(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 280 435 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
22.02.2017 Bulletin 2017/08

(51) Int Cl.:
H01L 51/52 *(2006.01)* ***H01L 27/32*** *(2006.01)*

(21) Application number: **10251336.3**

(22) Date of filing: **27.07.2010**

(54) Organic light emitting diode display device

Organische lichtemittierende Diodenanzeigevorrichtung

Dispositif d'affichage à diode électroluminescente organique

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR

(30) Priority: **28.07.2009 KR 20090069060**

(43) Date of publication of application:
02.02.2011 Bulletin 2011/05

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Description

[0001] The present invention relates to an organic light emitting diode (OLED) display device. More particularly, the present invention relates to an OLED display device of which a display characteristic is improved by efficiently suppressing reflection of external light.

[0002] An organic light emitting diode (OLED) display device is a self emissive display device that displays images by using organic light emitting diodes, and has a relatively smaller thickness and lighter weight compared to a LCD device, because the OLED display device differs from a liquid crystal display (LCD) device in that the OLED display device does not require a separate light source while the LCD device requires a separate light source. Furthermore, because the organic light emitting diode display device involves high quality characteristics such as low power consumption, high luminance, and short response time, the OLED device is spotlighted as a next generation display device for portable electronic appliances.

[0003] Usually, at least one of the hole injection electrodes or the electron injection electrodes of the OLED display device, and other various metal wires thereof, may reflect light that is incident thereupon from the exterior of the OLED device. Thus, when the OLED display device is used in a bright environment, the black color expression and the contrast of the OLED display device become poor due to the reflection of external light incident from the exterior of the OLED display device.

[0004] In order to solve the problems, a polarizing plate and a phase delay plate are disposed for suppressing reflection of the external light. A contempoary method that suppresses reflection of external light through the polarizing plate and the phase delay plate however suffers from the problem that a large amount of light generated from an organic emission layer may also be lost when the light generated from an organic emission layer is emitted to the exterior of the OELD display device by the polarizing plate and the phase delay plate.

[0005] US 2003/0107314 discloses an organic electroluminescent device with a red filter, a green filter and a blue filter formed on a scaling substrate, wherein adjacent filters overlap in a pixel defining region.

[0006] JP 2003178879 discloses an OLED having a magenta coloured filter formed only on top of the red and blue light emitting pixels.

[0007] The above information disclosed in this Background section is only for enhancement of understanding of the background of the invention.

[0008] It is therefore an aspect of the present invention to provide an improved organic light emitting diode (OLED) display device to improve visibility by suppressing reflection of external light and to minimize loss of light emitted by the organic light emitting element.

[0009] The present invention provides an organic light emitting diode (OLED) display device according to claim 1.

[0010] Preferred aspects of the invention are set out in claims 2 and 3.

[0011] According to the present invention, visibility of the OLED display device can be improved by effectively suppressing reflection of external light, and by minimizing the light loss emitted outside from the organic light emitting element.

[0012] Further, the OLED display device can have an improved light viewing angle.

[0013] A more complete appreciation of the invention, and many of the attendant advantage thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjuncton with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

FIG. 1 is a cross-sectional view of an organic light emitting diode (OLED) display device according to a first embodiment of the present invention;
FIG. 2 is an enlarged layout view of an internal structure of the OLED display device of FIG. 1;
FIG. 3 is a cross-sectional view of FIG. 2, taken along cross-sectional line III-III of FIG. 2; and
FIG. 4 is a graph illustrating viewing angles of experimental and comparative examples according to the first embodiment of the present invention.

[0014] The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which embodiments of the invention are shown. As those skilled in the art would realize, the described embodiments may be modified in various different ways, all without departing from the scope of the present invention.

[0015] Furthermore, with embodiments of the present invention, detailed description is given for the constituent elements in the first embodiment with reference to the relevant drawings by using the same reference numerals for the same constituent elements, while only different constituent elements from those related to the first embodiment are described in other embodiments.

[0016] Parts that are irrelevant to the description are omitted in order to clearly describe the present invention, and like reference numerals designate like elements throughout the specification.

[0017] Furthermore, as the size and thickness of the respective structural components shown in the drawings are arbitrarily illustrated for explanatory convenience, the present invention is not necessarily limited as illustrated.

[0018] In the drawings, the thickness of layers, films, panels, regions, etc, are exaggerated for clarity and explanatory convenience. 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.

[0019] Hereinafter, a first embodiment of the present

invention will be described with reference to FIG. 1.

[0020] As shown in FIG. 1, an organic light emitting diode (OLED) display device 101 according to the first embodiment of the present invention includes a display substrate 110 and an encapsulation substrate 210 sealed with display substrate 110 in a vacuum-tight manner.

[0021] Display substrate 110 includes a first substrate main body 111, a driving circuit (DC) 60, and an organic light emitting element 70.

[0022] The first substrate main body 111 may be formed of an insulation substrate made of glass, quartz, ceramic, or plastic. However, the first embodiment of the present invention is not limited thereto, and the first substrate main body 111 may be formed of a metallic substrate made of stainless steel.

[0023] The first substrate main body 111 is divided into a plurality of pixel areas 50 disposed spaced apart from each other, and non-pixel areas 51 respectively disposed between each of the plurality of pixel areas.

[0024] Driving circuit DC 60 may be formed on the first substrate main body 111. Driving circuit DC 60 includes thin film transistors 10 and 20 (shown in FIGS. 2 and 3), and driving circuit DC 60 drives organic light emitting element 70.

[0025] Organic light emitting element 70 is formed at each of the plurality of pixel areas 50, and emits light according to a driving signal transmitted from driving circuit DC 60. Organic light emitting element 70 includes a pixel electrode 710 that may functionas an anode, a common electrode 730 that may function as a cathode, and an organic emission layer 720 disposed between pixel electrode 710 and common electrode 730. Pixel electrode 710, organic emission layer 720, and common electrode 730 are sequentially stacked on each pixel area of the first substrate main body 111.

[0026] A plurality of organic light emitting elements 70 formed at each of the plurality of pixel areas 50 respectively emit one of two or more colors. In the first embodiment of the present invention, the plurality of organic light emitting elements 70 respectively emit one of three primary colors of red, green, and blue. However, the first embodiment of the present invention is not limited thereto.

[0027] In addition, display substrate 110 further includes a pixel definition layer 190. Pixel definition layer 190 has an opening through which pixel electrode 710 of organic light emitting element 70 is exposed. That is, pixel definition layer 190 corresponds to the non-pixel area 51 of the first substrate main body 111, and the opening of pixel definition layer 190 corresponds to the pixel area of the first substrate main body 111.

[0028] Structures of organic light emitting element 70 and driving circuit DC 60 are shown in FIG. 2 and FIG. 3, but the first embodiment of the present invention is not limited to the structures shown in FIG. 2 and FIG. 3. OLED 70 and driving circuit DC 60 may be variously modified within a range that can be easily realized by a person skilled in the art.

[0029] In addition, in the first embodiment of the present invention, organic light emitting element 70 displays an image by emitting light toward encapsulation substrate 210. That is, OLED display device 101 has a top light emitting structure.

[0030] Encapsulation substrate 210 includes a second substrate main body 211 and a selective light absorbing layer 230. In addition, encapsulation substrate 210 further includes a color purity enhancing layer 220.

[0031] The second substrate main body 211 may be formed of an insulation substrate made of glass, quartz, ceramic, or plastic. The second substrate main body 211 is disposed in correspondance to organic light emitting element 70 with a gap 40 between the second substrate main body 211 and organic light emitting element 70, and the gap is sealed with the first substrate main body 111 through a sealant (not shown) in a vacuum-tight manner. The sealant (not shown) is disposed between the two substrates 110 and 210 along edges of display substrate 110 and encapsulation substrate 210.

[0032] The selective light absorbing layer 230 is formed on one major surface of the second substrate main body 211, and the selective light absorbing layer 230 faces toward and corresponds to the non-pixel area 51 of the first substrate main body 111. That is, the selective light absorbing layer 230 faces pixel definition layer 190.

[0033] The selective light absorbing layer 230 selectively absorbs light of a color component having a large amount among color components of external light incident from the outside and reflected at organic light emitting element 70. In other words, the selective light absorbing layer 230 selectively absorbs light of a color component which is the major color component among all the color components of light which is incident from the exterior of the OLED display device and is reflected by organic light emitting element 70. In addition, the selective light absorbing layer 230 is divided into a plurality of light absorbing regions 231, 232, and 233 that respectively absorb light of a color among two or more colors. In the first embodiment of the present invention, the selective light absorbing layer 230 is divided into a first light absorbing region 231, a second light absorbing region 232, and a third light absorbing region 233. The first embodiment of the present invention is however not limited thereto. The selective light absorbing layer 230 may be divided into two or four or more light absorbing regions.

[0034] In FIG. 1, the arrows of dotted lines represent the light proceeding direction, and reference numerals R, G, B, M, Y, and C respectively represent initials of respective colors. That is, R denotes red, G denotes green, B denotes blue, M denotes magenta, Y denotes yellow, and C denotes cyan.

[0035] Light incident through encapsulation substrate 210 from the exterior of the OLED display device 101 is reflected at common electrode 730 or pixel electrode 710 of organic light emitting element 70. OLED display device 101 according to the first embodiment of the present in-

vention is a top light emission type, and therefore most of the light incident from the exterior is reflected at pixel electrode 710 that is made of a reflective material. In this case, since the reflected external light passes through an organic emission layer 720, a relatively large amount of light of a specific wavelength band is reflected according to a color of light emitted from the corresponding organic emission layer 720. In other words, the major color component of the external incident light reflected by the organic emission layer 720 is determined by the color of the light emitted from the organic emission layer 720.

[0036] In further detail, an organic light emitting element 70 emitting light of a red-based color relatively reflects light of a green-based color the most. In further detail, an organic light emitting element 70 emitting light of a green-based color relatively reflects light of a blue-based color the most. In further detail, an organic light emitting element 70 emitting light of a blue-based color relatively reflects light of a red-based color the most.

[0037] Therefore, one of light absorption areas 231, 232, and 233 absorbing light of a particular color is arranged so that its projection onto the pixel defining layer 190 surrounds an organic light emitting element 70 that relatively reflects light of the particular color the most.

[0038] For example, the first light absorbing region 231 absorbs light of a green-based color, and is arranged so that its projection onto the pixel defining layer 190 surrounds an organic light emitting element 70 that emits light of a red-based color and reflects light of the green-based color the most. In this case, a selective light absorbing region 231 of the first light absorbing region 231 is formed of a color filter having a magenta-based color.

[0039] In addition, the second light absorbing region 232 absorbs light of a blue-based color, and is arranged so that its projection onto the pixel defining layer 190 surrounds an organic light emitting element 70 that emits light of a green-based color and reflects light of blue-based color the most. In this case, a selective light absorbing layer 230 of the second light absorbing region 232 is formed of a color filter having a yellow-based color.

[0040] The third light absorbing region 233 absorbs light of a red-based color, and is arranged so that its projection onto the pixel defining layer 190 surrounds an organic light emitting element 70 that emits light of a blue-based color and reflects light of red-based color the most. In this case, a selective light absorbing layer 230 of the third light absorbing region 233 is formed of a color filter having a cyan-based color.

[0041] Alternatively, the selective light absorbing layer 230 may be formed of a color filter of various types that have been known to a person in the art.

[0042] With the above configuration, OLED display device 101 according to the first embodiment of the present invention can effectively suppress reflection of external light. That is, the selective light absorbing layer 230 selectively absorbs external incident light of a specific wavelength band that is reflected from organic light emitting element 70 so that reflection of external light can be effectively suppressed without loosing light emitted from organic light emitting element 70.

[0043] In addition, in the first embodiment of the present invention, the colors of the respective light absorbing layers 231, 232, and 233 of the selective light absorbing layer 230 are not limited to the above description. When a color of external light incident from the exterior of the OLED display device and reflected at an organic light emitting element 70 and a color of a selective light absorbing layer 230 that is arranged to surround the corresponding organic light emitting element 70 are mixed, the selective light absorbing layer may have various colors within a range in lower brightness than that of the original colors. When a color of external light incident from the exterior of the OLED display device and reflected at an organic light emitting element 70 and a color of a selective light absorbing layer 230 that is arranged to surround the corresponding organic light emitting element 70 are mixed, the mixture has a color within a range in lower brightness compared to that of each of the two original colors, i.e, the color of external light incident from the exterior of the OLED display device and reflected at an organic light emitting element 70 and the color of a selective light absorbing layer 230 that is arranged to surround the corresponding organic light emitting element 70.

[0044] In particular, reflection of external light can be most effectively suppressed when a color of external light reflected at one organic light emitting element 70 and a color of the selective light absorbing layer 230 arranged to surround the corresponding organic light emitting element 70 are in a complementary relationship. Two colors are complementary to each other when a mixture of the two colors may produce a neutral color, i.e., grey, white, or black when the two colors are mixed in the proper proportion.

[0045] Color purity enhancing layer 220 is formed on one major surface of the second substrate main body 211, facing toward the pixel area 50 of the first substrate main body 111. That is, color purity enhancing layer 220 faces to the opening of pixel definition layer 190 and faces organic emission layer 720 of organic light emitting element 70. Color purity enhancing layer 220 is formed of a color filter having a color that is the same as a color of light emitted from the facing organic light emitting element 70.

[0046] In further detail, color purity enhancing layer 220 includes a first color purity enhancing layer 221 facing toward organic light emitting element 70 emitting light of the red-based color, a second color purity enhancing layer 222 facing toward organic light emitting element 70 emitting light of the green-based color, and a third color purity enhancing layer 223 facing toward organic light emitting element 70 emitting light of the blue-based color. In addition, the first color purity enhancing layer 221 is formed of a red color filter, the second color purity enhancing layer 222 is formed of a green color filter, and the third color purity enhancing layer 223 is formed of a

blue color filter.

[0047] Color purity enhancing layer 220 prevents a light defect due to mixture of external incident light with light emitted from organic light emitting element 70. In addition, color purity enhancing layer 220 absorbs unnecessary light except light of colors of purity enhancing layer 220 so that reflection of the external light can be suppressed.

[0048] As described, OLED display device 101 according to the first embodiment of the present invention can improve visibility by effectively suppressing reflection of external light. Further, loss of light emitted from organic light emitting element 70 is minimized so that power consumption of OLED display device 101 can be reduced and life-span thereof can be increased.

[0049] In addition, compared to a contemporary OLED display device where a black light blocking layer is disposed on one major surface of the second surbrate main body 211 instead of the selective light absorbing layer 230 to suppress reflection of external light, OLED display device 101 according to the first embodiment of the present invention has an improved light viewing angle. The contemporary light blocking layer blocks all the light, but the selective light absorbing layer 230 selectively absorbs light so that the viewing angle can be improved.

[0050] Hereinafter, an internal structure of OLED display device 101 will be described in detail with reference to FIG. 2 and FIG. 3. FIG. 2 is a layout view of a pixel structure, focusing on display substrate 110, and FIG. 3 is a cross-sectional view of display substrate 110 and encapsulation substrate 210 of FIG. 2, taken along the line III-III.

[0051] FIG. 2 and FIG. 3 illustrate the active matrix (AM) organic light emitting diode display device 101 with a 2Tr-1Cap structure where two thin film transistors (TFT) 10 and 20 and a capacitor 80 are formed at each pixel, but the first embodiment of the present invention is not limited thereto. Accordingly, OLED display device 101 may have three or more thin film transistors and two or more capacitors per each pixel, and a separate wire with various different structures. Here, the pixel is a minimal unit for displaying an image, and OLED display device 101 displays images through a plurality of pixels.

[0052] As shown in FIG. 2 and FIG. 3, display substrate 110 includes a switching thin film transistor 10, a driving thin film transistor 20, a capacitor 80, and an organic light emitting diode (OLED) 70, which are formed at each pixel. The structure constructed by switching thin film transistor 10, driving thin film transistor 20, and capacitor 80 is called a driving circuit DC 60. Display substrate 110 further includes gate lines 151 arranged in a direction, data lines 171 crossing gate lines 151 in an insulated manner, and a common power line 172.

[0053] A pixel may be defined by taking gate lines 151, data line 171, and common power line 172 as a boundary, but is not limited thereto.

[0054] OLED 70 includes a pixel electrode 710, an organic emission layer 720 formed on pixel electrode 710, and a common electrode 730 formed on organic emission layer 720. Here, pixel electrode 710 may be a positive (+) electrode which is a hole injection electrode, and common electrode 730 may be a negative (-) electrode which is an electron injection electrode. The first embodiment of the present invention is however not limited thereto. That is, pixel electrode 710 may be a negative electrode and common electrode 730 may be a positive electrode according to a driving method of OLED display device 101. Holes and electrons are injected to organic emission layer 720 respectively from pixel electrode 710 and common electrode 730. When excitons being combinations of the injected holes and electrons fall from an excited state to a ground state, light is emitted.

[0055] The pixel area 50 that may be defined as an opening of pixel definition layer 190 indicates an area where organic emission layer 720 substantially emits light.

[0056] In addition, in OLED display device 101 according to the first embodiment of the present invention, OLED 70 emits light toward encapsulation substrate 210. In order for OLED 70 to emit light toward encapsulation substrate 210, pixel electrode 710 is formed as a reflective electrode, and common electrode 730 is formed as a transparent or semi-transparent electrode.

[0057] Capacitor 80 includes a pair of capacitor electrode plates 158 and 178, interposing an interlayer insulating layer 160 therebetween. Here, interlayer insulating layer 160 functions as a dielectric material. The capacitance is determined depending upon electric charges charged at the first capacitor 80 and the voltages applied to the two capacitor electrode plates 158 and 178.

[0058] Switching thin film transistor 10 includes a switching semiconductor layer 131, a switching gate electrode 152, a switching source electrode 173, and a switching drain electrode 174. Driving thin film transistor 20 includes a driving semiconductor layer 132, a driving gate electrode 155, a driving source electrode 176, and a driving drain electrode 177.

[0059] Switching thin film transistor 10 is used as a switch for selecting a pixel to emit light. Switching gate electrode 152 is electrically connected to gate line 151. Switching source electrode 173 is electrically connected to data line 171. Switching drain electrode 174 is separated from switching source electrode 173 and is electrically connected to one of capacitor electrode plates 158 and 178, for example, capacitor electrode plate 158.

[0060] Driving thin film transistor 20 applies a driving voltage to pixel electrode 710 to excite an organic emission layer 720 of an OLED 70 in the selected pixel. Driving gate electrode 155 is electrically connected to capacitor electrode plate 158 electrically connected with switching drain electrode 174. Driving source electrode 176 and the other capacitor electrode plate 178 are respectively electrically connected to common power line 172. Driving drain electrode 177 is electrically connected to pixel electrode 710 of OLED 70 through a contact hole.

[0061] With such a structure, switching thin film tran-

sistor 10 is operated by the gate voltage applied to gate line 151, and transmits the data voltage applied to data line 171 to driving thin film transistor 20. The voltage with a value corresponding to a difference between the common voltage applied to driving thin film transistor 20 from common power line 172 and the data voltage transmitted from switching thin film transistor 11 is stored at capacitor 80, and the current corresponding to the voltage stored at capacitor 80 flows to OLED 70 through driving thin film transistor 20 to thereby excite OLED 70.

[0062] As shown in FIG. 3, encapsulation substrate 210 is disposed on OLED 70 to protect OLED 70.

[0063] Hereinafter, an experimental example and a comparative example will be described with reference to FIG. 4.

[0064] In the experimental example, an OLED display device includes a selective light absorbing layer 230 that selectively absorbs light of a specific wavelength band for each pixel area according to the first embodiment of the present invention. In the comparative example, a contemporary OLED display device includes a black-colored light blocking layer instead of the selective light absorbing layer 230.

[0065] In the present experiment, the viewing angle is set to 0 degrees from the front of the OLED display device and 90 degrees from the side of the OLED display device.

[0066] As shown in FIG. 4, when the viewing angle exceeds 40 degrees, light is completely blocked by the OLED display device having the black-colored light absorbing layer in the case of the comparative example so that visibility is radically deteriorated.

[0067] Meanwhile, since the selective light absorbing layer 230 in the experimental example selectively absorbs light of a specific wavelength band from reflected external light rather than absorbing all the light, the visibility is deteriorated slower compared to the comparative example even though the viewing angle exceeds 40 degrees.

[0068] As described, through the present experiment, the experimental example according to the first embodiment of the present invention has improved visibility and light viewing angle compared to the comparative example.

[0069] While this invention has been described in connection with what is presently considered to be practical embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the scope of the appended claims.

Claims

1. An organic light emitting diode, hereinafter referred to as OLED display device, comprising:

a first substrate main body (111) divided into a plurality of spaced apart pixel areas (50) including a red pixel area, a green pixel area and a blue pixel area, and non-pixel areas (51) disposed between each of the plurality of pixel areas;

a plurality of organic light emitting elements (70) including: a first organic light emitting element (70) which emits red light formed in the red pixel area;

a second organic light emitting element (70) which emits green light formed in the green pixel area;

a third organic light emitting element (70) which emits blue light formed in the blue pixel area; and

a second substrate main body (211) disposed spaced apart and facing toward the plurality of organic light emitting elements (70) with a space disposed between the second substrate main body and the plurality of organic light emitting elements, the space being sealed by the first and second substrate main bodies in a vacuum;

characterised by a selective light absorbing layer (230) formed on a major surface of the second substrate main body, the selective light absorbing layer (230) comprising:

a first light absorbing layer (231) comprising a color filter having a magenta- based color, disposed in alignment with and facing toward the non-pixel area (51) so that its projection onto the non-pixel area surrounds the first organic light emitting element (70);

a second light absorbing layer (232) comprising a color filter having a yellow-based color, disposed in alignment with and facing toward the non-pixel area (51) so that its projection onto the non-pixel area surrounds the second organic light emitting element (70); and

a third light absorbing layer (233) comprising a color filter having a cyan- based color, disposed in alignment with and facing toward the non-pixel area (51) so that its projection onto the non-pixel area surrounds the third organic light emitting element (70).

2. The OLED display device of claim 1, further comprising a color purity enhancing layer (220) formed on the major surface of the second substrate main body (211), the color purity enhancing layer facing toward the pixel area (50).

3. The OLED display device of claim 2, wherein the color purity enhancing layer (220) is a color filter having the same color of light emitted from the organic light emitting element facing toward the color purity enhancing layer.

Patentansprüche

1. Organische lichtemittierende Diode, hierin nachfolgend als OLED-Anzeigeeinrichtung bezeichnet, Folgendes umfassend:

einen ersten Substrat-Hauptkörper (111), unterteilt in eine Vielzahl von mit Zwischenraum angeordneten Pixelbereichen (50), die einen roten Pixelbereich, einen grünen Pixelbereich und einen blauen Pixelbereich einschließen, und Nicht-Pixelbereichen (51), die zwischen allen der Vielzahl von Pixelbereichen angeordnet sind;
eine Vielzahl von organischen lichtemittierenden Elementen (70), Folgendes einschließend:

ein erstes organisches lichtemittierendes Element (70), das rotes Licht emittiert, das im roten Pixelbereich geformt wird;
ein zweites organisches lichtemittierendes Element (70), das grünes Licht emittiert, das im grünen Pixelbereich geformt wird;
ein drittes organisches lichtemittierende*s Element (70), das blaues Licht emittiert, das im blauen Pixelbereich geformt wird; und
einen zweiten Substrat-Hauptkörper (211), mit Zwischenraum angeordnet und der Vielzahl von organischen lichtemittierenden Elementen (70) zugewandt, mit einem zwischen dem zweiten Substrat-Hauptkörper und der Vielzahl von organischen lichtemittierenden Elementen angeordneten Raum, wobei der Raum durch die ersten und zweiten Substrat-Hauptkörper in einem Vakuum versiegelt ist;

gekennzeichnet durch eine selektive lichtabsorbierende Schicht (230), die auf einer großen Oberfläche des zweiten Substrat-Hauptkörpers geformt ist, wobei die selektive lichtabsorbierende Schicht (230) Folgendes umfasst:

eine erste lichtabsorbierende Schicht (231), ein Farbfilter mit einer magentabasierten Farbe umfassend, auf den Nicht-Pixelbereich (51) ausgerichtet und ihm zugewandt, sodass ihre Projektion auf den Nicht-Pixelbereich das erste organische lichtemittierende Element (70) umschließt;
eine zweite lichtabsorbierende Schicht (232), ein Farbfilter mit einer gelbbasierten Farbe umfassend, auf den Nicht-Pixelbereich (51) ausgerichtet und ihm zugewandt, sodass ihre Projektion auf den Nicht-Pixelbereich das zweite organische lichtemittierende Element (70) umschließt; und
eine dritte lichtabsorbierende Schicht (233), ein Farbfilter mit einer cyanbasierten Farbe umfassend, auf den Nicht-Pixelbereich (51) ausgerichtet und ihm zugewandt, sodass ihre Projektion auf den Nicht-Pixelbereich das dritte organische lichtemittierende Element (70) umschließt.

2. OLED-Anzeigeeinrichtung nach Anspruch 1, außerdem eine Farbreinheit verbessernde Schicht (220) umfassend, die auf der großen Oberfläche des zweiten Substrat-Hauptkörpers (211) geformt ist, wobei die Farbreinheit verbessernde Schicht dem Pixelbereich (50) zugewandt ist.

3. OLED-Anzeigeeinrichtung nach Anspruch 2, worin die Farbreinheit verbessernde Schicht (220) ein Farbfilter ist, das dieselbe Farbe hat wie die des Lichts, das vom organischen lichtemittierenden Element emittiert wird, das der Farbreinheit verbessernden Schicht zugewandt ist.

Revendications

1. Diode électroluminescente organique, appelée ci-après dispositif d'affichage à OLED, comprenant :

un premier corps principal de substrat (111) divisé en une pluralité de zones de pixels espacées (50) comprenant une zone de pixel rouge, une zone de pixel vert et une zone de pixel bleu, et des zones non de pixel (51) disposées entre chacune de la pluralité de zones de pixels ;
une pluralité d'éléments électroluminescents organiques (70) comprenant :

un premier élément électroluminescent organique (70) qui émet une lumière rouge formé dans la zone de pixel rouge ;
un deuxième élément électroluminescent organique (70) qui émet une lumière verte formé dans la zone de pixel vert ;
un troisième élément électroluminescent organique (70) qui émet une lumière bleue formé dans la zone de pixel bleu ; et
un deuxième corps principal de substrat (211) disposé espacé de et orienté vers la pluralité d'éléments électroluminescents organiques (70), un espace étant disposé entre le deuxième corps principal de substrat et la pluralité d'éléments électroluminescents organiques, l'espace étant scellé par les premier et deuxième corps principaux de substrat sous vide ;

caractérisée par une couche d'absorption sélective de la lumière (230) formée sur une surface principale du deuxième corps principal de

substrat, la couche d'absorption sélective de la lumière (230) comprenant :

une première couche absorbant la lumière (231) comprenant un filtre coloré ayant une couleur à base de magenta, disposée en alignement avec la zone non de pixel (51) et orientée vers celle-ci de sorte que sa projection sur la zone non de pixel entoure le premier élément électroluminescent organique (70) ;
une deuxième couche absorbant la lumière (232) comprenant un filtre coloré ayant une couleur à base de jaune, disposée en alignement avec la zone non de pixel (51) et orientée vers celle-ci de sorte que sa projection sur la zone non de pixel entoure le deuxième élément électroluminescent organique (70) ; et
une troisième couche absorbant la lumière (233) comprenant un filtre coloré ayant une couleur à base de cyan, disposée en alignement avec la zone non de pixel (51) et orientée vers celle-ci de sorte que sa projection sur la zone non de pixel entoure le troisième élément électroluminescent organique (70).

2. Dispositif d'affichage à OLED selon la revendication 1, comprenant en outre une couche d'amélioration de pureté de couleur (220) formée sur la surface principale du deuxième corps principal de substrat (211), la couche d'amélioration de pureté de couleur étant orientée vers la zone de pixel (50).

3. Dispositif d'affichage à OLED selon la revendication 2, dans lequel la couche d'amélioration de pureté de couleur (220) est un filtre coloré ayant la même couleur de lumière que celle émise par l'élément électroluminescent organique orienté vers la couche d'amélioration de pureté de couleur.

FIG.1

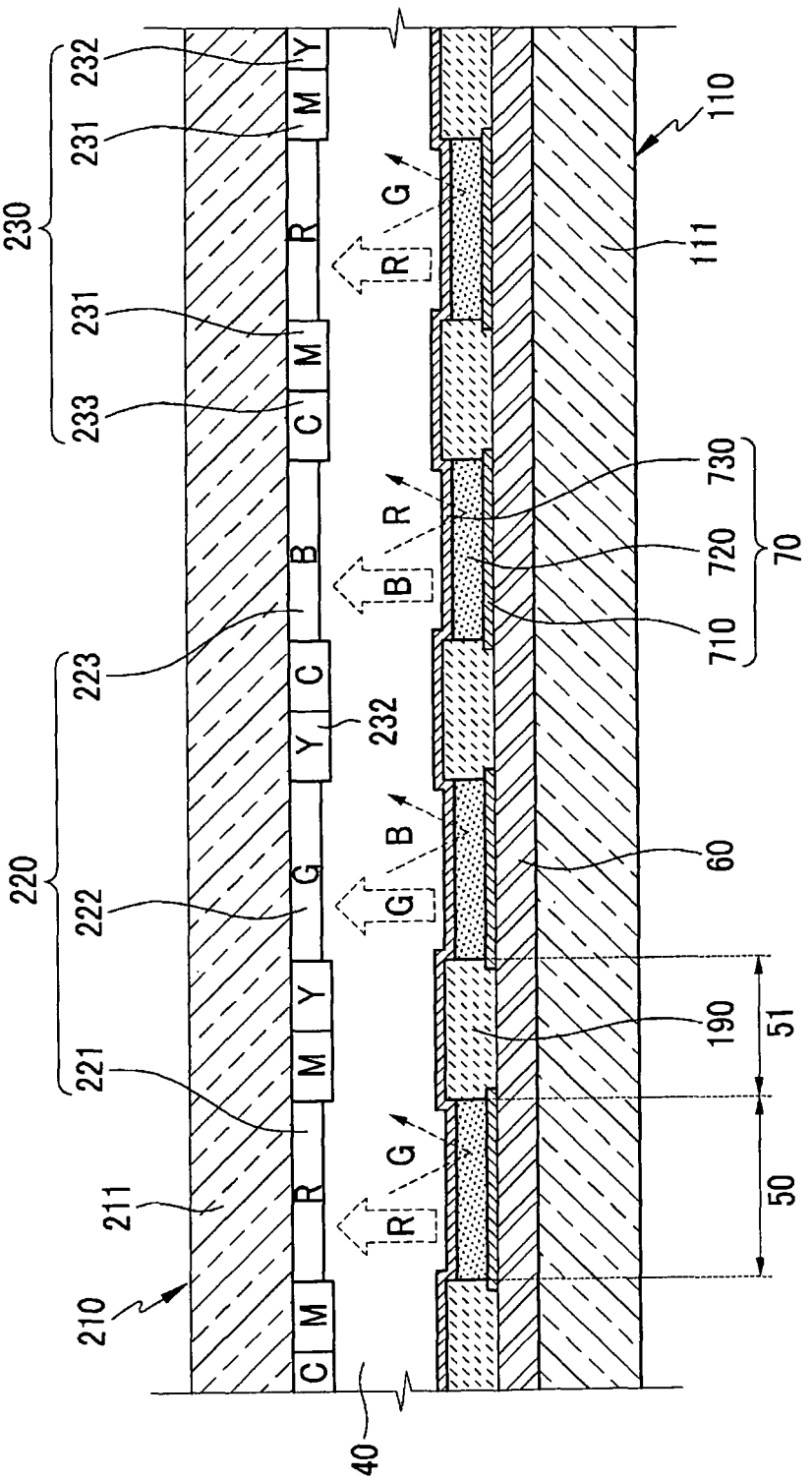

101
230
232
231
231
233
223
220
222
221
211
210
40
110
111
730
720
710
70
60
190
51
50
Y
M
R
M
C
B
C
Y
G
Y
M
R
C
M
G
R
B
R
G
R
B
G
R

FIG.2

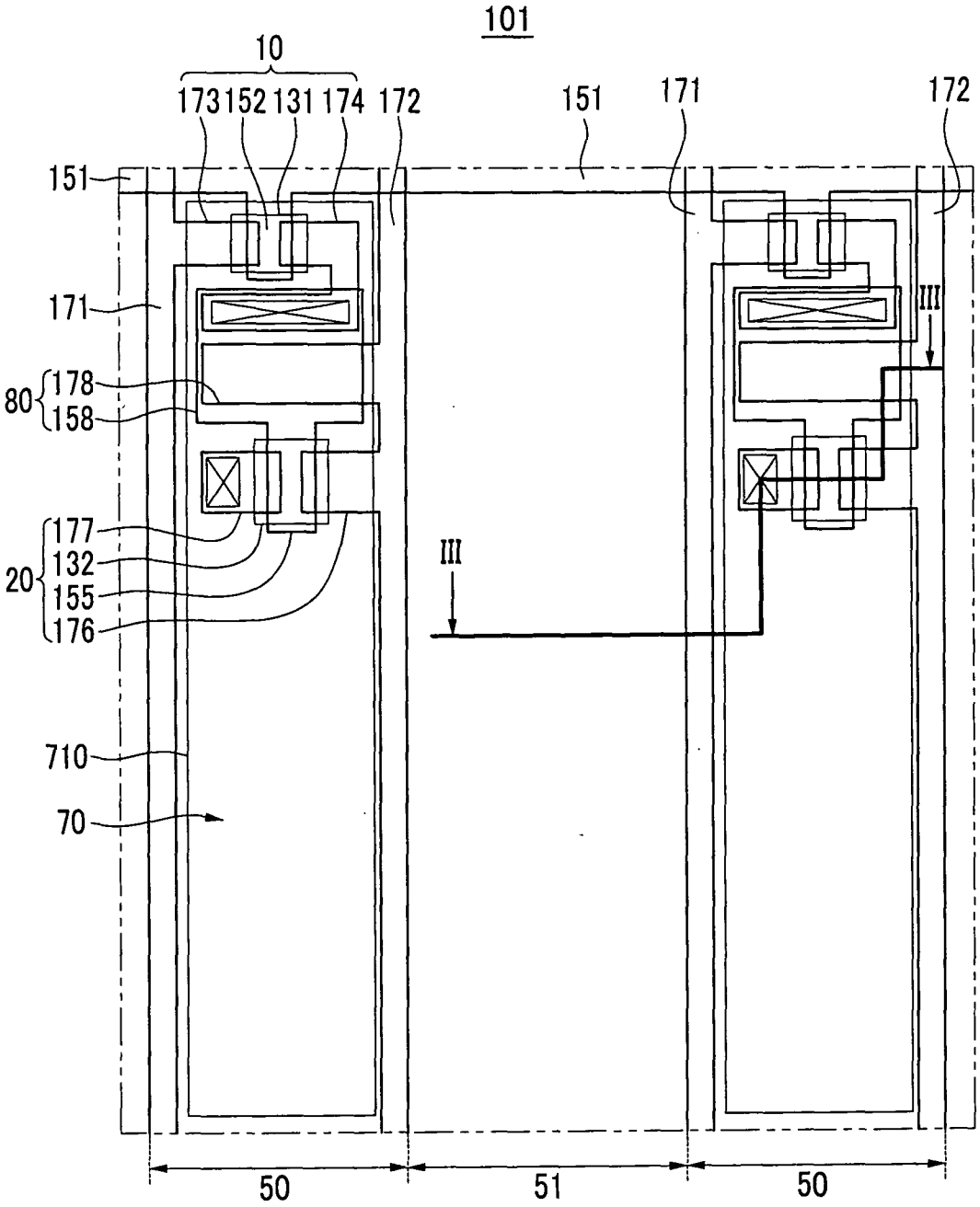

101
10
173
152
131
174
172
151
171
172
151
171
III
80
178
158
177
132
155
176
20
III
710
70
50
51
50

FIG.3

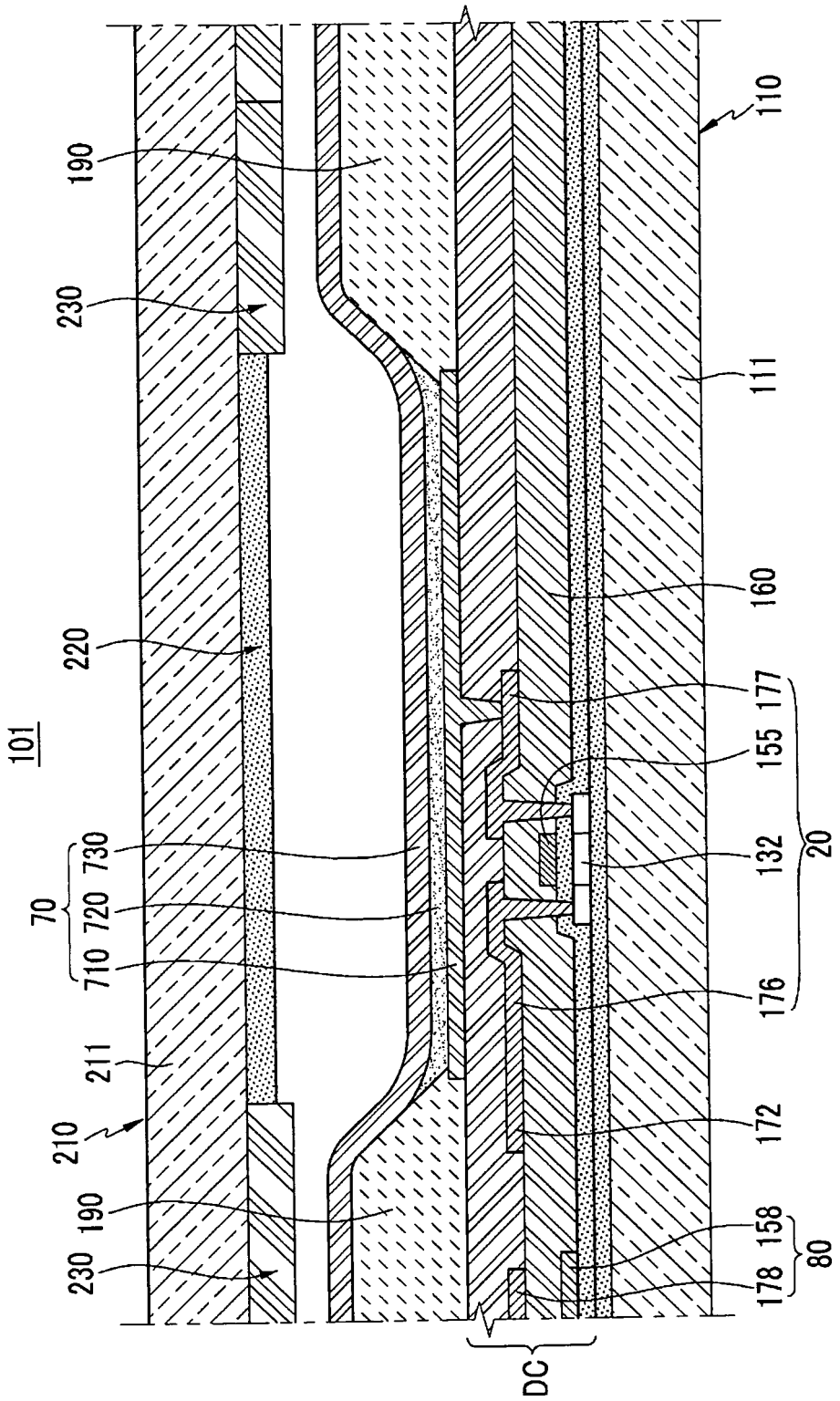
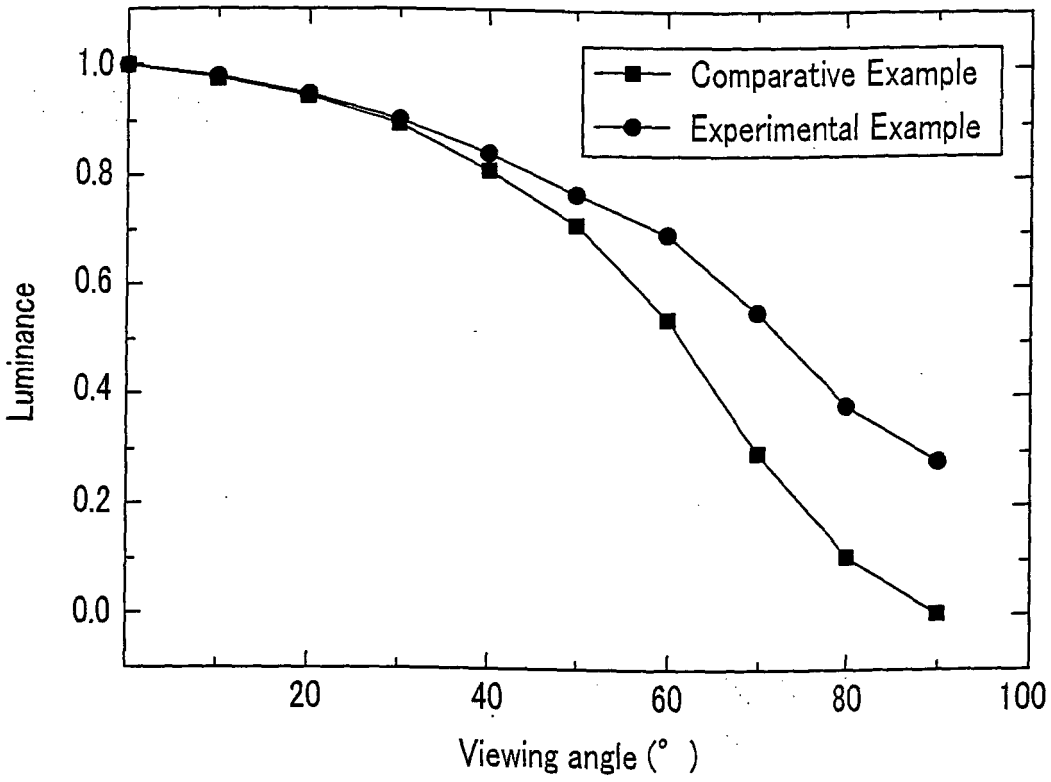

110
190
230
111
160
220
177
155
101
730
132
20
70
720
710
176
211
172
210
190
158
80
230
178
DC

FIG. 4


Comparative Example
Experimental Example
Luminance
1.0
0.8
0.6
0.4
0.2
0.0
20
40
60
80
100
Viewing angle (°)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- JP 2003178879 B **[0006]**

专利名称(译)	有机发光二极管显示装置		
公开(公告)号	EP2280435B1	公开(公告)日	2017-02-22
申请号	EP2010251336	申请日	2010-07-27
[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.		
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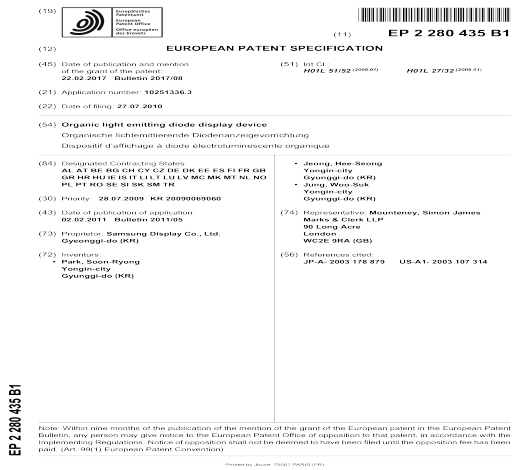
IPC分类号	H01L51/52 H01L27/32		
CPC分类号	H01L51/5284 H01L27/3211 H01L27/3244		
优先权	1020090069060 2009-07-28 KR		
其他公开文献	EP2280435A2 EP2280435A3		
外部链接	Espacenet		

摘要(译)

一种有机发光二极管显示装置，包括：第一基板主体，分为多个像素区域;非像素区域，分别设置在所述多个像素区域中的每个像素区域之间;多个有机发光元件形成在多个像素区域的每一个中;第二基板主体，设置成面对所述多个有机发光元件，其间具有真空空间;选择性光吸收层形成在第二基板主体的主表面上，选择性光吸收层面向非像素区域，选择性光吸收层选择性地吸收对应于主要颜色成分的颜色的光在与非像素区域相邻的多个有机发光元件之一处反射的外部入射光的颜色分量中。


(19) European Patent Office

(11) EP 2 280 435 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent: 22.02.2017 Bulletin 2017/08

(51) Int Cl.: H01L 51/52 (2006.01) H01L 27/32 (2006.01)

(21) Application number: 10251336.3

(22) Date of filing: 27.07.2010

(54) Organic light emitting diode display device

Organische lichtemittierende Diodenanzeigevorrichtung

Dispositif d'affichage à diode électroluminescente organique

(84) Designated Contracting States: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR

(30) Priority: 28.07.2009 KR 20090069060

(43) Date of publication of application: 02.02.2011 Bulletin 2011/05

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(56) References cited: JP-A- 2003 178 879 US-A1- 2003 107 314

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