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(54) **Organic light emitting diode display**

(57) An organic light emitting diode (OLED) display is disclosed; the OLED display includes i) a plurality of pixels (a,b,c) comprising a blue light emitting region, a green light emitting region, and a red light emitting region on a substrate (200) and formed by stacking a lower electrode (290), an organic layer (300), and an upper electrode (310); the blue and green light emitting regions are formed in a microcavity structure, and the red light emitting region is formed in a non-microcavity structure.

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Description

[0001] The described technology generally relates to an organic light emitting diode (OLED) display.

[0002] Among flat panel displays, an electroluminescent device uses an electroluminescence (EL) phenomenon whereby light is generated when a predetermined electric field is applied to phosphor. EL devices are generally classified into inorganic or organic type according to the material used to form a light emitting layer. Since an organic EL device emits light across a broad colour spectrum and has desirable characteristics such as high luminance and low driving voltage, it has received considerable attention for commercial applications.

[0003] In an organic light emitting diode (OLED), a pixel area defined by a plurality of scan lines and a plurality of data lines formed in a direction substantially perpendicular thereto implements each of red, green, and blue sub-pixels, thereby making it possible to configure a matrix of pixels into a full-colour flat panel device.

[0004] In a typical OLED, a first electrode layer having a predetermined pattern is formed on the upper portion of a substrate including a red pixel area, a green pixel area, and a blue pixel area in order to implement red (R), green (G), and blue (B), respectively.

[0005] The organic layer including the light emitting layer is formed on the upper portion of the first electrode layer. The organic layer may include a hole injection layer (HIL), a hole transport layer (HTL), a hole blocking layer, an electron transport layer (ETL), and an electron injection layer (EIL) in addition to the light emitting layer. A second electrode layer is formed on the upper portion of the organic layer over the substrate.

[0006] In this case, the organic layer may be formed by a deposition method, an ink jet method, a laser thermal induced method, or the like.

[0007] One inventive aspect is an organic light emitting diode display capable of making substantially uniformly thick organic layers for blue, green and red light emitting regions, while implementing full colour.

[0008] Another aspect is an organic light emitting diode display including: a plurality of pixels defined by a blue light emitting region, a green light emitting region, and a red light emitting region on a substrate and formed by stacking a lower electrode, an organic layer, and an upper electrode, wherein the blue and green light emitting regions are formed in a microcavity structure and the red light emitting region is formed in a non-microcavity structure.

[0009] Another aspect is an organic light emitting diode display including: a substrate having a plurality of light emitting regions defined by a blue light emitting region, a green light emitting region, and a red light emitting region; a lower electrode formed in the blue and green light emitting regions, and formed by stacking a first transparent conductive layer, a semitransparent metal layer, and a second transparent conductive layer; and a lower electrode formed of a transparent conductive layer in the red light emitting region. Another aspect is an organic light emitting diode (OLED) display comprising: a plurality of pixels comprising a blue light emitting region, a green light emitting region, and a red light emitting region on a substrate and formed by stacking a lower electrode, an organic layer, and an upper electrode, wherein the lower electrode of the blue and green light emitting regions is formed of at least one transparent layer and at least one semitransparent layer and wherein the lower electrode of the red light emitting region is formed of only a transparent layer.

[0010] In the above display, the lower electrode of the red light emitting region is formed of one or more transparent conductive layers. In the above display, the lower electrode of the blue and green light emitting regions is formed of a first transparent conductive layer, a semitransparent metal layer, and a second transparent conductive layer which are sequentially formed. In the above display, the thickness of the first transparent conductive layer is from about 50 nm to about 150 nm and the thickness of the second transparent conductive layer is from about 10 nm to about 20 nm.

[0011] In the above display, the thickness of the semitransparent metal layer is from about 5 nm to about 20 nm. In the above display, the thickness of the organic layer is from about 50 nm to about 60 nm. In the above display, the organic layers formed on the blue light emitting region, the green light emitting region, and the red light emitting region include a blue emission layer, a green emission layer, and a red emission layer, respectively. In the above display, the organic layer further includes at least one of: a hole injection layer (HIL), a hole transport layer (HTL), a hole blocking layer and, an electron injection layer (EIL). In the above display, the thickness of the hole injection layer (HIL) and the hole transport layer (HTL) is from about 19 nm to about 36 nm. In the above display, the thickness of the organic layer in the red light emitting region is substantially the same as the thickness of the red right emitting layer or is about 60 nm.

[0012] The above display further comprises: a colour filter or a colour converting layer formed on the upper electrode of the red light emitting region. The above display further comprises: an encapsulation substrate bonded to the substrate and including the colour filter or a colour converting layer formed to correspond to the red light emitting region.

[0013] Another aspect is an organic light emitting diode (OLED) display comprising: a substrate having a plurality of light emitting regions which comprise a blue light emitting region, a green light emitting region, and a red light emitting region; a first lower electrode formed in the blue and green light emitting regions, and formed by stacking a first transparent conductive layer, a semitransparent metal layer, and a second transparent conductive layer; and a second lower electrode formed in the red light emitting region and formed of only a transparent conductive layer.

[0014] In the above display, an organic layer and an upper electrode are further formed on the lower electrodes. In the above display, the thickness of the first transparent conductive layer is from about 50 nm to about 150 nm and the thickness of the second transparent conductive layer is from about 10 nm to about 20 nm. In the above display, the thickness of the semitransparent metal layer is from about 5 nm to about 20 nm. In the above display, the thickness of the organic layer is from about 50 nm to about 60 nm.

[0015] Another aspect is an organic light emitting diode (OLED) display comprising: a plurality of pixels each of which comprises blue, red and green sub-pixels configured to emit blue, red and green light, respectively; a first lower electrode formed in the blue and green sub-pixels, wherein the first lower electrode comprises at least one transparent layer and at least one semitransparent layer; and a second lower electrode formed in the red sub-pixel and formed of a transparent conductive layer, wherein the second lower electrode does not include a semitransparent layer.

[0016] In the above display, the first lower electrode comprises i) a first transparent conductive layer, ii) a semitransparent metal layer and iii) a second transparent conductive layer which are sequentially formed. In the above display, the second lower electrode is formed of one or more transparent conductive layers.

[0017] Embodiments of the invention will now be described by way of example with reference to the accompanying drawings, in which:

FIG. 1 is a cross-sectional view of an organic light emitting diode display according to an embodiment.

FIG. 2A is a cross-sectional view showing in detail a structure of a lower electrode and an organic layer in a blue light emitting region.

FIG. 2B is a cross-sectional view showing in detail a lower electrode and an organic layer in a green light emitting region.

FIG. 2C is a cross-sectional view showing in detail a lower electrode and a structure of an organic layer in a red light emitting region.

FIGS. 3 and 4 are CIE-based colour coordinates for explaining a colour reproduction rate when the red light emitting region is formed in a non-microcavity structure.

[0018] Generally, in order to increase the colour reproduction rate, e.g., the proportion of colours that can be generated with respect to a colour gamut which humans can recognize, of an OLED display, a first electrode having an ITO/Ag/ITO structure is used to transmit a portion of emitted light and resonate another portion of the emitted light.

[0019] In this case, since the red area emits light having a longer wavelength than blue and green areas, the thickness of the organic layer in the red area should be formed to be thicker than that of the organic layer in the blue and green areas in order to generate the desired degree of resonance. Therefore, the thickness of the organic layer formed in each light emitting region becomes non-uniform.

[0020] Hereinafter, an organic light emitting diode display according to an embodiment will be described more fully hereinafter with reference to the accompanying drawings. The disclosed embodiments mainly describe the case where a plurality of pixels defined by blue, green and red light emitting regions are formed on a substrate. Further, the disclosed embodiments describe, by way of example, an active matrix organic light emitting diode display; however, they may be applied to a passive matrix organic light emitting diode display.

[0021] Referring to FIG. 1, a buffer layer 210 is formed over a substrate 200 and an amorphous silicon layer is formed on the buffer layer 210 by, for example, a deposition method such as PECVD, LPCVD, or the like. In this case, the substrate 200 may be an insulating substrate such as glass, quartz, sapphire, etc., and the buffer layer 210 prevents the amorphous silicon layer from being polluted by impurities diffused from the substrate 200.

[0022] The amorphous silicon layer may be crystallized by methods such as excimer laser annealing (ELA), sequential lateral solidification (SLS), metal induced crystallization (MIC) or metal induced lateral crystallization (MILC). The amorphous silicon layer may be patterned by a photolithography process to form a semiconductor layer 220 in a thin layer transistor area in a unit pixel.

[0023] Thereafter, a gate insulating layer 230 is formed over the substrate 200 including the semiconductor layer 220. The gate insulating layer 230 may be formed at least partially of silicon oxide, silicon nitride or may be formed in a stacked structure thereof.

[0024] Next, after a gate electrode material is applied to the upper portion of the gate insulating layer 230, it is etched to form the patterned gate electrode 240. The gate electrode 240 is formed to be partially overlapping with the semiconductor layer 220, and the semiconductor layer 220 area overlapping with the gate electrode 240 is defined as the channel area.

[0025] The gate electrode 240 may be formed of a single layer of an aluminium alloy of aluminium (Al) or aluminium-neodymium (Al-Nd) or of a multi-layer in which aluminium alloy is stacked on chromium (Cr) or molybdenum (Mo) alloy.

[0026] Next, an interlayer insulating layer 250 is formed over the surface. The interlayer insulating layer 250 may use a silicon nitride layer or a silicon oxide layer.

[0027] Next, a metal layer (not shown) is formed on an interlayer insulating layer 250 and is then patterned, thereby forming source/drain electrodes 260a and 260b. The source/drain electrodes 260a and 260b are electrically connected to the source area and the drain area of the semiconductor layer 220 through a contact hole formed by partially etching the gate insulating layer 230 and the interlayer insulating layer 250.

[0028] The metal layer forms a single layer selected from a group of Mo, W, MoW, AlNd, Ti, Cu, Cu alloy, Al, Al alloy, Ag and Ag alloy, etc. Alternatively, in order to reduce the wire resistance, the metal layer may be formed of one stacking structure selected from one group consisting of a two-layer structure of Mo, Cu, Al or Ag that is a low resistance material or a multilayer structure of two layers or more.

[0029] Then, the silicon nitride layer, the silicon oxide layer or the stacking structure thereof are deposited over the surface at a predetermined thickness to form the protective layer 270 and then a planarization layer 280 is formed on the protective layer 270. The planarization layer 280 may be formed at least partially of polyimide, benzocyclobutene based resin, and acrylate.

[0030] Thereafter, the protective layer 270 and the planarization layer 280 are partially etched to form a via hole that exposes any one of source/drain electrodes 260a and 260b and the lower electrode 290 formed on the planarization layer 280 is electrically connected to any one of the source/drain electrodes 260a and 260b exposed through a via hole.

[0031] The lower electrode 290 is formed in a blue light emitting region (a), a green light emitting region (b), a red light emitting region (c), respectively, and the position in which the light emitting region is formed is not limited thereto.

[0032] A pixel defining layer 295 having an opening is formed on the upper of the lower electrode 290 to expose a portion of the lower electrode 290 through the opening and to form the organic layer 300 on the lower electrode 290 that is opened.

[0033] The pixel defining layer 295 may be formed at least partially of polyimide, benzocyclobutene series resin, spin-on glass (SOG), and acrylate.

[0034] Then, the upper electrode 310 is formed over the substrate 200 to complete the organic light emitting diode. The upper electrode 310 may be formed at least partially of Li, Ca, LiF/Ca, LiF/Al, Al, Mg and an alloy thereof.

[0035] Referring to FIG. 2A, the lower electrode 290 formed in the blue light emitting region (a) is formed by sequentially stacking the first transparent conductive layer 290a, a semitransparent metal layer 290c, and the second transparent conductive layer 290b and the organic layer 300 is formed on the lower electrode 290. The lower electrode 290 of the blue light emitting region (a) may include at least one transparent conductive layer and at least one semitransparent metal layer. This applies to the lower electrode 290 formed in the green light emitting region (b). The first and second transparent conductive layers 290a and 290b may be formed at least partially of indium tin oxide (ITO), an indium zinc oxide (IZO), tin oxide (To), and zinc oxide (ZnO). The first transparent conductive layer 290a substantially serves as an anode and the second transparent conductive layer 290b serves to match work function, thereby completing the lower electrode 290.

[0036] In one embodiment, the first transparent conductive layer 290a has good light efficiency of blue, green, red within a thickness of about 50 nm to about 150 nm of blue, green, and red and thus, the first transparent conductive layer 290a is formed at the thickness of about 50 nm to about 150 nm.

[0037] In one embodiment, the second transparent conductive layer 290b is formed at about 10 nm or more to sufficiently perform a role of the anode and since it is considered together with the thickness of the organic layer, it may be formed at about 30 nm or less in order to maximize the microcavity (resonance) effect of light generated from the organic light emitting layer.

[0038] The semitransparent metal layer 290c may be formed at least partially of Ag, Al, Ni, Pt and Pd. In one embodiment, the thickness of the semitransparent metal layer 290c is from about 5 nm to about 20 nm. This range may provide an optimum balance between light transmittance and the functionality as a metal electrode. However, the thickness of the semitransparent metal layer 290c may be less than about 5 nm or greater than about 20 nm.

[0039] The organic layer 300 may further include at least one of the blue light emitting layer 303a, the hole injection layer 301 positioned between the blue light emitting layer 303a and the lower electrode 290 other than the blue light emitting layer 303a, the hole blocking layer 304 positioned on the hole transport layer 302 and the blue light emitting layer 303a and the electron injection layer 305. In this configuration, the organic layer 300 may be formed at the thickness of about 50 nm to about 60 nm in consideration of the light emitting luminance and the colour reproduction rate. Alternatively, the thickness of the organic layer 300 may be less than about 50 nm or greater than about 60 nm.

[0040] In this case, the thickness of the hole injection layer 301 and the hole transport layer 302 between the lower electrode 290 and the blue light emitting layer 303a maximizes the luminance and the microcavity effect, such that they may be formed at a thickness of about 19 nm to about 36 nm in order to maximize the microcavity effect. Again, the thickness of the layers 301 and 302 may be less than about 19 nm or greater than about 36 nm.

[0041] Referring to FIG. 2B, the lower electrode 290 formed in the green light emitting region (b) is formed by sequentially stacking the first transparent conductive layer 290a, the semitransparent metal layer 290c and the second transparent conductive layer 290b and the organic layer 300 is formed on the lower electrode 290. The description for the layers 290a-290c and organic layer 300 of the blue light emitting region (a) applies to those of the green light emitting region (b), except that in FIG. 2B, the organic layer 300 includes a green light emitting layer 303b instead of the blue light emitting layer 303a.

[0042] Referring to FIG. 2C, the lower electrode 290 formed in the red light emitting region (c) is formed of the transparent conductive layer and the organic layer 300 is formed on the lower electrode 290. The lower electrode 290 may be formed in a single layer or a multilayer structure of the transparent conductive layer. The transparent conductive layer may be formed at least partially of indium tin oxide (ITO), an indium zinc oxide (IZO), tin oxide (TO), and zinc oxide (ZnO) and serves as the anode of the lower electrode 290.

[0043] The thickness of the lower electrode 290 is determined together with the thickness of the organic layer 300 in order to increase the light emitting luminance and the colour reproduction rate.

[0044] The organic layer 300 includes the red light emitting layer 303c and may further include at least one of the hole injection layer 301 positioned between the lower electrode 290 and the red light emitting layer 303c, the hole blocking layer 304 positioned on the hole transport layer 302 and the red light emitting layer 303c and the electron injection layer 305.

[0045] In this case, the organic layer 300 may be formed at the thickness of about 50 nm to about 60 nm in consideration of the light emitting luminance, the colour reproduction rate, the thickness of the organic layers of the blue light emitting region and the green light emitting region, etc. However, the red light emitting region can sufficiently satisfy the colour reproduction rate by including only the red light emitting layer and thus, may be formed at the thickness of the red light emitting layer to the thickness of about 60 nm, but is not limited thereto. However, when the red light emitting layer is about 33.6 nm to about 35.6 nm, the light emitting efficiency and the colour reproduction rate is excellent.

[0046] According to the above description with reference to FIGS. 2A to 2C, the lower electrode formed in the blue light emitting region and the green light emitting region has a structure of the first transparent conductive layer/semi-transparent metal layer/second transparent conductive layer, but the lower electrode positioned in the red light emitting region is formed of the transparent conductive layer. In other words, a microcavity (resonance) structure is formed in the blue light emitting region and the green light emitting region, but a non-microcavity structure is formed in the red light emitting region. In other words, the red light emitting region does not include a microcavity/resonance structure.

[0047] According to a conventional device (not necessarily prior art), in order to form the microcavity structure, the thickness of the organic layer of the red light emitting region is thicker than the thickness of the organic layer of the blue light emitting region and the green light emitting region. In one embodiment, when the red light emitting region forms the non-microcavity structure, the thickness of the organic layers of the blue light emitting region and the green light emitting region is uniform by controlling the thickness of the organic layer of the red light emitting region.

[0048] FIGS. 3 and 4 are CIE-based colour coordinates for explaining a colour reproduction rate when the red light emitting region is formed in a non-microcavity structure, wherein FIG. 3 shows a colour coordinate system according to CIE 1931 colour space, also known as the CIE XYZ colour space and FIG. 4 shows a colour coordinate system according to CIE 1976 (L*, u*, v*) colour space, also known as CIELUV.

[0049] The following Table 1 shows results obtained by comparing the colour coordinate, the colour reproduction area, and the colour reproduction rate with the NTSC when the red light emitting region is formed in the non-microcavity structure in the colour coordinate of FIG. 3 and the following Table 2 shows results obtained by comparing the colour coordinate, the colour reproduction rate, and the colour reproduction rate with the NTSC when the red light emitting region is formed in the non-microcavity structure in the colour coordinate of FIG. 4.

(Table 1)

	colour coordinate (x, y)			Colour reproduction area	Colour reproduction rate
	blue	green	red	Colour reproduction area	Colour reproduction rate
Comparative Example	(0.140,0.080)	(0.210, 0.710)	(0.670, 0.330)	0.158	100%
embodiment	(0.144, 0.077)	(0.210, 0.717)	(0.668, 0.329)	0.159	100.7%

(Table 2)

	colour coordinate (u', v')			Colour reproduction area	Colour reproduction rate
	blue	green	red	Colour reproduction area	Colour reproduction rate
Comparative Example	(0.152, 0.196)	(0.076, 0.576)	(0.477, 0.528)	0.074	100%

(continued)

	colour coordinate (u', v')			Colour reproduction area	Colour reproduction rate
	blue	green	red	Colour reproduction area	Colour reproduction rate
embodiment	(0.159,0.190)	(0.075, 0.577)	(0.476, 0.528)	0.075	101.4%

[0050] In Tables 1 and 2, the colour reproduction area represents the colour representation range. The higher the number, the wider the colour representation range becomes and the colour reproduction rate relatively represents the colour reproduction rate of the embodiment based on the NTSC reference of 100%.

[0051] Referring to FIG. 3 and Table 1, when the red light emitting region is formed in the non-microcavity structure, the colour reproduction area is 0.159, which is higher than 0.158 that is a reference of NTSC (National Television System Committee) and the colour reproduction rate is 100.7%, which is relatively higher than the NTSC reference.

[0052] In addition, referring to FIG. 4 and Table 2, when the red light emitting region has the non-microcavity structure, it can be appreciated that the colour representation area is 0.075, which is higher than 0.074 that is the NTSC reference and the colour reproduction rate is 101.4%, which is relatively higher than that of NTSC reference.

[0053] Therefore, as in the above embodiment, even though the red light emitting region has the non-microcavity structure, it can be appreciated that the colour reproduction rate satisfies the NTSC reference.

[0054] Meanwhile, although not shown in FIG. 1, in order to increase the colour reproduction rate of the red light emitting region, it is possible to form the colour filter or the colour converting layer in the red light emitting region.

[0055] The colour filter or the colour converting layer may be implemented by applying the method for forming the generally used colour filter or colour converting layer in the current display device field, may be formed on the upper electrode 310 in the red light emitting region, and may be formed to correspond to the red light emitting region on an encapsulation substrate (not shown) bonded to the substrate 200 of FIG. 1.

[0056] According to at least one of the disclosed embodiments, the blue and green light emitting regions are formed in a microcavity structure and the red light emitting region is formed in a non-microcavity structure, such that the thickness of the organic layer of the red light emitting region is controlled to make the thickness of the blue light emitting region and the green light emitting region uniform, thereby making it possible to make the thickness of the organic layers of each light emitting region uniform while implementing the full colour.

[0057] It is to be understood that the disclosed embodiments are not considered limiting and cover various modifications and equivalent arrangements included within the scope of the appended claims.

Claims

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

    a plurality of pixels comprising a blue light emitting region, a green light emitting region, and a red light emitting region on a substrate and formed by stacking a lower electrode, an organic layer, and an upper electrode, wherein the blue and green light emitting regions are formed to have a microcavity structure and wherein the red light emitting region is formed to have a non-microcavity structure.

2. The organic light emitting diode display of claim 1, wherein:

    the lower electrode of the blue and green light emitting regions is formed of at least one transparent layer and at least one semitransparent layer; and
    wherein the lower electrode of the red light emitting region is formed of only a transparent layer.

3. The organic light emitting diode display of claim 1, wherein the lower electrode of the red light emitting region is formed of one or more transparent conductive layers.

4. The organic light emitting diode display of claim 1, 2 or 3, wherein the lower electrode of the blue and green light emitting regions is formed of a first transparent conductive layer, a semitransparent metal layer, and a second transparent conductive layer which are sequentially formed.

5. The organic light emitting diode display of claim 4, wherein the thickness of the first transparent conductive layer is

from about 50 nm to about 150 nm and the thickness of the second transparent conductive layer is from about 10 nm to about 20 nm.

6. The organic light emitting diode display of claim 4, wherein the thickness of the semitransparent metal layer is from about 5 nm to about 20 nm.

7. The organic light emitting diode display of any one of the preceding claims, wherein the thickness of the organic layer is from about 50 nm to about 60 nm.

8. The organic light emitting diode display of any one of the preceding claims, wherein the organic layers formed on the blue light emitting region, the green light emitting region, and the red light emitting region include a blue emission layer, a green emission layer, and a red emission layer, respectively.

9. The organic light emitting diode display of claim 8, wherein the organic layer further includes at least one of a hole injection layer (HIL), a hole transport layer (HTL), a hole blocking layer and an electron injection layer (EIL).

10. The organic light emitting diode display of claim 9, wherein the thickness of the hole injection layer (HIL) and the hole transport layer (HTL) is from about 19 nm to about 36 nm.

11. The organic light emitting diode display of claim 8, 9 or 10, wherein the thickness of the organic layer in the red light emitting region is substantially the same as the thickness of the red right emitting layer or is about 60 nm.

12. The organic light emitting diode display of any one of the preceding claims, further comprising a colour filter or a colour converting layer formed on the upper electrode of the red light emitting region.

13. The organic light emitting diode display of any one of claims 1 to 11, further comprising an encapsulation substrate bonded to the substrate and including a colour filter or a colour converting layer formed to correspond to the red light emitting region.

FIG. 1

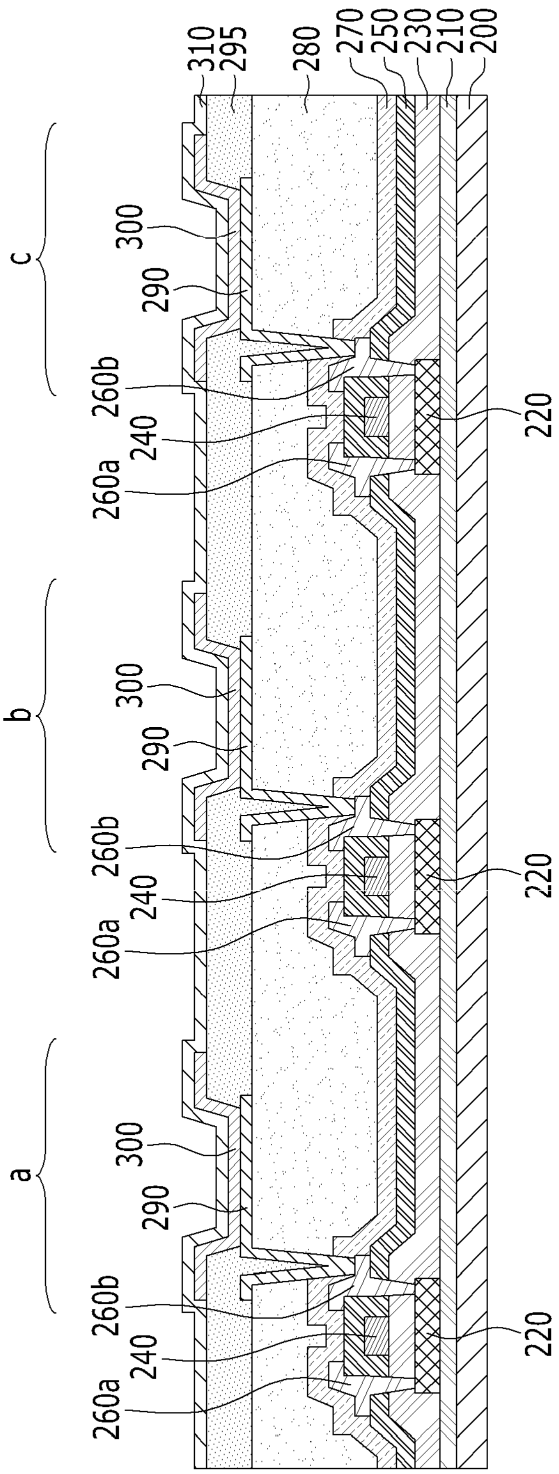


FIG. 2A

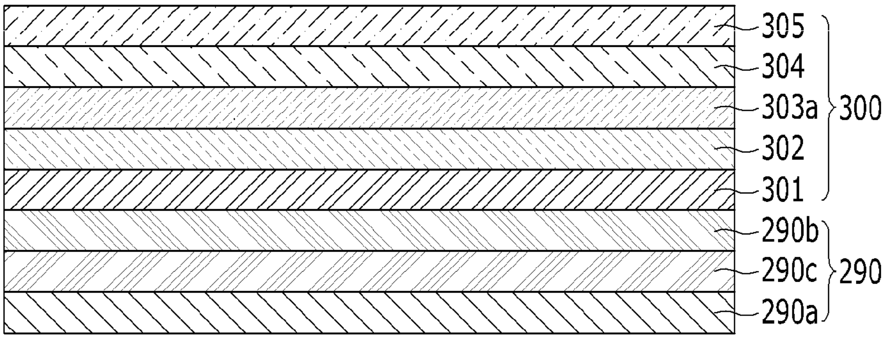

305
304
303a
300
302
301
290b
290c
290
290a

FIG. 2B

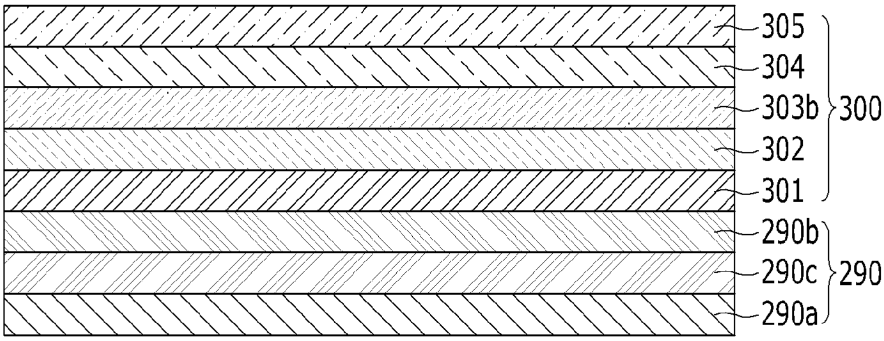

305
304
303b
300
302
301
290b
290c
290
290a

FIG. 2C

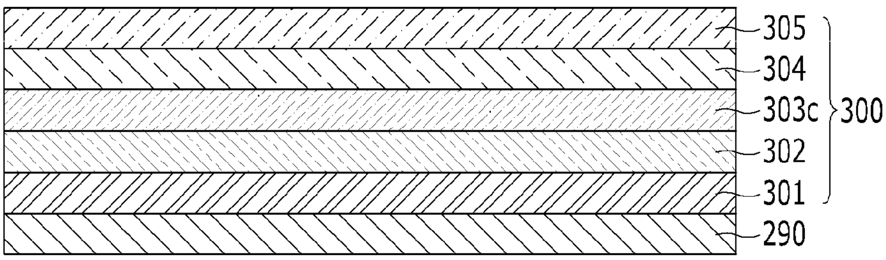


FIG. 3

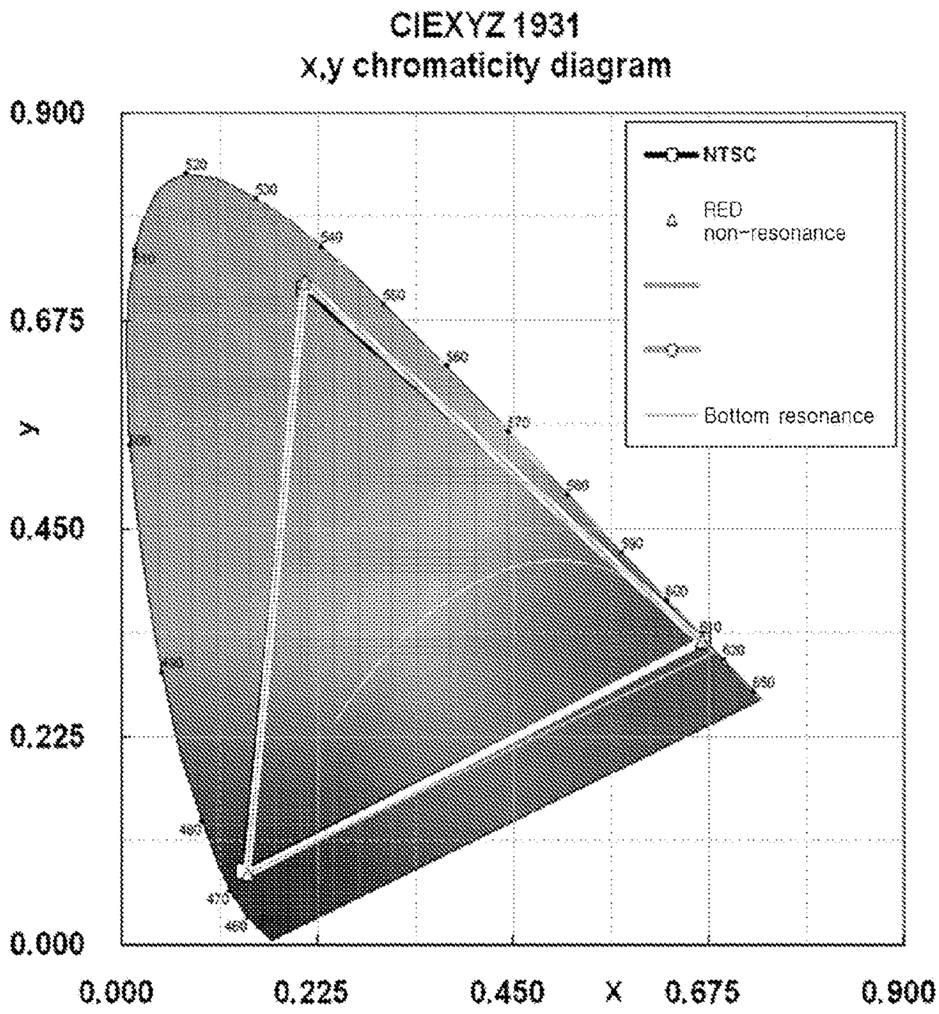
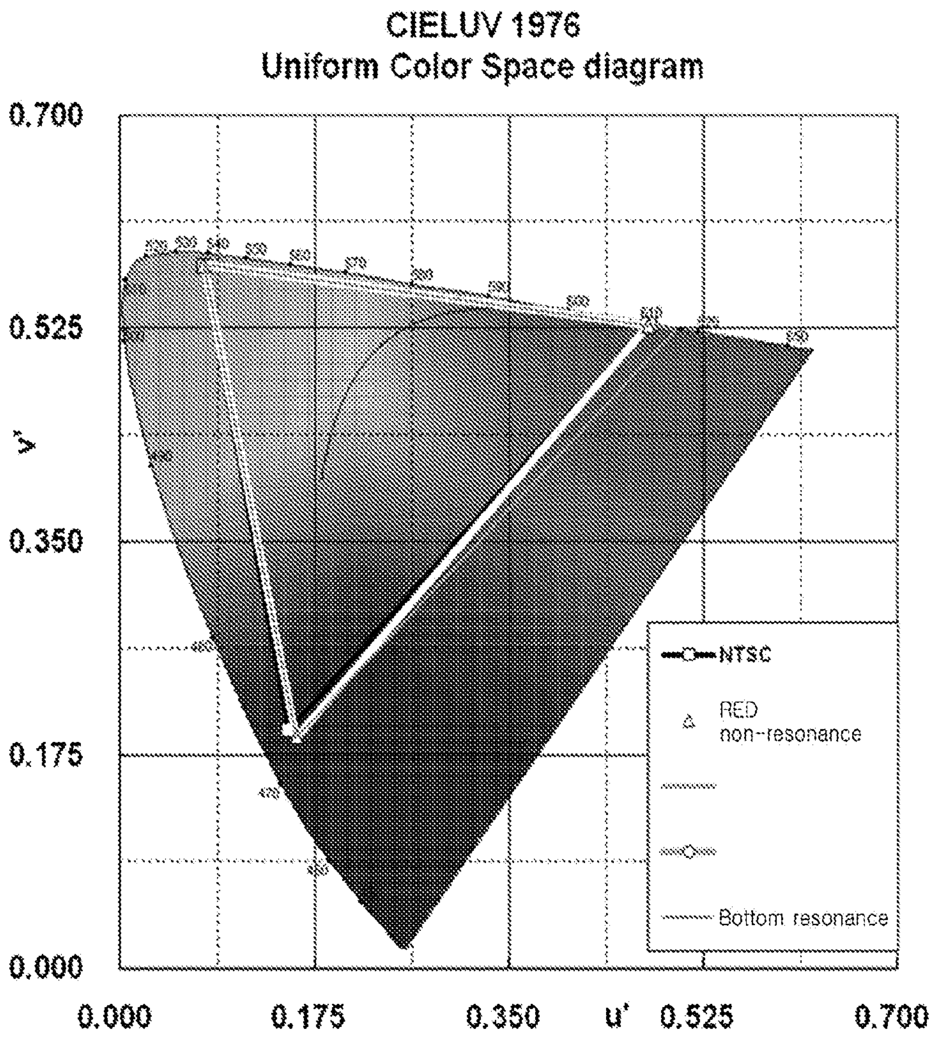

CIEXYZ 1931
x,y chromaticity diagram
0.900
0.675
0.450
0.225
0.000
y
0.000
0.225
0.450
x
0.675
0.900
NTSC
RED
non-resonance
Bottom resonance

FIG. 4


CIELUV 1976
Uniform Color Space diagram
0.700
0.525
0.350
0.175
0.000
v'
0.000
0.175
0.350
u'
0.525
0.700
NTSC
RED
non-resonance
Bottom resonance

专利名称(译)	有机发光二极管显示器		
公开(公告)号	EP2403030A2	公开(公告)日	2012-01-04
申请号	EP2011171668	申请日	2011-06-28
[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	LEE SEUNG MOOK KIM DO YOUNG PYO SANG WOO KANG TAE MIN JEONG HEE SEONG		
发明人	LEE, SEUNG-MOOK KIM, DO-YOUNG PYO, SANG-WOO KANG, TAE-MIN JEONG, HEE-SEONG		
IPC分类号	H01L51/52		
CPC分类号	H01L51/5265 H01L27/3211 H01L51/5203 H01L51/5234		
优先权	1020100062880 2010-06-30 KR		
其他公开文献	EP2403030A3		
外部链接	Espacenet		

摘要(译)

公开了一种有机发光二极管（OLED）显示器; OLED显示器包括i）多个像素（a，b，c），其包括在基板（200）上的蓝色发光区域，绿色发光区域和红色发光区域，并且通过堆叠下电极形成（ 290），有机层（300）和上电极（310）;蓝色和绿色发光区域形成在微腔结构中，红色发光区域形成为非微腔结构。

FIG. 1