therebetween, wherein the light scattering spacer parts of the pixel defining layer may maintain a gap between the substrate member and the sealing member.

[0021] The shape of the light scattering spacer parts of the pixel defining layer may include one or more of a prismoid, a prism, a cone, a cylinder, a hemisphere, and a semi-spheroid.

[0022] The above and other features and advantages will become more apparent to those of ordinary skill in the art by describing in detail example embodiments with reference to the attached drawings, in which:

FIG. 1 illustrates a layout view of an OLED display according to an example embodiment;
FIG. 2 illustrates a cross sectional view along line II-II of FIG. 1; and
FIGS. 3-7 illustrate cross-sectional views of sequential stages in a manufacturing process of an OLED display according to an example embodiment.

[0023] Example embodiments will now be described more fully hereinafter with reference to the accompanying drawings; however, they may be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0024] In the drawing figures, the dimensions of layers, elements, and regions may be exaggerated for clarity of illustration. It will also be understood that when a layer or element is referred to as being "on" another layer or substrate, it can be directly on the other layer or substrate, or intervening layers or elements may also be present. In addition, it will also be understood that when a layer is referred to as being "between" two layers or elements, it can be the only layer/element between the two layers and/or elements, or one or more intervening layers or elements may also be present. Like reference numerals refer to like elements throughout.

[0025] As used herein, the expressions "at least one," "one or more," and "and/or" are open-ended expressions that are both conjunctive and disjunctive in operation. For example, each of the expressions "at least one of A, B, and C," "at least one of A, B, or C," "one or more of A, B, and C," "one or more of A, B, or C" and "A, B, and/or C" includes the following meanings: A alone; B alone; C alone; both A and B together; both A and C together; both B and C together; and all three of A, B, and C together.

[0026] As used herein, the terms "a" and "an" are open terms that may be used in conjunction with singular items or with plural items.

[0027] It is noted that the accompanying drawings illustrate an active matrix (AM)-type OLED display having a 2Tr-1Cap structure in which one pixel may include two thin film transistors (TFTs) and one capacitor, but it is not limited thereto. Accordingly, an OLED display according to example embodiments may have, e.g., three or more TFTs and two or more capacitors in one pixel, and may have various structures including separate wires.

[0028] Herein, a pixel refers to a minimum unit used to display an image. The OLED display may display an image through a plurality of pixels. Hereinafter, an example embodiment will be described with reference to FIGS. 1-2.

[0029] Referring to FIGS. 1 and 2, an OLED display 100 according to an example embodiment may include a switching TFT 10, a driving TFT 20, a capacitor 80, and an OLED 70 that may be arranged for one pixel. Additionally, the OLED display 100 may further include gate lines 151 arranged in one direction, data lines 171 insulated from and crossing the gate lines 151, and a common power line 172. One pixel may be defined by one gate line 151, one data line 171, and the common power line 172. However, the pixel may not be limited to the above definition.

[0030] As illustrated in FIG. 2, the OLED 70 may include a pixel electrode 710, an organic light emitting layer 720 formed on the pixel electrode 710, and a common electrode 730 formed on the organic light emitting layer 720. The pixel electrode 710 may be a positive (+) electrode, i.e., a hole injection electrode, and the common electrode 730 may be a negative (-) electrode, i.e., an electron injection electrode. It is noted, however, that example embodiments are not limited to the above description and other electrode configurations are within the scope of the present invention, e.g., the pixel electrode 710 may be a negative electrode and the common electrode 730 may be a positive electrode according to a driving method of the OLED display 100. Holes and electrons may be injected from the pixel electrode 710 and the common electrode 730, respectively, to the organic light emitting layer 720. Light may be emitted when excitons formed by combining the injected holes and electrons fall from an excited state to a ground state. Since one or more pixel electrodes 710 may be formed for each pixel, the OLED display 100 may have a plurality of pixel electrodes 710 spaced apart from each other.

[0031] As illustrated in FIGS. 1-2, the capacitor 80 may include a first capacitor plate 158 and a second capacitor plate 178 that may be arranged with a gate insulating film 140 interposed therebetween. The gate insulating film 140 may extend to the driving TFT 20 illustrated in FIG. 2.

[0032] As illustrated in FIG. 1, the switching TFT 10 may include a switching semiconductor layer 131, a switching gate electrode 152, a switching source electrode 173, and a switching drain electrode 174. The driving TFT 20, as illustrated in FIGS. 1-2, may include a driving semiconductor layer 132, a driving gate electrode 155, a driving source electrode 176, and a driving drain electrode 177.

[0033] The switching TFT 10 may be used as a switching element to select a pixel to emit light. The switching gate electrode 152 may be connected to the gate lines 151.

[0034] The switching source electrode 173 may be connected to the data lines 171. The switching drain electrode 174 may be spaced apart from the switching source electrode 173 and may be connected to the first capacitor plate 158.

[0035] The driving TFT 20 may apply a driving power to the pixel electrode 710 to cause light emission from the organic light emitting layer 720 of the OLED 70 in the selected pixel, i.e., as selected by the switching TFT 10. The driving gate electrode 155 may be connected to the first capacitor plate 158. The driving source electrode 176 and the second capacitor plate 178 may be respectively connected to the common power line 172. The driving drain electrode 177 may be connected to the pixel electrode 710 of the OLED 70 through a contact hole 182.

[0036] With the above-described configuration, the switching TFT 10 may be driven by a gate voltage supplied to the gate lines 151, and may supply the gate voltage from the gate lines 151 to the driving TFT 20, i.e., data voltage. A voltage corresponding to a difference between the common voltage supplied from the common power line 172 to the driving

TFT 20 and the data voltage supplied from the switching TFT 10 to the driving TFT 20 may be stored in the capacitor 80. A current corresponding to the voltage stored in the capacitor 80 may flow into the OLED 70 through the driving TFT 20 to cause the OLED 70 to emit light.

[0037] As further illustrated in FIG. 2, the OLED display 100 may include a pixel defining layer 190 and a sealing member 210.

[0038] The sealing member 210 and a substrate member 111 may be bonded and sealed together with the OLED 70 interposed therebetween. The sealing member 210 may cover and protect the switching and driving TFTs 10 and 20 and the OLED 70 formed on the substrate member 111, i.e., to seal the switching and driving TFTs 10 and 20 and the OLED 70 from the outside. Here, the components excluding the sealing member 210 may be referred to as a display substrate 110. The sealing member 210 may be an insulation substrate, e.g., glass or plastic substrate.

[0039] The pixel defining layer 190 may include a pixel defining part 191 having an opening for exposing the pixel electrode 710, and light scattering spacer parts 195 protruding in an upward direction, i.e., a direction extending from the pixel electrode 710 away from the substrate member 111, from the pixel defining part 191. The plurality of pixel electrodes 710 formed for each pixel may be formed at a position corresponding to the opening of the pixel defining part 191, e.g., each opening in the pixel defining part 191 may overlap a corresponding pixel electrode 710 to expose at least a portion thereof.

[0040] The pixel defining part 191 and the light scattering spacer parts 195 of the pixel defining layer 190 may be integrally formed of a photosensitive material by a photolithography process. That is, the pixel defining part 191 and the light scattering spacer parts 195 may be formed together by adjusting an exposure amount through a half-tone exposure process. However, example embodiments are not limited thereto, e.g., the pixel defining part 191 and the light scattering spacer parts 195 may be sequentially or independently formed, e.g., of different materials with respect to each other.

[0041] The light scattering spacer parts 195 of the pixel defining layer 190 may maintain a gap between the substrate member 111 and the sealing member 210. The light scattering spacer parts 195 may have any suitable shape. Examples of shapes may include a prismatoid, a prism, a cone, a cylinder, a spheroid, an ellipsoid, a hemisphere, and a semi-spheroid. The light scattering spacer parts 195 of the pixel defining layer 190 may scatter external light reflected from conductive films. For example, as illustrated in FIG. 2, the light scattering spacer parts 195 may be positioned on, e.g., to overlap, conductive films, e.g., gate lines 151, data lines 171, a common power line 172, etc., so external light reflection from the conductive films may be suppressed. Therefore, the OLED display 100 may suppress external light reflection more effectively by means of the light scattering spacer parts 195.

[0042] As illustrated in FIG. 2, the OLED 70 of the OLED display 100 may further include a transmissive film 600 formed on the common electrode 730 and an additional common electrode 750 formed on the transmissive film 600. Hereinafter, the common electrode 730 may be referred to as a first common electrode and the additional common electrode 750 may be referred to as a second common electrode.

[0043] The first common electrode 730 may be formed on the organic light emitting layer 720 and the pixel defining layer 190. For example, as illustrated in FIG. 2, the first common electrode 730 may extend on, e.g., directly on, the organic light emitting layer 720, and may extend conformally on, e.g., directly on, the pixel defining part 191 and light scattering spacer part 195.

[0044] The transmissive film 600 may be formed on the first common electrode 730. The transmissive film 600 may have a smaller thickness than that of the light scattering spacer parts 195 of the pixel defining layer 190. In other words, as illustrated in FIG. 2, an uppermost surface of the light scattering part 195, i.e., a surface facing away from the substrate member 111, may be higher by a distance h than an upper surface of the transmissive film 600, i.e., a surface facing away from the substrate member 111, as measured relative to the substrate member 111. That is, the light scattering spacer part 195 of the pixel defining layer 190 may protrude above the transmissive film 600 at a greater height than that of the transmissive film 600.

[0045] The second common electrode 750 may be formed on, e.g., directly on, the transmissive film 600. The second common electrode 750 may be connected to the first common electrode 730 in a contact area CA on the light scattering spacer parts 195 protruded above the transmissive film 600. For example, as illustrated in FIG. 2, the second common electrode 750 may be directly on and connected to the first common electrode 730 in the contact area CA, so the first common electrode 730 may be between the light scattering spacer part 195 and the second common electrode 750 in the contact area CA, e.g., only in the contact area CA. It is noted that the contact area CA may be defined as a region including an interface region between the first and second common electrodes 730 and 750, as illustrated in FIG. 2. It is further noted that the sealing member 210 may be positioned on the second common electrode 750. For example, since the light scattering spacer parts 195 protrude from the pixel defining part 191, the sealing member 210 may contact, e.g., directly contact, a portion of the second common electrode 750 on the light scattering spacer parts 195, e.g., only on the light scattering spacer parts 195, and may be spaced apart from portions of the second common electrode 750 overlapping portions other than the light scattering spacer parts 195, e.g., pixel electrode 171.

[0046] The first common electrode 730 and the second common electrode 750 may be formed of a semi-transmissive, i.e., semi-transparent, film. It is noted, however, that use of other materials to form the first and second common electrodes

730 and 750 is included within the scope of the present invention, e.g., one of the first common electrode 730 and the second common electrode 750 may be formed of a semi-transmissive film, and the other may be transparent. The transmissive film 600 may be tightly attached at both surfaces to the first common electrode 730 and the second common electrode 750, respectively. That is, the transmissive film 600 may be directly sandwiched between the first and second common electrodes 730 and 750 without contacting air, i.e., there may not be an interface between air and the transmissive film 600. For example, as illustrated in FIG. 2, the first and second common electrodes 730 and 750 may be configured to completely enclose, i.e., completely overlap and cover all surfaces, the transmissive film 600 therebetween. Accordingly, a considerable amount of light entering from the outside and incident on the transmissive film 600 through the second common electrode 750 may be eliminated by destructive interference caused by reflection between the first common electrode 730 and the second common electrode 750. It is noted that in order to cause destructive interference of light between the first common electrode 730 and the second common electrode 750, the transmissive film 600 may be configured to have an appropriate refractive index and thickness. Selection and adjustment of the refractive index and thickness of the transmissive film 600 will be explained in more detail below with reference to Formula 1.

[0047] In this manner, the OLED display 100 may improve display properties by suppressing external light reflection through the first common electrode 730, the transmissive film 600, and the second common electrode 750.

[0048] In addition, the second common electrode 750 may be connected to the first common electrode 730 in the contact area CA on the light scattering spacer parts 195 protruded above the transmissive film 600, thus suppressing a voltage drop (IR drop) between the first common electrode 730 and the second common electrode 750.

[0049] In addition, the light scattering spacer parts 195 of the pixel defining layer 190 may be formed over spaces between the plurality of pixel electrodes 710, e.g., between adjacent pixel electrodes 710. Due to this, it may be possible to prevent the first common electrode 730 and second common electrode 750, which may be connected to each other through the light scattering spacer parts 195, from affecting the quality of images displayed by the OLED display 100.

[0050] In addition, the first common electrode 730 and the second common electrode 750 may be connected to each other in regions between the pixel electrodes 710, i.e., the contact area CA may overlap a region between adjacent electrode pixels 710. Thus, such structure may effectively suppress light emitted from the OLED 70 from becoming poor and non-uniform due to voltage drop (IR drop).

[0051] As described above, the light scattering spacer parts 195 of the pixel defining layer 190 may facilitate connecting the first common electrode 730 and the second common electrode 750 to each other, may maintain the gap between the substrate member 111 and the sealing member 210, and may scatter external light to reduce reflection thereof. Therefore, the OLED display 100 with the scattering spacer parts 195 may effectively reduce external light reflection, thereby improving display properties thereof.

[0052] Hereinafter, the structure of the OLED display 100 according to an example embodiment will be described in more detail with reference to FIG. 2. FIG. 2 illustrates a portion of the OLED display 100 including the driving TFT 20 and the OLED 70.

[0053] Hereinafter, the structure of the driving TFT 20 will be described in detail. Additionally, the switching TFT 10 will be described briefly in comparison to the driving TFT 20.

[0054] The substrate member 111 may be formed of an insulating substrate made of, e.g., one or more of glass, quartz, ceramic, plastic, etc. However, the present invention is not limited thereto, so the first substrate member 111 may be formed of a metal substrate, e.g., stainless steel or the like.

[0055] A buffer layer 120 may be formed on the first substrate member 111. The buffer layer 120 may prevent or substantially minimize penetration of impurity elements, and may planarizing a surface. The buffer layer 120 may be formed of, e.g., one or more of a silicon nitride (SiNx) film, a silicon oxide (SiOx) film, and a silicon oxynitride (SiOxNy). However, the buffer layer 120 may not be necessarily required, and may be omitted according to the type of the first substrate member 111 and the process conditions.

[0056] A driving semiconductor layer 132 may be formed on the buffer layer 120. The driving semiconductor layer 132 may be formed of, e.g., a polysilicon film. Further, the driving semiconductor layer 132 may include a channel region 135 in which no impurity may be doped, and a source region 136 and a drain region 137. The source and drain regions 136 and 137 may be doped with a dopant, e.g., p+ ions, and may be formed at both sides of the channel region 135, respectively. The p+ ions may be, e.g., boron (B), B_2H_6, etc. The dopant may differ according to the type of the TFTs. For example, a TFT of a PMOS structure using a P-type impurity as the driving TFT 20 may be used, but it may be not limited thereto, e.g., TFTs of both NMOS and CMOS structures may be used as the driving TFT 20.

[0057] In this respect it is noted that while the driving TFT 20 illustrated in FIG. 2 may be a polycrystalline TFT including a polysilicon film, the switching TFT 10 (not shown in FIG. 2) may be a polycrystalline TFT or an amorphous TFT including an amorphous silicon film.

[0058] The gate insulating film 140 may be formed, e.g., of silicon nitride (SiNx) or silicon oxide (SiO_2), on the driving semiconductor layer 132. Gate wires including the driving gate electrode 155 may be formed on the gate insulating film 140. The gate wires may further include gate lines 151 (shown in FIG. 1), a first capacitor plate 158 (shown in FIG. 1), and other wires. In addition, the driving gate electrode 155 may be formed to overlap at least a portion of the driving semiconductor layer 132, e.g., overlap at least a portion of the channel region 135.

[0059] An interlayer insulating film 160 covering the driving gate electrode 155 may be formed on the gate insulating film 140. The gate insulating layer 140 and the interlayer insulating layer 160 may have through holes therethrough to expose the source area 136 and drain area 137 of the driving semiconductor layer 132. Like the gate insulating film 140, the interlayer insulating layer 160 may be formed of, e.g., silicon nitride (SiNx) or silicon oxide (SiO_2).

[0060] Data wires including a driving source electrode 176 and a driving drain electrode 177 may be formed on the interlayer insulating film 160. The data wires may further include data lines 171, a common power line 172, a second capacitor plate 178 (shown in FIG. 1), and other wires. In addition, the driving source electrode 176 and the driving drain electrode 177 may be respectively connected to the source area 136 and drain area 137 of the driving semiconductor layer 132 through the through holes.

[0061] In this manner, the driving TFT 20 including the driving semiconductor layer 132, the driving gate electrode 155, the driving source electrode 176, and the driving drain electrode 177 may be formed. The configuration of the driving TFT 20 may not be limited to the foregoing example, but may be changed into a variety of well-known configurations that may be easily carried out by those skilled in the art.

[0062] A planarization film 180 covering the data wires 171, 172, 176, 177, and 178 may be formed on the interlayer insulating film 160. The planarization film 180 may eliminate and planarize a stepped region in order to increase the light emission efficiency of the OLED 70 to be formed thereon. Further, the planarization film 180 may have a contact hole 182 for exposing a part of the drain electrode 177. The planarization film 180 may be made of one or more of, e.g., polyacrylate resin, epoxy resin, phenolic resin, polyamides resin, polyimide resin, unsaturated polyesters resin, poly (phenylenether) resin, poly (phenylenesulfide) resin, and benzocyclobutene (BCB).

[0063] The pixel electrode 710 of the OLED 70 may be formed over the planarization film 180. The pixel electrode 710 may be connected to the drain electrode 177 through the contact hole 182 of the planarization film 180.

[0064] The pixel defining layer 190 may be formed over the planarization film 180. The pixel defining layer 190 may include a pixel defining part 191 having an opening for exposing the pixel electrode 710, and a plurality of light scattering spacer parts 195 protruded upward, i.e., a direction directed away from the planarization film 180, from the pixel defining part 191. That is, the pixel electrode 710 may be disposed so as to correspond, e.g., overlap, to the opening of the pixel defining layer 190.

[0065] The pixel defining layer 190 may be made of, e.g., a polyacrylate resin or a polyimide resin. For example, the pixel defining part 191 and the light scattering spacer parts 195 of the pixel defining layer 190 may be integrally formed, but it may not be limited thereto, e.g., the pixel defining part 191 and the light scattering spacer parts 195 may be formed separately.

[0066] The light scattering spacer parts 195 of the pixel defining layer 190 may scatter external light reflected from conductive films, e.g., the gate lines 151, data lines 171, and common power line 172, disposed under the light scattering spacer parts 195, i.e., between the substrate member 111 and the light scattering spacer parts 195.

[0067] The organic light emitting layer 720 may be formed on the pixel electrode 710 in the opening of the pixel defining part 191, and the first common electrode 730 may be formed on the pixel defining layer 190 and the organic light emitting layer 720. In this manner, the OLED 70 including the pixel electrode 710, the organic light emitting layer 720, and the common electrode 730 may be formed.

[0068] In an example embodiment, the OLED 70 may further include the transmissive film 600 and the second common electrode 750. The transmissive film 600 may be formed over the first common electrode 730. The transmissive film 600 may be an organic film or an inorganic film. In addition, the transmissive film 600 may be adjusted to have a predetermined thickness, i.e., within an appropriate range. The predetermined thickness of the transmissive film 600 may be determined according to the refractive index of the transmissive film 600.

[0069] In addition, the transmissive film 600 may have a smaller height, i.e., thickness as measured along a direction normal to the substrate member 111, than that of the light scattering spacer parts 195. That is, the light scattering spacer parts 195 of the pixel defining layer 190, i.e., the uppermost surface of the light scattering spacer part 195, may protrude above the transmissive film 600, i.e., the upper surface of the transmissive film 600.

[0070] The second common electrode 750 may be formed over the transmissive film 600. The second common electrode 750 may be connected to the first common electrode 730 in the contact area CA on the light scattering spacer parts 195 protruding above the transmissive film 600.

[0071] The first common electrode 730 and the second common electrode 750 may be formed of a semi-transmissive film. For example, the semi-transmissive film 600 may include metal, e.g., one or more of magnesium (Mg), silver (Ag), calcium (Ca), lithium (Li), chromium (Cr), and aluminum (Al).

[0072] The first common electrode 730 and the second common electrode 750 may exhibit sufficient reflectance to effectively emit light generated by the OLED 70, while minimizing reflection of external light. For example, the first common electrode 730 may exhibit reflectance of about 50% or less, and the second common electrode 750 may exhibit reflectance of about 30% or less.

[0073] The transmissive film 600 may be tightly attached at both surfaces to the first common electrode 730 and the second common electrode 750, respectively. That is, there may be no interface with air between the transmissive film 600 and the first common electrode 730 and second common electrode 750.

[0074] The thickness and refractive index of the transmissive film 600 may be adjusted to optimize destructive interference of light between the first common electrode 730 and the second common electrode 750. The thickness and refractive index of the transmissive film 600 may be established by Formula 1 below derived for a condition of destructive interference of reflected light.

$$d=\lambda/(4n)\cos\theta \qquad \text{Formula 1}$$

[0075] It is noted that in Formula 1 above, d refers to a distance between two reflecting surfaces. That is, d may equal a distance between the first common electrode 730 and the second common electrode 750, i.e., the thickness of the transmissive film 600. Further, n in Formula 1 above refers to a refractive index of a medium, i.e., the transmissive film 600, θ refer to an incident angle of light on the medium, i.e., incident angle of external light on the transmissive film 600, and λ refers to a wavelength of reflected light.

[0076] The wavelength of the reflected light, i.e., a wavelength of visible light, and a refractive index of a material used for the transmissive film 600 may be substituted into Formula 1. An average incident angle of external light may be approximated as about 30 degrees to about 45 degrees, i.e., with respect to a normal to the transmissive film 600 as illustrated in FIG. 2, and substituted into Formula 1. Based on the above, an average thickness of the transmissive film 600 may be calculated. That is, the transmissive film 600 may be made of a predetermined material, i.e., having a predetermined refractive index, so the thickness may be adjusted according to the type of material used for the transmissive film 600 in order to provide destructive interference of light between the first and second common electrodes 730 and 750. Alternatively, the transmissive film 600 may have a predetermined thickness, so the material for forming the transmissive film 600 may be adjusted, i.e., a material having an appropriate refractive index, in order to form the transmissive film 600 at a desired thickness for providing destructive interference of light between the first and second common electrodes 730 and 750 according to Formula 1 above. As described above, when a thickness of the transmissive film 600 is adjusted, the thickness may be set to be smaller than that of the light scattering spacer parts 195 of the pixel defining layer 190.

[0077] With the above-described structure, when external light is incident on the OLED display 100, as illustrated in FIG. 2, the external light may be transmitted to be incident on the second common electrode 750. Based on the reflectance of the second common electrode 750, a first portion of the external light may be reflected away from the second common electrode 750 and a second portion of the external light may be transmitted through the transmissive film 600 toward the first common electrode 730, as illustrated in FIG. 2. The second portion of the external light incident on the first common electrode 730 may be reflected back toward the second common electrode 750, as further illustrated in FIG. 2. A part of the light directed toward the second common electrode 750 from the first common electrode 730 may be emitted to the outside through the second common electrode 750, and another part thereof may be reflected again and directed toward the first common electrode 730. In this manner, as the external light entering from the outside may be repeatedly reflected between the first common electrode 730 and the second common electrode 750, with the transmissive film 600 interposed therebetween, destructive interference may occur between the first and second common electrodes 730 and 750. Therefore, a substantial amount of the external light incident on the second common electrode 750 may be eliminated. Thus, the OLED display 100 according to example embodiments may exhibit substantially reduced reflection of external light, thereby exhibiting improved display properties.

[0078] In addition, the first common electrode 730 and the second common electrode 750 may be connected to each other in the contact area CA on the light scattering spacer parts 195 protruding above the transmissive film 600, thus suppressing a voltage drop (IR drop) to be generated between the first common electrode 730 and the second common electrode 750.

[0079] In addition, the light scattering spacer parts 195 of the pixel defining layer 190 may be formed over spaces between the plurality of pixel electrodes 710. Due to this, it may be possible to prevent or substantially minimize the first common electrode 730 and second common electrode 750 connected to each other through the light scattering spacer parts 195 from affecting the quality of images displayed by the OLED display 100.

[0080] In addition, since the first common electrode 730 and the second common electrode 750 may be connected to each other between the pixel electrodes 710, this may more effectively suppress the light emitted from the OLED 70 from becoming poor and non-uniform due to the voltage drop (IR drop).

[0081] Further, as described above, the first common electrode 730 and the second common electrode 750 may be formed as a semi-transmissive type. However, the OLED display 100 according the example embodiments may not be limited thereto, e.g., either one of the first common electrode 730 and the second common electrode 750 may be formed as a transmissive type. Meanwhile, the pixel electrode 710 may be formed of any one of a transparent type, a semi-transmissive type, and a reflective type. A transparent conductive material may include one or more of, e.g., indium tin oxide (ITO), indium zinc oxide (IZO), zinc oxide (ZnO), and indium oxide (In_2O_3). A reflective or semi-transmissive material may include one or more of, e.g., lithium (Li), calcium (Ca), lithium fluoride/calcium (LiF/Ca), lithium fluoride/aluminum (LiF/Al), aluminum (Al), silver (Ag), magnesium (Mg), and gold (Au).

[0082] The OLED display 100 may be a front emission type, a rear emission type, or a both-direction emission type according to the type of material forming the pixel electrode 710, the first common electrode 730, and the second common electrode 750. For example, the OLED display 100 may be a front emission type when the OLED 70 displays an image by emitting light in the direction of the sealing member 210.

[0083] The organic light emitting layer 720 may be made of a low molecular organic material or a polymer material. The organic light emitting layer 720 may be formed as multiple layers including a light emitting layer and one or more of a hole-injection layer (HIL), a hole-transporting layer (HTL), an electron-transporting layer (ETL), and an electron-injection layer (EIL). That is, the hole-injection layer may be disposed on the pixel electrode 710, and the hole-transporting layer, the light emitting layer, the electron-transporting layer, and the electron-injection layer may be sequentially stacked on the hole-injection layer.

[0084] The sealing member 210 may be disposed on the OLED 70. The sealing member 210 may be disposed to face the substrate member 111, and may cover the driving TFT 20 and the OLED 70. In addition, the gap between the substrate member 111, i.e., the display substrate 110, and the sealing member 210, may be maintained by the light scattering spacer parts 195 of the pixel defining layer 190.

[0085] With the above-described configuration, the OLED display 100 may exhibit improved display properties by suppressing external light reflection.

[0086] Hereinafter, referring to FIGS. 3 to 7, a method of manufacturing an OLED display according to example embodiments, e.g., the OLED display 100, will be described.

[0087] As illustrated in FIG. 3, the driving TFT 20 and the pixel electrode 710 connected to the drain electrode 177 of the driving TFT 20 may be formed on the substrate member 111. Next, a photosensitive material layer 199 may be applied on the pixel electrode 710, and a photolithography process may be carried out by using a mask 800. The mask 800 may include a mask substrate 810 and a light shielding pattern 820 formed on the mask substrate 810. The photolithography process may include a half-tone exposure process using a mask 800 having a slit pattern.

[0088] An exposed portion of the photosensitive material layer 199 may be removed, and an unexposed portion thereof may remain through a developing process. Alternatively, according to the type of the photosensitive material layer 199, the exposed portion may remain and the unexposed portion may be removed.

[0089] Next, as illustrated in FIG. 4, the pixel defining layer 190 having the pixel defining part 191 and light scattering spacer parts 195 may be formed through the mask 800 in the developing process.

[0090] Next, as illustrated in FIG. 5, the organic light emitting layer 720 and the first common electrode 730 may be formed on the pixel electrode 710 exposed through the opening of the pixel defining part 191. The first common electrode 730 may cover at least a portion of the pixel defining layer 190.

[0091] Next, as shown in FIG. 6, the transmissive film 600 may be formed on the first common electrode 730 to the predetermined thickness. The transmissive film 600 may have a smaller thickness than that of the light scattering spacer parts 195 of the pixel defining layer 190. That is, the light scattering spacer parts 195 of the pixel defining layer 190 may have a greater height (h) than that of the transmissive film 600 and may protrude above the transmissive film 600. In addition, the transmissive film 600 may be formed of a material having an appropriate reflective index, i.e., to provide the predetermined thickness as discussed previously with reference to Formula 1.

[0092] Next, as illustrated in FIG. 7, the second common electrode 750 may be formed on the transmissive film 600. The second common electrode 750 may be connected to the first common electrode 730 in the contact area CA on the light scattering spacer parts 195 protruding above the transmissive film 600.

[0093] At least one of the first common electrode 730 and the second common electrode 750 may be a semi-transmissive film formed of one or more metals, i.e., one or more of magnesium (Mg), silver (Ag), calcium (Ca), lithium (Li), chromium (Cr), and aluminum (Al).

[0094] Next, the sealing member 210 may be disposed on the second common electrode 750 to complete the OLED display 100 as illustrated in FIG. 2. The light scattering spacer parts 195 of the pixel defining layer 190 may maintain the gap between the substrate member 111 and the sealing member 210.

[0095] According to this manufacturing method, it may be possible to manufacture an OLED display having improved display properties by suppressing external light reflection.

[0096] Example embodiments of the present invention have been disclosed herein, and although specific terms are employed, they are used and are to be interpreted in a generic and descriptive sense only and not for purpose of limitation. Accordingly, it will be understood by those of ordinary skill in the art that various changes in form and details may be made without departing from the scope of the present invention as set forth in the following claims.

Claims

1. An organic light emitting diode (OLED) display (100), comprising:

a substrate member (111);
a plurality of pixel electrodes (710) on the substrate member;
a pixel defining layer (190) on the substrate member, the pixel defining layer including a pixel defining part (191) and a plurality of light scattering spacer parts (195), the pixel defining part including a plurality of openings corresponding to and exposing the pixel electrodes, and the light scattering spacer parts protruding upward from the pixel defining part away from the substrate member;
an organic light emitting layer (720) on the pixel electrodes;
a first common electrode (730) on the organic light emitting layer, at least a portion of the first common electrode being on the pixel defining layer to overlap the light scattering spacer parts, **characterised by**
a transmissive film (600) on the first common electrode; and
a second common electrode (750) on the transmissive film,
wherein the light scattering spacer parts of the pixel defining layer protrude above the transmissive film, and wherein the second common electrode is directly on and connected to the first common electrode in a contact area on the light scattering spacer parts that protrude above the transmissive film.

2. The OLED display as claimed in claim 1, wherein one or more of the first common electrode and the second common electrode includes a semi-transmissive film.

3. The OLED display as claimed in claim 2, wherein the semi-transmissive film includes at least one metal, the metal being one or more of magnesium (Mg), silver (Ag), calcium (Ca), lithium (Li), chromium (Cr), and aluminum (Al).

4. The OLED display as claimed in claim 1, further comprising a sealing member (210) on the substrate member, the pixel defining layer being between the sealing member and the substrate member, and the light scattering spacer parts of the pixel defining layer maintaining a gap between the substrate member and the sealing member.

5. The OLED display as claimed in claim 4, wherein the light scattering spacer parts of the pixel defining layer have the shape of a prismoid, a prism, a cone, a cylinder, a hemisphere, or a semi-spheroid.

6. The OLED display as claimed in any one of the preceding claims, wherein the first and second common electrodes completely overlap the transmissive film.

7. A method of manufacturing an organic light emitting diode (OLED) display (100), comprising:

forming a plurality of pixel electrodes (710) on a substrate member;
forming a pixel defining layer (190) on the substrate member, the pixel defining layer including a pixel defining part (191) and a plurality of light scattering spacer parts (195), the pixel defining part including a plurality of openings corresponding to and exposing the pixel electrodes, and the light scattering spacer parts protruding upward from the pixel defining part away from the substrate member;
forming an organic light emitting layer (720) on the pixel electrodes;
forming a first common electrode (730) on the organic light emitting layer, at least a portion of the first common electrode being on the pixel defining layer to overlap the light scattering spacer parts, **characterised by**
forming a transmissive film (600) on the first common electrode; and
forming a second common electrode (750) on the transmissive film,
wherein the light scattering spacer parts of the pixel defining layer are formed to protrude above the transmissive film, and wherein the second common electrode is formed directly on and connected to the first common electrode in a contact area on the light scattering spacer parts that protrude above the transmissive film.

8. The method as claimed in claim 7, wherein forming a pixel defining layer includes patterning a photosensitive material layer (199) on the substrate member by a photolithography process using a mask (800).

9. The method as claimed in claim 8, wherein the photolithography process includes a half-tone exposure process.

10. The method as claimed in claim 7, further comprising disposing a sealing member (210) to face the substrate member, with the pixel defining layer interposed therebetween, such that the light scattering spacer parts of the pixel defining layer maintain a gap between the substrate member and the sealing member.

11. The method as claimed in claim 7, comprising forming the first and second common electrodes and the transmissive film so that the first and second common electrodes completely overlap the transmissive film.

Patentansprüche

1. Organische Leuchtdioden-(OLED-)Anzeige (100), umfassend:

ein Trägerelement (111);
eine Mehrzahl von Pixelelektroden (710) auf dem Trägerelement;
eine pixeldefinierende Schicht (190) auf dem Trägerelement, wobei die pixeldefinierende Schicht einen pixeldefinierenden Teil (191) und eine Mehrzahl von lichtstreuenden Abstandsteilen (195) einschließt, wobei der pixeldefinierende Teil eine Mehrzahl von Öffnungen einschließt, die den Pixelelektroden entsprechen und diese freilegen, und die lichtstreuenden Abstandsteile von dem Trägerelement weg nach oben aus dem pixeldefinierenden Teil herausragen;
eine organische lichtemittierende Schicht (720) auf den Pixelelektroden;
eine erste gemeinsame Elektrode (730) auf der organischen lichtemittierenden Schicht, wobei zumindest ein Abschnitt der ersten gemeinsamen Elektrode so auf der pixeldefinierenden Schicht liegt, dass er die lichtstreuenden Abstandsteile überlappt, **gekennzeichnet durch**
einen lichtdurchlässigen Film (600) auf der ersten gemeinsamen Elektrode und
eine zweite gemeinsame Elektrode (750) auf dem lichtdurchlässigen Film,
wobei die lichtstreuenden Abstandsteile der pixeldefinierenden Schicht über den lichtdurchlässigen Film hinausragen und wobei die zweite gemeinsame Elektrode sich unmittelbar auf der ersten gemeinsamen Elektrode befindet und mit dieser in einem Kontaktbereich auf den lichtstreuenden Abstandsteilen, die über den lichtdurchlässigen Film hinausragen, verbunden ist.

2. OLED-Anzeige nach Anspruch 1, wobei die erste gemeinsame Elektrode und/oder die zweite gemeinsame Elektrode einen halblichtdurchlässigen Film einschließt.

3. OLED-Anzeige nach Anspruch 2, wobei der halblichtdurchlässige Film zumindest ein Metall einschließt, wobei das Metall eines oder mehrere der Elemente ausgewählt aus Magnesium (Mg), Silber (Ag), Calcium (Ca), Lithium (Li), Chrom (Cr) und Aluminium (Al) ist.

4. OLED-Anzeige nach Anspruch 1, weiterhin umfassend ein Dichtungselement (210) auf dem Trägerelement, wobei sich die pixeldefinierende Schicht zwischen dem Dichtungselement und dem Trägerelement befindet, und die lichtstreuenden Abstandsteile der pixeldefinierenden Schicht eine Lücke zwischen dem Trägerelement und dem Dichtungselement aufrechterhalten.

5. OLED-Anzeige nach Anspruch 4, wobei die lichtstreuenden Abstandsteile der pixeldefinierenden Schicht die Form eines Prismoids, eines Prismas, eines Kegels, eines Zylinders, einer Halbkugel oder eines Halbspheroids aufweisen.

6. OLED-Anzeige nach einem der vorangehenden Ansprüche, wobei die erste und die zweite gemeinsame Elektrode den lichtdurchlässigen Film vollständig überlappen.

7. Verfahren zur Herstellung einer organischen Leuchtdioden-(OLED-)Anzeige (100), umfassend:

Ausbilden einer Mehrzahl von Pixelelektroden (710) auf einem Trägerelement;
Ausbilden einer pixeldefinierenden Schicht (190) auf dem Trägerelement, wobei die pixeldefinierende Schicht einen pixeldefinierenden Teil (191) und eine Mehrzahl von lichtstreuenden Abstandsteilen (195) einschließt, wobei der pixeldefinierende Teil eine Mehrzahl von Öffnungen einschließt, die den Pixelelektroden entsprechen und diese freilegen, und die lichtstreuenden Abstandsteile von dem Trägerelement weg nach oben aus dem pixeldefinierenden Teil herausragen;
Ausbilden einer organischen lichtemittierenden Schicht (720) auf den Pixelelektroden;
Ausbilden einer ersten gemeinsamen Elektrode (730) auf der organischen lichtemittierenden Schicht, wobei zumindest ein Abschnitt der ersten gemeinsamen Elektrode so auf der pixeldefinierenden Schicht liegt, dass er die lichtstreuenden Abstandsteile überlappt, **gekennzeichnet durch**

Ausbilden eines lichtdurchlässigen Films (600) auf der ersten gemeinsamen Elektrode und
Ausbilden einer zweiten gemeinsamen Elektrode (750) auf dem lichtdurchlässigen Film,
wobei die lichtstreuenden Abstandsteile der pixeldefinierenden Schicht so ausgebildet sind, dass sie über den lichtdurchlässigen Film hinausragen und wobei die zweite gemeinsame Elektrode unmittelbar auf der ersten gemeinsamen Elektrode ausgebildet ist und mit dieser in einem Kontaktbereich auf den lichtstreuenden Abstandsteilen, die über den lichtdurchlässigen Film hinausragen, verbunden ist.

8. Verfahren nach Anspruch 7, wobei das Ausbilden einer pixeldefinierenden Schicht das Aufbringen eines Musters auf einer lichtempfindlichen Materialschicht (199) auf dem Trägerelement durch einen Fotolithographieprozess unter Anwendung einer Maske (800) einschließt.

9. Verfahren nach Anspruch 8, wobei der Fotolithographieprozess einen Halbtonbelichtungsprozess einschließt.

10. Verfahren nach Anspruch 7, weiterhin umfassend das Anordnen eines Dichtungselements (210) gegenüber dem Trägerelement, wobei die pixeldefinierende Schicht so dazwischenliegend angeordnet ist, dass die lichtstreuenden Abstandsteile der pixeldefinierenden Schicht eine Lücke zwischen dem Trägerelement und dem Dichtungselement aufrechterhalten.

11. Verfahren nach Anspruch 7, umfassend das Ausbilden der ersten und der zweiten gemeinsamen Elektrode und des lichtdurchlässigen Films so, dass die erste und die zweite gemeinsame Elektrode den lichtdurchlässigen Film vollständig überlappen.

Revendications

1. Écran (100) à diodes électroluminescentes organiques (OLED pour "Organic Light Emitting Diode"), comprenant :

un élément substrat (111) ;
une pluralité d'électrodes (710) de pixel sur l'élément substrat ;
une couche (190) de définition de pixels sur l'élément substrat, la couche de définition de pixels incluant une partie (191) de définition de pixels et une pluralité de parties (195) formant écarteur de diffusion de lumière, la partie de définition de pixels incluant une pluralité d'ouvertures correspondant aux et mettant à nu les électrodes de pixel, et les parties formant écarteur de diffusion de lumière dépassant vers le haut par rapport à la partie de définition de pixels en s'écartant de l'élément substrat ;
une couche organique (720) d'émission de lumière sur les électrodes de pixel ;
une première électrode commune (730) sur la couche organique d'émission de lumière, au moins une portion de la première électrode commune étant sur la couche de définition de pixels pour chevaucher les parties formant écarteur de diffusion de lumière,
caractérisé par :

un film transmissif (600) sur la première électrode commune ; et
une seconde électrode commune (750) sur le film transmissif,
dans lequel les parties formant écarteur de diffusion de lumière de la couche de définition de pixels dépassent au-dessus du film transmissif, et dans lequel la seconde électrode commune est directement sur la première électrode commune et connectée à celle-ci dans une zone de contact sur les parties formant écarteur de diffusion de lumière qui dépassent au-dessus du film transmissif.

2. Écran à OLED selon la revendication 1, dans lequel un ou plusieurs de la première électrode commune et de la seconde électrode commune inclut un film semi-transmissif.

3. Écran à OLED selon la revendication 2, dans lequel le film semi-transmissif inclut au moins un métal, le métal étant un ou plusieurs du magnésium (Mg), de l'argent (Ag), du calcium (Ca), du lithium (Li), du chrome (Cr) et de l'aluminium (Al).

4. Écran à OLED selon la revendication 1, comprenant en outre un élément (210) d'étanchéité sur l'élément substrat, la couche de définition de pixels étant entre l'élément d'étanchéité et l'élément substrat, et les parties formant écarteur de diffusion de lumière de la couche de définition de pixels maintenant un écartement entre l'élément substrat et l'élément d'étanchéité.

5. Écran à OLED selon la revendication 4, dans lequel les parties formant écarteur de diffusion de lumière de la couche de définition de pixels ont la forme d'un prismoïde, d'un prisme, d'un cône, d'un cylindre, d'un hémisphère ou d'un semi-sphéroïde.

6. Écran à OLED selon l'une quelconque des revendications précédentes, dans lequel les première et seconde électrodes communes recouvrent complètement le film transmissif.

7. Procédé de fabrication d'un écran (100) à diodes électroluminescentes organiques (OLED), comprenant :

la formation d'une pluralité d'électrodes (710) de pixel sur un élément substrat ;
la formation d'une couche (190) de définition de pixels sur l'élément substrat, la couche de définition de pixels incluant une partie (191) de définition de pixels et une pluralité de parties (195) formant écarteur de diffusion de lumière, la partie de définition de pixels incluant une pluralité d'ouvertures correspondant aux et mettant à nu les électrodes de pixel, et les parties formant écarteur de diffusion de lumière dépassant vers le haut par rapport à la partie de définition de pixels en s'écartant de l'élément substrat ;
la formation d'une couche organique (720) d'émission de lumière sur les électrodes de pixel ;
la formation d'une première électrode commune (730) sur la couche organique d'émission de lumière, au moins une portion de la première électrode commune étant sur la couche de définition de pixels pour chevaucher les parties formant écarteur de diffusion de lumière,
caractérisé par .
la formation d'un film transmissif (600) sur la première électrode commune ; et
la formation d'une seconde électrode commune (750) sur le film transmissif,
dans lequel les parties formant écarteur de diffusion de lumière de la couche de définition de pixels sont formées de façon à dépasser au-dessus du film transmissif, et dans lequel la seconde électrode commune est formée directement sur la première électrode commune et connectée à celle-ci dans une zone de contact sur les parties formant écarteur de diffusion de lumière qui dépassent au-dessus du film transmissif.

8. Procédé selon la revendication 7, dans lequel la formation d'une couche de définition de pixels inclut la formation suivant un motif d'une couche (199) de matière photosensible sur l'élément substrat par une opération de photolithographie en utilisant un masque (800).

9. Procédé selon la revendication 8, dans lequel l'opération de photolithographie inclut une opération d'exposition en demi-teinte.

10. Procédé selon la revendication 7, comprenant en outre la mise en place d'un élément (210) d'étanchéité en face de l'élément substrat, avec la couche de définition de pixels interposée entre eux, de sorte que les parties formant écarteur de diffusion de lumière de la couche de définition de pixels maintiennent un écartement entre l'élément substrat et l'élément d'étanchéité.

11. Procédé selon la revendication 7, comprenant la formation des première et seconde électrodes communes et du film transmissif de façon que les première et seconde électrodes communes recouvrent complètement le film transmissif.

FIG. 1

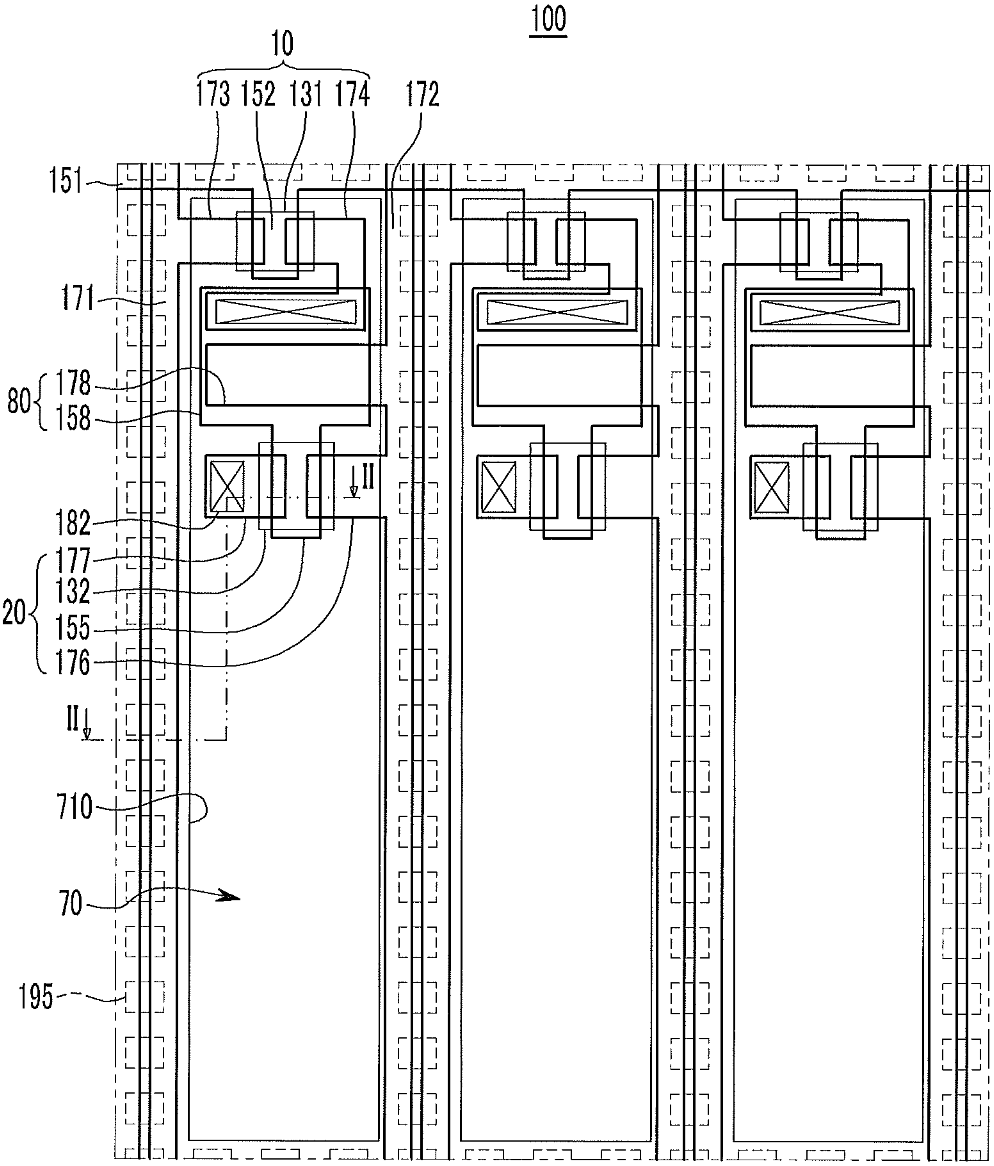
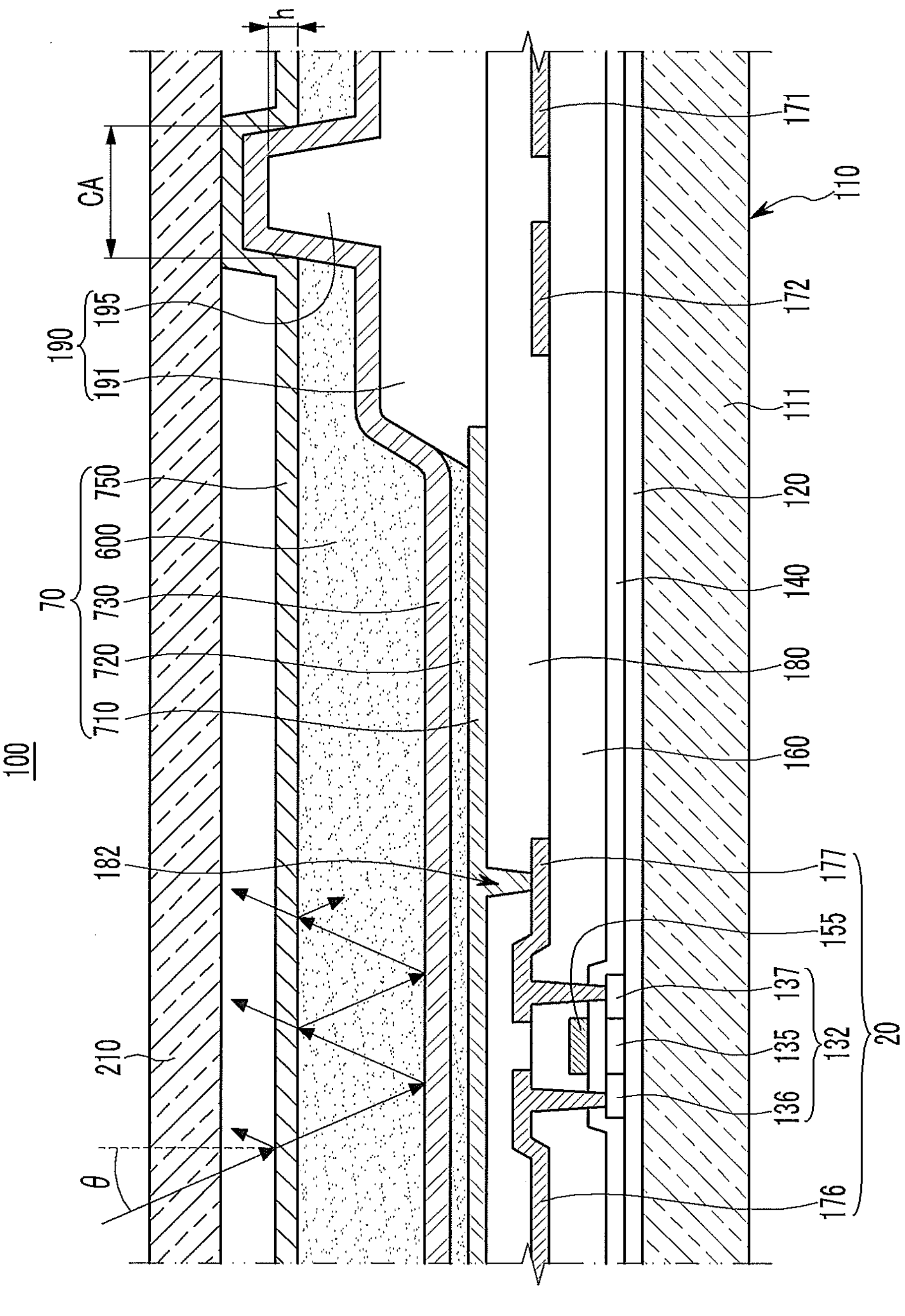

100
10
173 152 131 174
172
151
171
80
178
158
182
II
177
132
20
155
176
II
710
70
195

FIG. 2


100
h
CA
190
195
191
70
750
600
730
720
710
182
210
θ
171
172
111
120
140
180
160
177
155
137
135
136
132
20
176
110

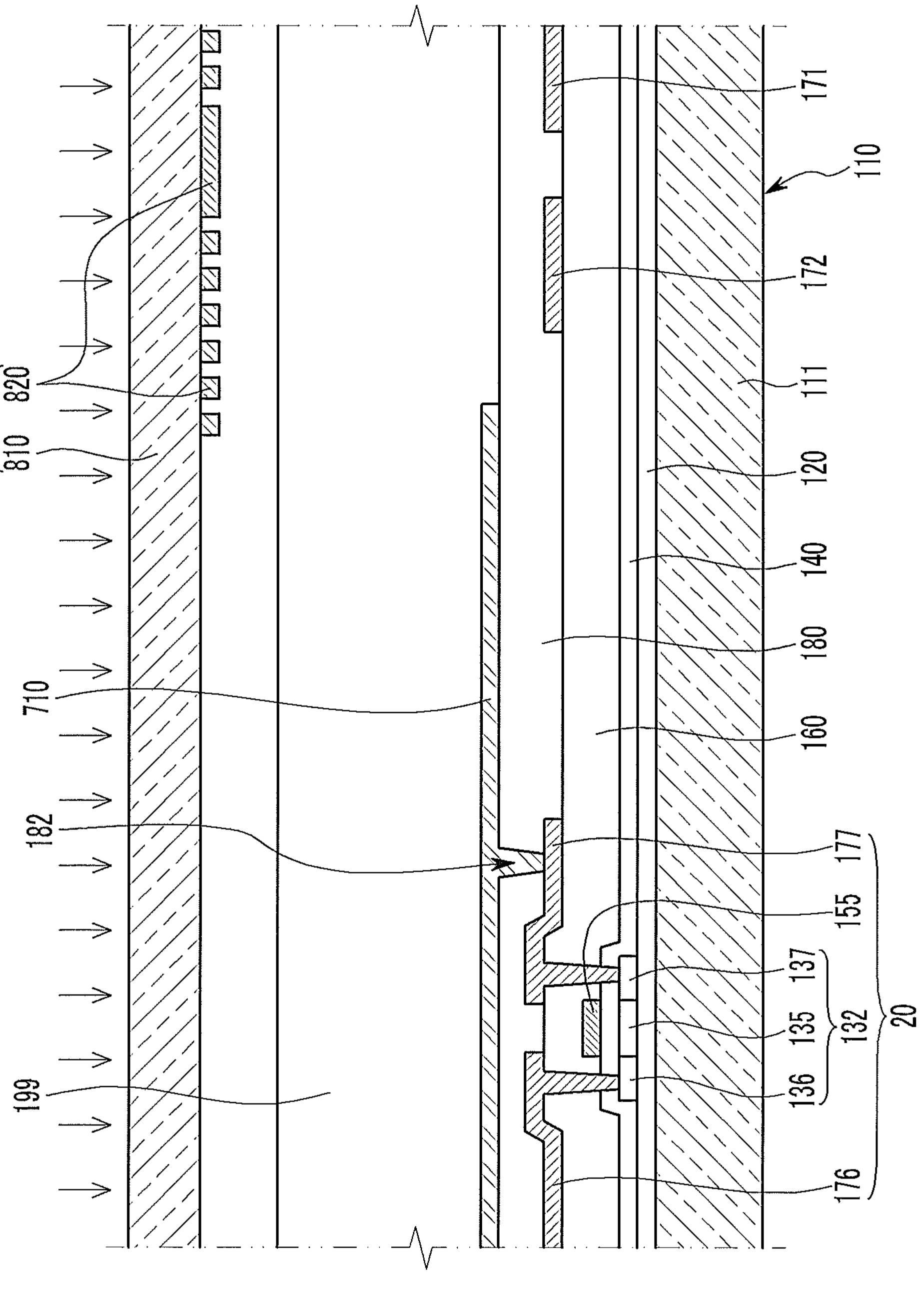

800
810
820
710
182
199
171
172
110
111
120
140
180
160
177
155
137
135
136
132
20
176

FIG. 3

FIG. 4

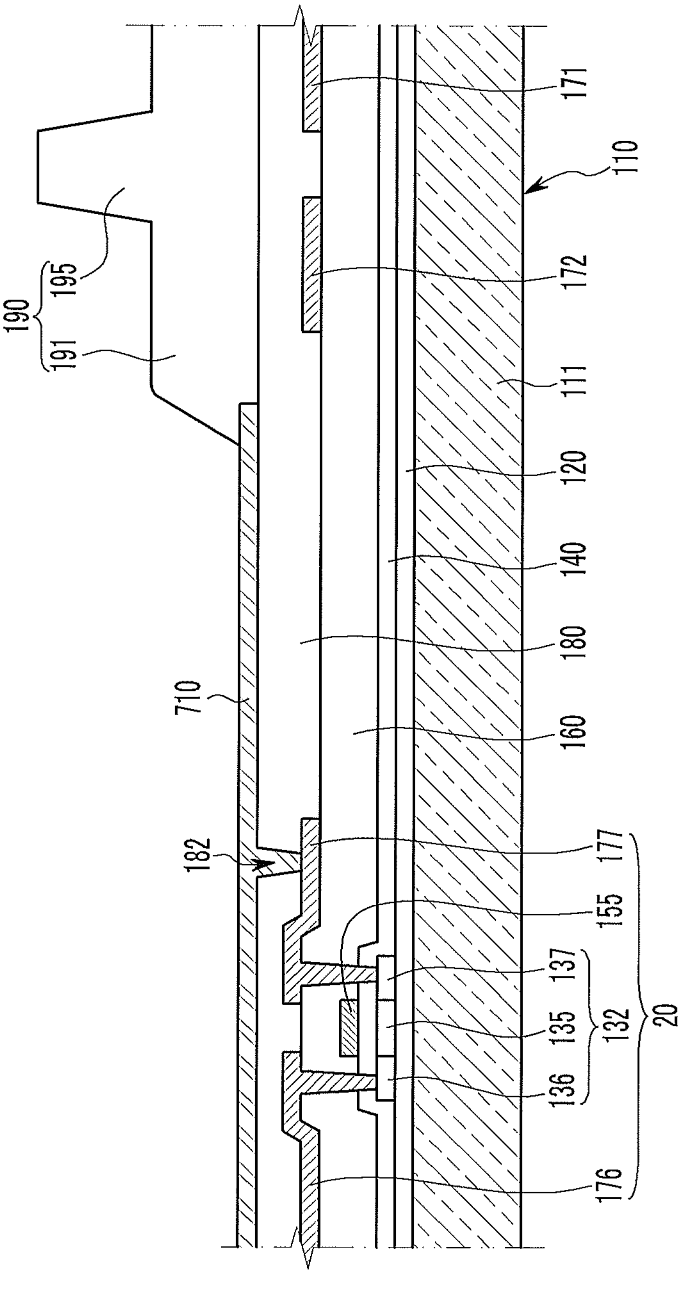

190
191
195
710
182
171
172
110
111
120
140
180
160
177
155
137
135
136
132
20
176

FIG. 5

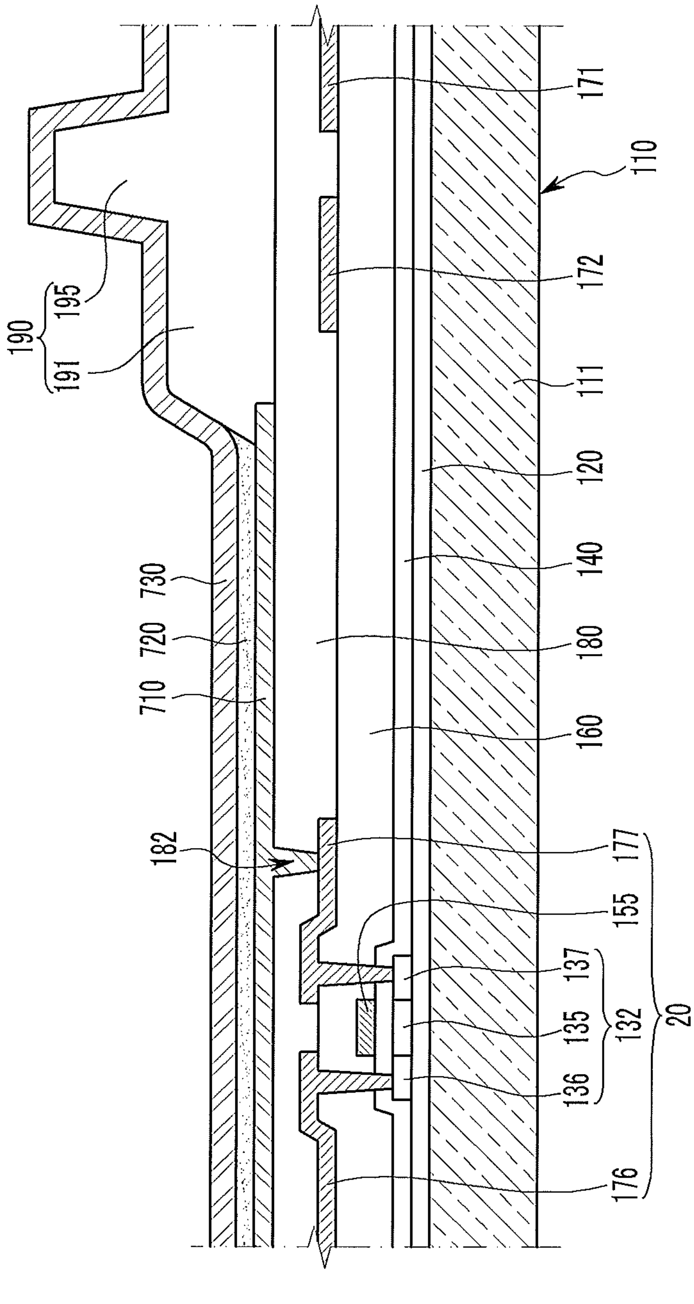

190
191
195
171
172
110
111
120
140
180
160
730
720
710
182
177
155
137
135
136
132
20
176

FIG. 6

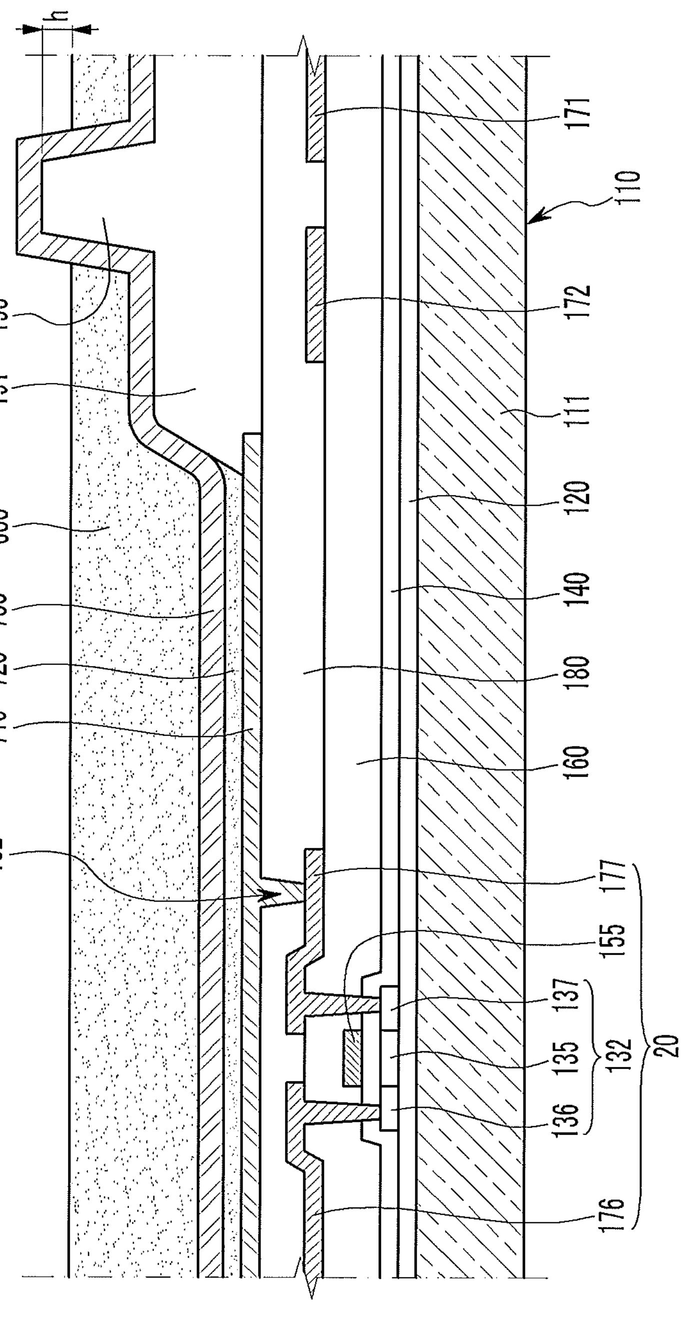
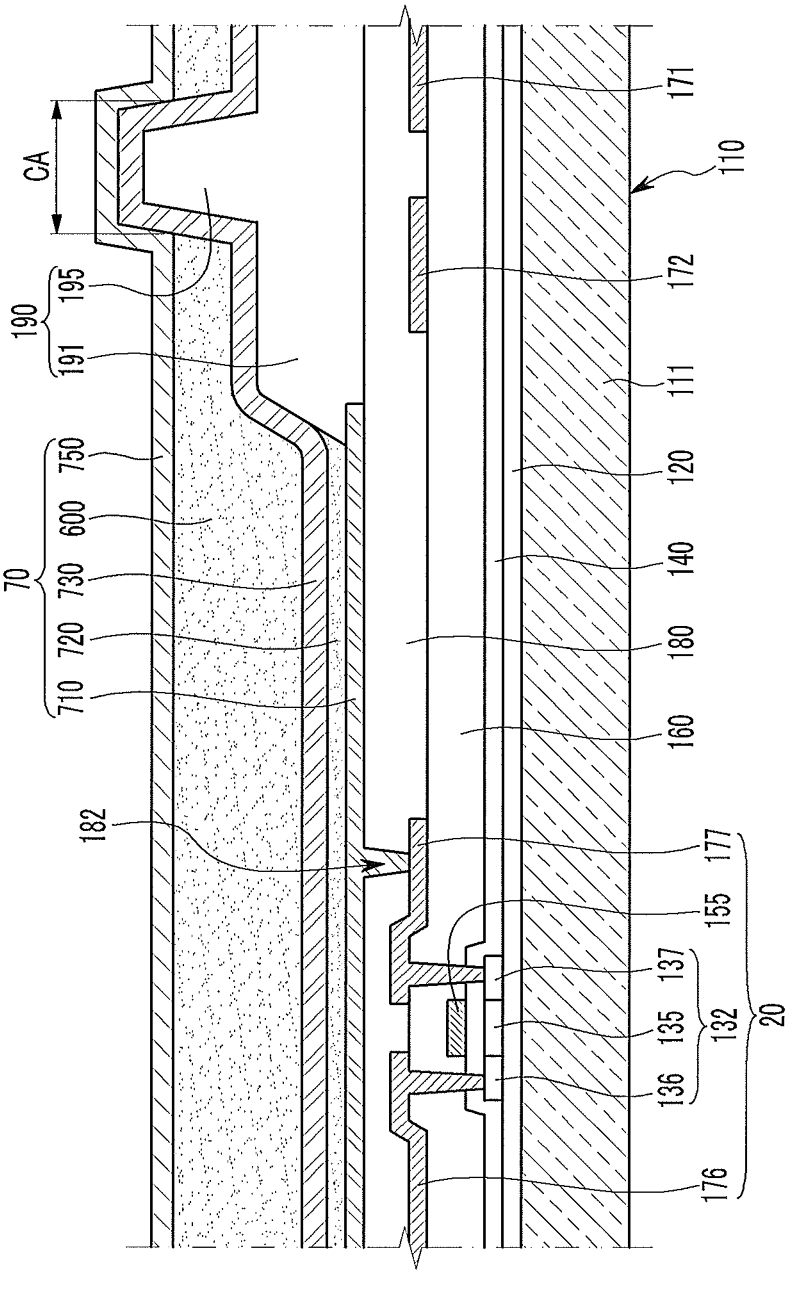

h
190
195
191
600
730
720
710
182
171
172
110
111
120
140
180
160
177
155
137
135
136
132
20
176

FIG. 7


CA
190
195
191
70
750
600
730
720
710
182
171
110
172
111
120
140
180
160
177
155
137
135
132
20
136
176

REFERENCES CITED IN THE DESCRIPTION

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- US 2007080377 A **[0005]**
- KR 20050030296 **[0005]**

专利名称(译)	有机发光二极管显示器及其制造方法		
公开(公告)号	[EP2207219B1](EP2207219B1)	公开(公告)日	2015-10-07
申请号	EP2010150138	申请日	2010-01-05
[标]申请(专利权)人(译)	三星显示有限公司		
申请(专利权)人(译)	三星移动显示器有限公司.		
当前申请(专利权)人(译)	三星DISPLAY CO.，LTD.		
[标]发明人	JEON HEE CHUL JEONG CHUL WOO LEE JOO HWA JUNG WOO SUK PARK SOON RYONG KWAK NOH MIN JEONG HEE SEONG KIM EUN AH		
发明人	JEON, HEE-CHUL JEONG, CHUL-WOO LEE, JOO-HWA JUNG, WOO-SUK PARK, SOON-RYONG KWAK, NOH-MIN JEONG, HEE-SEONG KIM, EUN-AH		
IPC分类号	H01L27/32 H01L51/52		
CPC分类号	H01L51/5281 H01L27/3246 H01L51/5228 H01L51/525 H01L51/5268		
优先权	1020090001163 2009-01-07 KR		
其他公开文献	EP2207219A2 EP2207219A3		
外部链接	Espacenet		

摘要(译)

OLED显示器包括基板构件（111），基板构件（111）上的多个像素电极（710），基板构件上的像素限定层（190），像素限定层（190），包括限定像素的像素部分（191）和多个光散射间隔物部分（195），像素限定部分（191）包括对应于并暴露像素电极（710）的多个开口，以及向上突出的光散射间隔物部分（195）从像素限定部分（191）远离基板构件（111），像素电极（710）上的有机发光层（720），有机发光层（720）上的第一公共电极（730），第一公共电极（730）的至少一部分位于像素限定层（190）上以与光散射间隔物部分（195）重叠，第一公共电极（730）上的透射膜（600）和第二公共电极（730）透射膜（600）上的公共电极（750）。