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(54) **ORGANIC LIGHT EMITTING DIODE DISPLAY DEVICE AND METHOD OF FABRICATING THE SAME**

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(57) **ABSTRACT**

An organic light emitting diode (OLED) display device and a method of fabricating the same. The OLED display device includes a substrate having a pixel region and a non-pixel region, a buffer layer arranged on the substrate, a semiconductor layer arranged in the non-pixel region of the substrate, a first electrode arranged in the non-pixel region and in the pixel region and electrically connected to the semiconductor layer, a gate insulating layer arranged on an entire surface of the substrate and partially exposing the first electrode in the pixel region, a gate electrode arranged on the gate insulating layer to correspond to the semiconductor layer, a pixel defining layer partially exposing the first electrode, an organic layer arranged on the first electrode; and a second electrode arranged on the entire surface of the substrate.

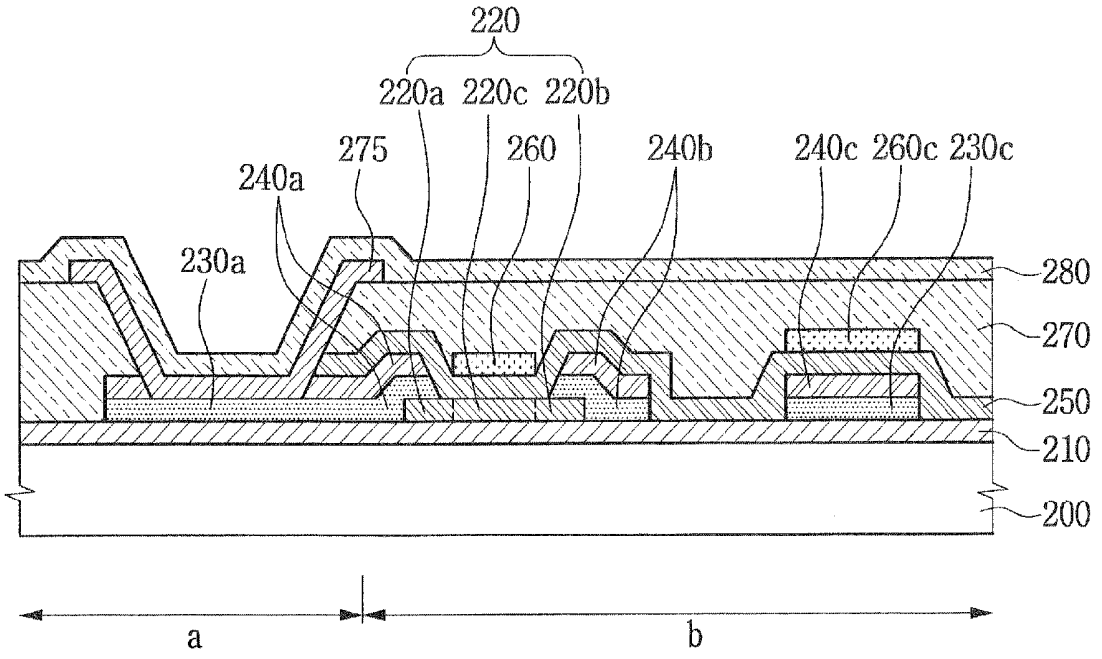


FIG. 1A

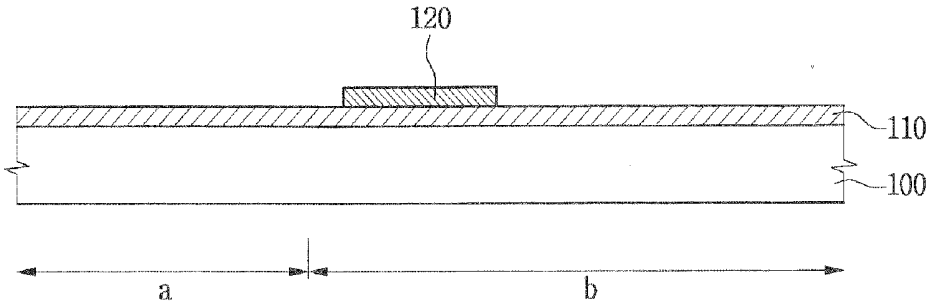


FIG. 1B

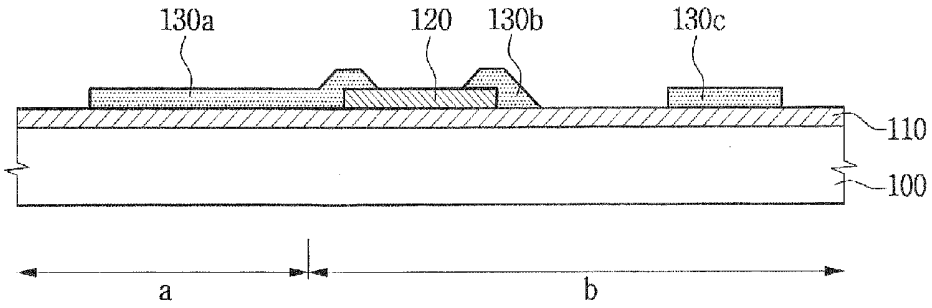


FIG. 1C

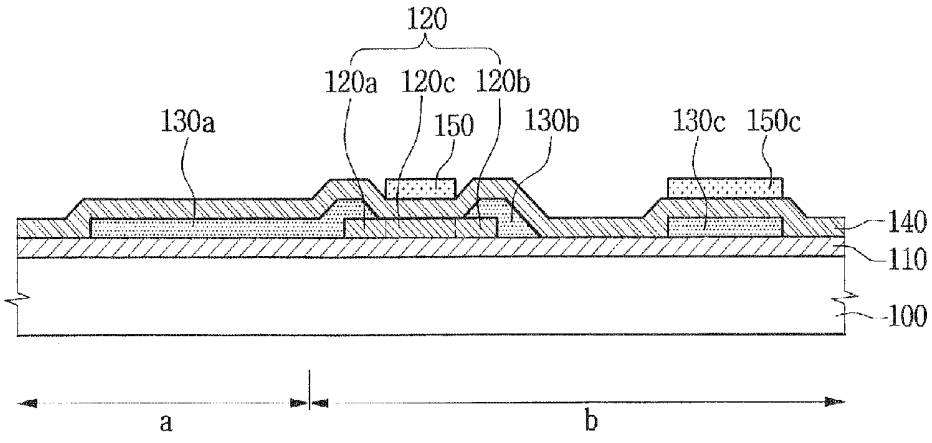


FIG. 1D

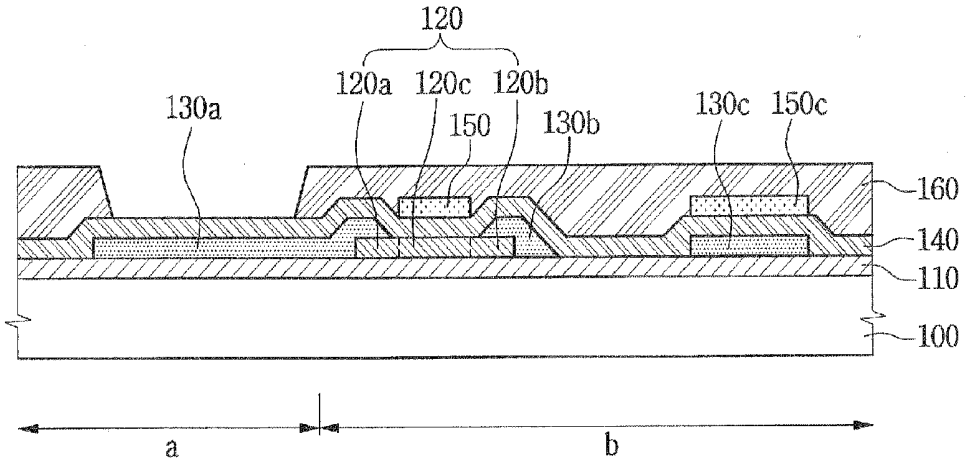

120
120a
120c
120b
130a
150
130b
130c
150c
160
140
110
100
a
b

FIG. 1E

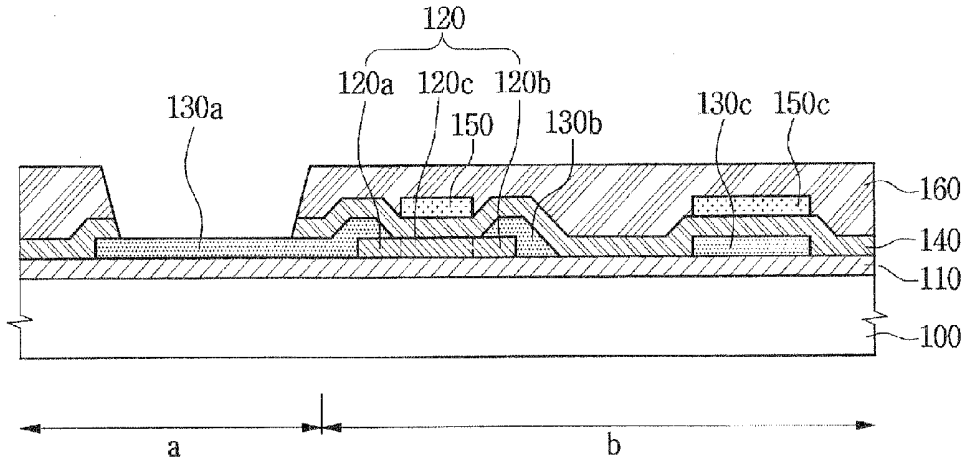

120
120a
120c
120b
130a
150
130b
130c
150c
160
140
110
100
a
b

FIG. 1F

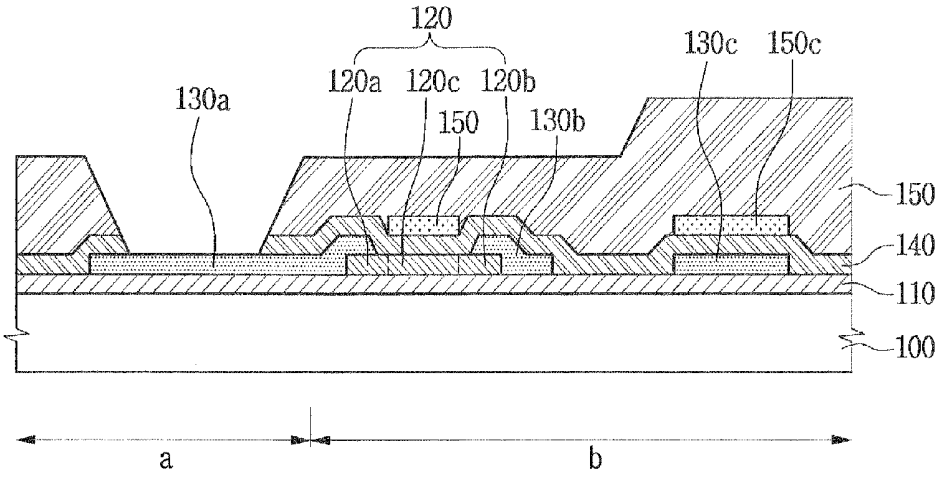

120
130c
150c
120a
120c
120b
130a
150
130b
150
140
110
100
a
b

FIG. 1G

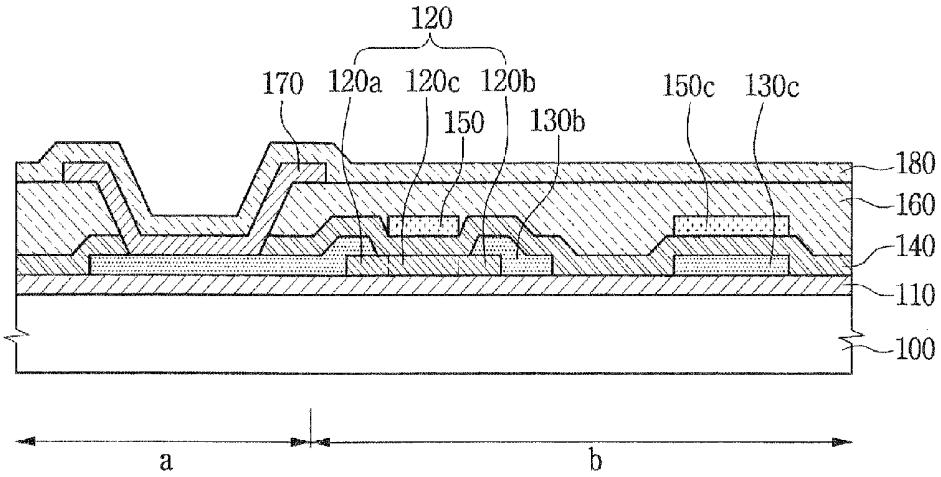

120
170
120a
120c
120b
150c
130c
150
130b
180
160
140
110
100
a
b

FIG. 2A

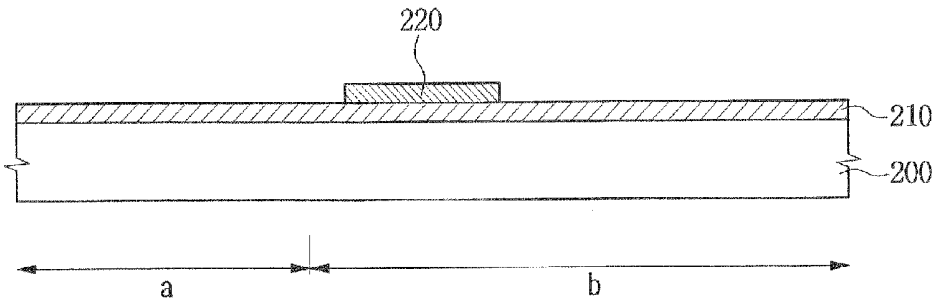


FIG. 2B

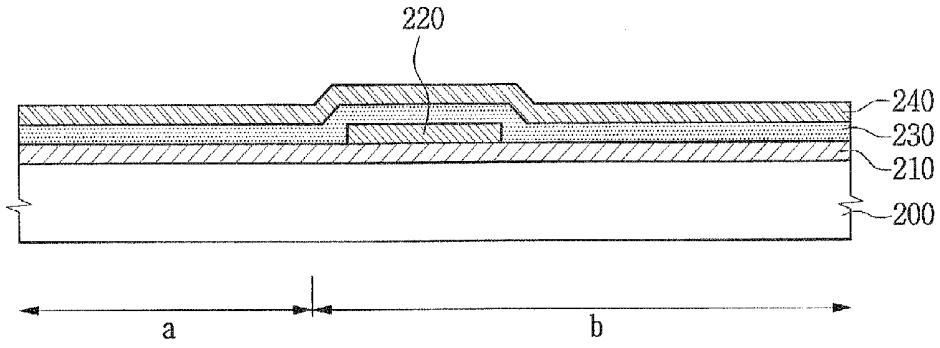
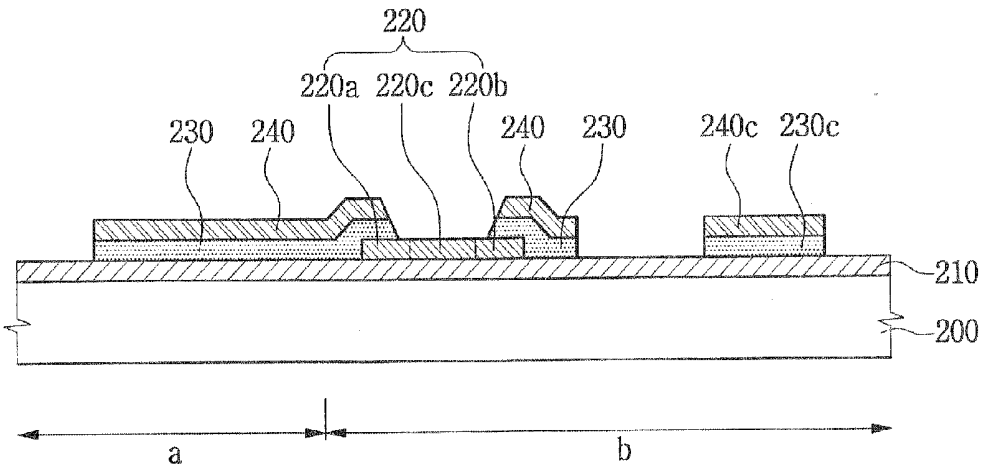


FIG. 2C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220a
220c
220b
230
240
240
230
240c
230c
210
200
a
b

FIG. 2D

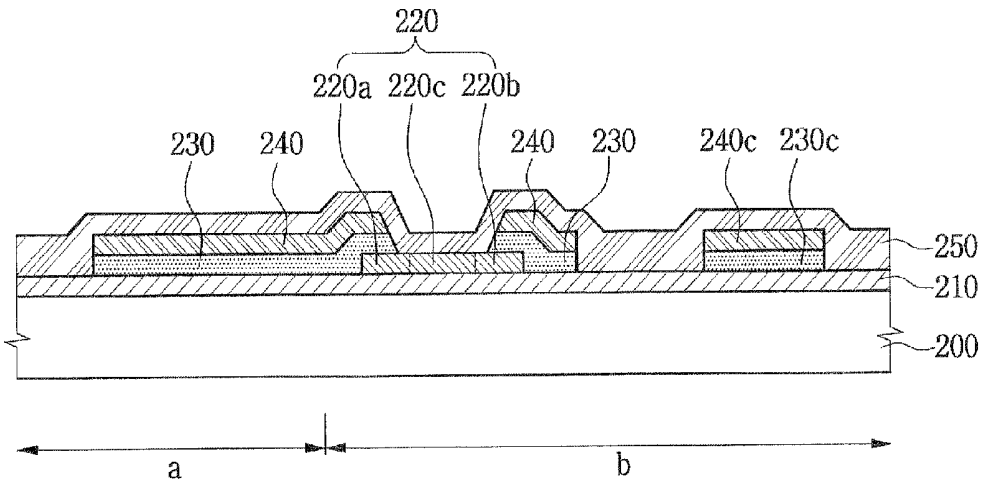

220
220a
220c
220b
230
240
240
230
240c
230c
250
210
200
a
b

FIG.2E

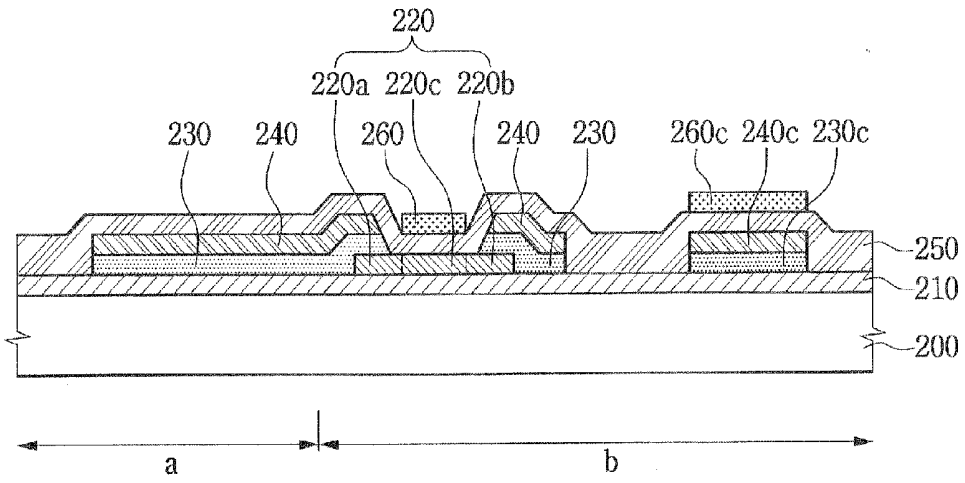

220
220a
220c
220b
230
240
260
240
230
260c
240c
230c
250
210
200
a
b

FIG.2F

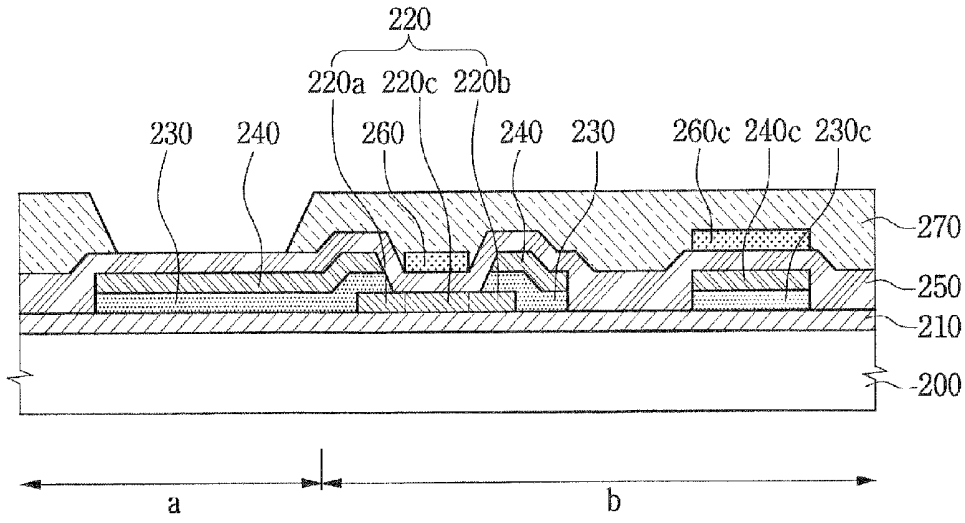

220
220a
220c
220b
230
240
260
240
230
260c
240c
230c
270
250
210
200
a
b

FIG. 2G

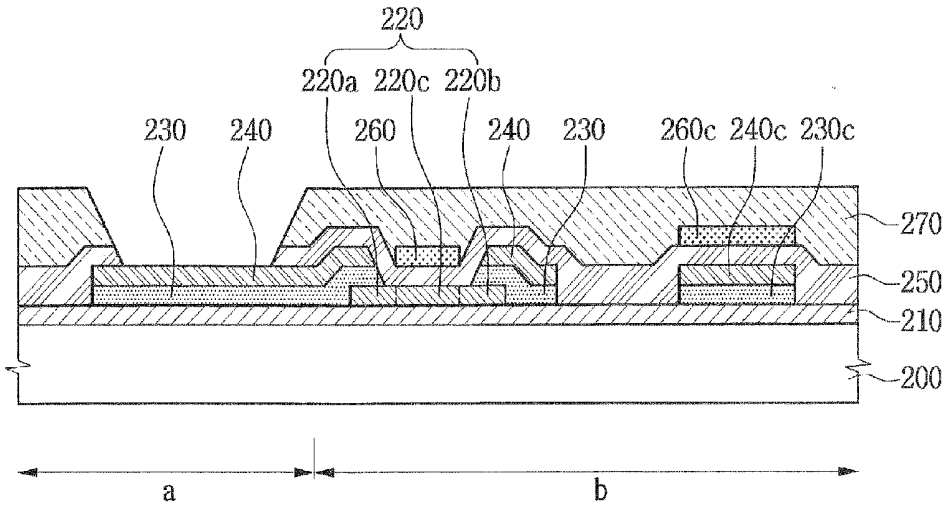

220
220a
220c
220b
230
240
260
240
230
260c
240c
230c
270
250
210
200
a
b

FIG. 2H

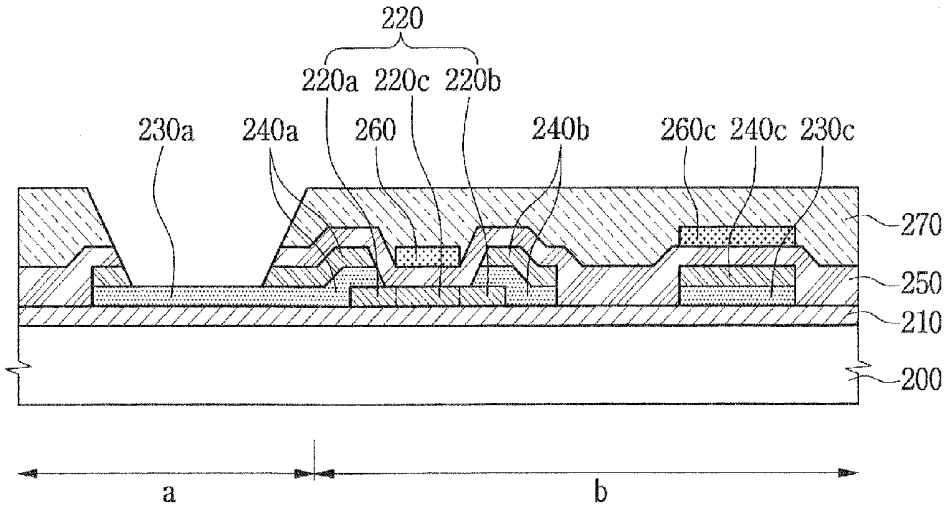
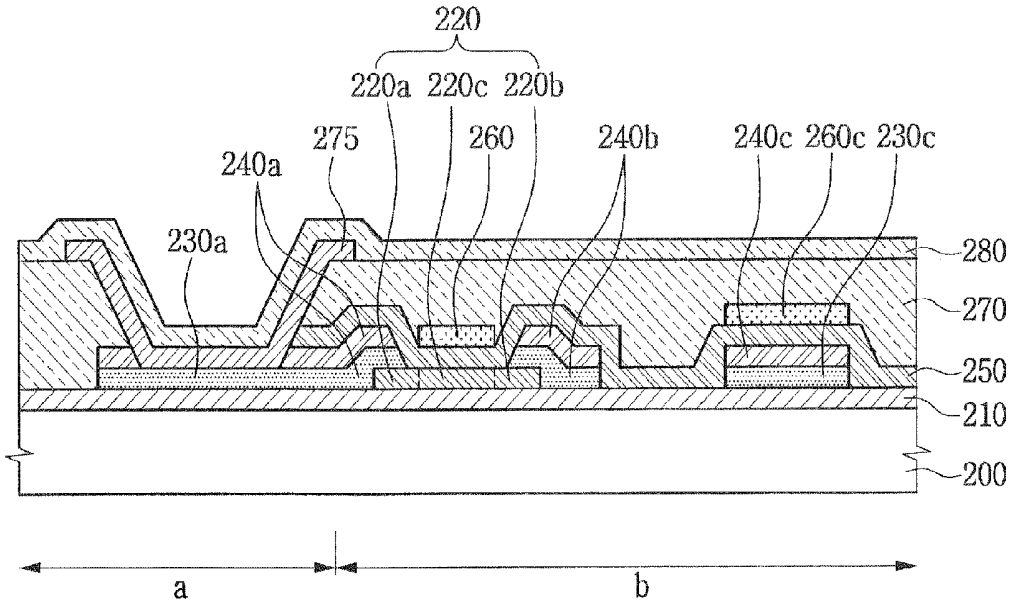

220
220a
220c
220b
230a
240a
260
240b
260c
240c
230c
270
250
210
200
a
b

FIG. 2I


220
220a
220c
220b
275
260
240b
240c
260c
230c
240a
230a
280
270
250
210
200
a
b

ORGANIC LIGHT EMITTING DIODE DISPLAY DEVICE AND METHOD OF FABRICATING THE SAME

CLAIM OF PRIORITY

[0001] This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from an application earlier filed in the Korean Intellectual Property Office on 7 Aug. 2009 and there duly assigned Serial No. 2009-72861.

BACKGROUND

[0002] 1. Field

[0003] Non-limiting example embodiments of the present invention relate to an organic light emitting diode (OLED) display device and a method of fabricating the same, in which a first electrode is made out of an interconnection metal, thereby simplifying a process of fabricating a top or bottom light-emitting device.

[0004] 2. The Related Art

[0005] Generally, in OLED display devices, electrons and holes are respectively injected into an emission layer from a cathode (an electron injection electrode) and an anode (a hole injection electrode) and then combined in the emission layer to create excitons, and when the excitons transition from an excited state to a ground state, light is emitted. By such a principle, the OLED display device does not require a separate light source, which is required in a conventional thin film liquid crystal display device, so that its volume and weight can be reduced.

[0006] The OLED display device may be classified into a passive-matrix type and an active-matrix type according to its driving mechanism. The passive-matrix OLED display device has a relatively simple configuration, and its fabrication method does not require complicated processes, but the passive-matrix OLED display device has disadvantages in power consumption and size. Also, in the passive-matrix OLED display device, an aperture ratio is reduced as the number of interconnections is increased.

[0007] The OLED display device can also be classified into a bottom-emitting structure and a top-emitting structure according to a direction of emitted light generated from an organic emission layer. The bottom emitting structure emits light toward a substrate, and includes a reflective electrode or reflective layer as an upper electrode and a transparent electrode as a lower electrode. Here, when the OLED display device adopts an active-matrix type having a thin film transistor, light does not pass through a portion in which the thin film transistor is formed, resulting in reduction of a light transmissive area. On the other hand, the top-emitting structure has a transparent electrode as an upper electrode, and a reflective electrode or reflective layer as a lower electrode, and thus light is emitted in a direction away from the substrate, resulting in an increased area that the light is emitted, providing increased brightness. Currently, a dual-emission OLED display device that is capable of simultaneously performing top and bottom emitting on one substrate is attracting attention.

[0008] However, the conventional OLED display device has no problem when used in the top-emitting type, but is difficult to realize a high quality image due to a decrease in transmittance, caused by an organic layer when used in a bottom-emitting type. In addition, due to a step difference generated when the organic layer in an emissive portion is completely removed, the conventional OLED display device has poor step coverage during deposition of thin films such as a lower electrode, an organic layer and an upper electrode, resulting in failures such as dark spots. Thus, to prevent the failures, technology of improving productivity is required.

SUMMARY

[0009] Non-limiting example embodiments of the present invention provide an organic light emitting diode (OLED) display device, and a method of fabricating the same, in which a pixel electrode is made out of an interconnection metal. More particularly, an OLED display device and a method of fabricating the same, which can reduce the number of mask processes by changing a location of a pixel electrode and increase productivity, are provided.

[0010] According to an non-limiting example embodiment of the present invention, there is provided an OLED display device that includes a substrate having a pixel region and a non-pixel region, a buffer layer arranged on the substrate, a semiconductor layer arranged in the non-pixel region of the substrate, a first electrode arranged in the non-pixel region and in the pixel region and electrically connected to the semiconductor layer, a gate insulating layer arranged on an entire surface of the substrate and partially exposing the first electrode in the pixel region, a gate electrode arranged on the gate insulating layer to correspond to the semiconductor layer, a pixel defining layer partially exposing the first electrode, an organic layer arranged on the first electrode and a second electrode arranged on the entire surface of the substrate.

[0011] The first electrode can include a source electrode and a drain electrode, both being comprised of a metal. The first electrode can be arranged on source and drain regions of the semiconductor layer. The second electrode can be a transparent conductive layer. The gate electrode does not overlap the first electrode.

[0012] According to another non-limiting example embodiment of the present invention, there is provided an OLED display device that includes a substrate having a pixel region and a non-pixel region, a buffer layer arranged on the substrate, a semiconductor layer arranged in the non-pixel region of the substrate, a first electrode arranged in the pixel region and electrically connected to the semiconductor layer, source and drain electrodes arranged on the semiconductor layer in the non-pixel region, a gate insulating layer partially exposing the first electrode in the pixel region and arranged on an entire surface of the substrate, a gate electrode arranged on the gate insulating layer to correspond to the semiconductor layer, a pixel defining layer partially exposing the first electrode, an organic layer arranged on the first electrode and a second electrode arranged on the entire surface of the substrate, wherein the source and drain electrodes can include a substantially same material as the first electrode.

[0013] The source and drain electrodes can be a double layer structure. The double layer structure of the source and drain electrodes can include a lower layer extending from the first electrode. The double layer structure of the source and drain electrodes can include a lower layer that includes a substantially same material as the first electrode. The double layer structure of the source and drain electrodes can include a lower layer that includes a transparent conductive material and an upper layer that includes an opaque metal. The first electrode can include a transparent conductive layer. The second electrode can include a reflective conductive layer.

[0014] According to another non-limiting example embodiment of the present invention, there is provided a method of making an OLED display device, including providing a substrate having a pixel region and a non-pixel region, forming a buffer layer on an entire surface of the substrate, forming a semiconductor layer on the buffer layer in the non-pixel region, forming a first electrode in the pixel region and in the non-pixel region, the first electrode being connected to the semiconductor layer, forming a gate insulating layer partially exposing the first electrode, forming a gate electrode on the gate insulating layer to correspond to the semiconductor layer, forming a pixel defining layer partially exposing the first electrode, forming an organic layer on the exposed first electrode and forming a second electrode on the entire surface of the substrate.

[0015] The first electrode can be patterned to correspond to source and drain regions of the semiconductor layer. The first electrode can be produced by patterning a metal layer for source and drain electrodes. The second electrode can include a transparent conductive material.

[0016] According to yet another non-limiting example embodiment of the present invention, there is provided a method of making an OLED display device, including providing a substrate having a pixel region and a non-pixel region, forming a buffer layer on an entire surface of the substrate, forming a semiconductor layer on the buffer layer in the non-pixel region, forming first and second conductive layers connected to the semiconductor layer in the pixel region and in the non-pixel region, forming a gate insulating layer partially exposing the second conductive layer, forming a gate electrode on the gate insulating layer to correspond to the semiconductor layer, forming a pixel defining layer partially a portion of the second conductive layer, forming a first electrode by removing the exposed portion of the second conductive layer, forming an organic layer on the first electrode and forming a second electrode on the entire surface of the substrate.

[0017] The method can further include simultaneously patterning the first and second conductive layers that cover an entirety of the semiconductor layer, forming a gate insulating layer on the entire surface of the substrate, forming a pixel defining layer on the substrate, the pixel defining layer exposing a portion of the gate insulating layer in the pixel region, exposing a portion of the second conductive layer in the pixel region by removing the exposed portion of the gate insulating layer and forming a first electrode connected to source and drain electrodes by removing the exposed portion of the second conductive layer in the pixel region.

[0018] The source and drain electrodes can have a double layer structure. The double layer structure of the source and drain electrodes can include a lower layer including a first conductive layer and an upper layer including a second conductive layer. The first conductive layer can be a transparent conductive layer and the second conductive layer can be an opaque metal layer. The lower layer of the source and drain electrodes can include a substantially same material as the first electrode. The gate electrode is arranged to correspond to a channel region of the semiconductor layer. The first electrode can include a transparent conductive layer. The second electrode can include a reflective conductive layer.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] A more complete appreciation of the non-limiting example embodiments of the present invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

[0020] FIGS. **1**A to **1**G illustrate an organic light emitting diode (OLED) display device according to a first non-limiting example embodiment of the present invention; and

[0021] FIGS. **2**A to **2**I illustrate an OLED display device according to a second non-limiting example embodiment of the present invention.

DETAILED DESCRIPTION

[0022] Reference will now be made in detail to the present embodiments of the present invention, examples of which are shown in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The embodiments are described below in order to explain the present invention by referring to the figures.

First Non-Limiting Example Embodiment

[0023] FIGS. **1**A to **1**G illustrate an organic light emitting diode (OLED) display device according to a first non-limiting example embodiment of the present invention.

[0024] Referring to FIG. **1**A, a substrate **100** including a pixel region a and a non-pixel region b is provided. Subsequently, a buffer layer **110** is formed on the substrate **100**. The substrate **100** is a transparent substrate made out of plastic or glass, and the buffer layer **110** serves to prevent diffusion of moisture or impurities generated by a lower substrate, and can be a single layer or multilayer structure. The layer or layers of the buffer layer **110** can include an oxide layer such as a silicon oxide layer or a nitride layer such as a silicon nitride layer.

[0025] A semiconductor layer **120** is formed on the buffer layer **110** in the non-pixel region b. The semiconductor layer **120** is made out of amorphous silicon, which is crystallized into polycrystalline or single crystalline silicon, and then patterned to form the semiconductor layer **120**. Here, the amorphous silicon can be deposited by chemical vapor deposition or physical vapor deposition. When or after the amorphous silicon is formed, a process of reducing a concentration of hydrogen by dehydrogenation can be performed. The semiconductor layer **120** can also be formed using an oxide semiconductor layer.

[0026] Afterwards, referring to FIG. **1**B, first electrodes **130***a* and **130***b* are formed to be electrically connected to the semiconductor layer **120**. The first electrodes **130***a* and **130***b* are patterned to correspond to the pixel region a and the non-pixel region b, and to source and drain regions **120***a* and **120***b* respectively of the semiconductor layer **120**. Here, the first electrodes **130***a* and **130***b* can be made out of a metal to form the source and drain electrodes, and the metal can be one of molybdenum (Mo), chromium (Cr), tungsten (W), molybdenum-tungsten (MoW), aluminum (Al), aluminum-neodymium (Al—Nd), titanium (Ti), titanium nitride (TiN), copper (Cu), a Mo alloy, an Al alloy and a Cu alloy. These may be used alone or in a combination thereof.

[0027] During the formation of the first electrodes **130***a* and **130***b*, a first electrode interconnection **130***c* can be simultaneously formed in the non-pixel region b.

[0028] Referring to FIG. **1**C, a gate insulating layer **140** is fin sued on the entire surface of the substrate **100** having the

first electrodes **130***a* and **130***b* and the first electrode interconnection **130***c*. A gate electrode **150** corresponding to the semiconductor layer **120** and a gate interconnection **150***c* are both formed in the non-pixel region b on the gate insulating layer **140**.

[0029] The gate electrode **150** is formed to correspond to a channel region **120***c* of the semiconductor layer **120**, but not to correspond to the first electrodes **130***a* and **130***b*.

[0030] The first electrodes **130***a* and **130***b* are connected to and correspond to the source and drain regions **120***a* and **120***b* respectively of the semiconductor layer **120**, respectively, over the pixel region a and the non-pixel region b and serve as source and drain electrodes.

[0031] Here, the gate electrode **150** is produced by forming a metal layer for a gate electrode (not shown) using a single layer of Al or an Al alloy such as Al—Nd or multiple layers in which an Al alloy is stacked on a Cr or Mo alloy, and etching the gate electrode metal layer via photolithography.

[0032] Afterwards, referring to FIG. **1**D, a pixel defining layer **160** partially exposing the gate insulating layer **140** corresponding to the first electrode **130***a*, which is disposed in the pixel region a, is formed. The pixel defining layer **160** can be produced by stacking an insulating material, and the insulating material can be an organic or an inorganic material. The organic material can include, but is not limited to, one of photosensitive resins including benzocyclobutenes (BCB), acryl-based photoresist, phenol-based photoresist and polyimide-based photoresist. These may be used alone or in a combination thereof.

[0033] Referring to FIG. **1**E, the gate insulating layer **140** exposed by the pixel defining layer **160** is removed, thereby partially exposing a portion of the first electrode **130***a* disposed within the pixel region a.

[0034] Referring to FIG. **1**F, an organic layer **170** that includes an organic emission layer is formed on the exposed portion of the first electrode **130***a*, and a second electrode **180** is formed on the entire surface of the substrate **100**. Thus, the OLED display device according to the first non-limiting example embodiment of the present invention is completed. The second electrode **180** can be made out of a transparent conductive layer such as indium tin oxide (ITO), indium zinc oxide (IZO), Al_2O_3 (AZO) or Ga_2O_3 doped ZnO (GZO). These may be used alone or in a combination thereof.

[0035] The OLED display device according to the first non-limiting example embodiment of the present invention can be fabricated by a simpler process than the conventional five- or six-mask process by using four masks for patterning of the semiconductor layer, the first electrode and the gate electrode, and forming the pixel defining layer.

Second Non-Limiting Example Embodiment

[0036] FIGS. **2**A to **2**I illustrate an OLED display device according to a second non-limiting example embodiment of the present invention.

[0037] Referring to FIG. **2**A, a substrate **200** including a pixel region a and a non-pixel region b is prepared, a buffer layer **210** is formed on the substrate **200**, and a semiconductor layer **220** is formed on the buffer layer **210**.

[0038] The substrate **200** is a transparent substrate made out of plastic or glass, and the buffer layer **210** serves to prevent diffusion of moisture or impurities generated by lower substrate **200**, and is a single layer or multilayer structure where ones of the layers can include silicon oxide or silicon nitride. The semiconductor layer **220** is made out of amorphous silicon, which is crystallized into polycrystalline or single crystalline silicon, and then patterned to form the semiconductor layer **220**. Here, the amorphous silicon can be deposited by chemical vapor deposition or physical vapor deposition. During or after when the amorphous silicon is formed, a process of reducing a concentration of hydrogen by dehydrogenation can be performed. The non-limiting example embodiment shows that the semiconductor layer **220** is made out of a silicon layer, but it can also be made out of an oxide semiconductor layer.

[0039] Referring to FIG. **2**B, a first conductive layer **230** and a second conductive layer **240** are sequentially formed on the entire surface of the substrate **200**. The first conductive layer **230** can be a transparent conductive layer, which is a transparent conducting oxide (TCO), for example, ITO or ZnO such as IZO, AZO or GZO, to have a thickness of about 300 to about 500 Å. The second conductive layer **240** can be an opaque and highly conductive metal layer for source and drain electrodes, which can be one of Mo, Cr, W, MoW, Al, Al—Nd, Ti, TiN, Cu, a Mo alloy, an Al alloy, and a Cu alloy. These may be used alone or in a combination thereof.

[0040] Afterwards, referring to FIG. **2**C, the first conductive layer **230** and the second conductive layer **240** are simultaneously patterned. A first electrode interconnection pattern **230***c* and an interconnection pattern **240***c* for the source and drain electrodes can be formed in the non-pixel region b.

[0041] Referring to FIG. **2**D, a gate insulating layer **250** can be formed on the entire surface of the substrate **200**. The gate insulating layer **250** can be a single layer or multilayer structure that can include silicon oxide or silicon nitride.

[0042] Referring to FIG. **2**E, a gate electrode **260** is formed on the gate insulating layer **250** of the substrate **200** to correspond to the semiconductor layer **220**, and a gate electrode interconnection pattern **260***c* is formed. The gate electrode **260** and the gate electrode pattern **260***c* can be simultaneously produced.

[0043] The gate electrode **260** can be produced by forming a metal layer for a gate electrode (not shown) using a single layer of Al or an Al alloy such as Al—Nd, or multiple layers in which an Al alloy is stacked on a Cr or Mo alloy, and etching the gate electrode metal layer via photolithography.

[0044] Referring to FIG. **2**F, a pixel defining layer **270** is formed on the entire surface of the substrate **200** except for a portion of the pixel region a. The pixel defining layer **270** can be formed by stacking an insulating material, which can be an organic or inorganic material. The organic material can include, but is not limited to, one of photosensitive resins such as benzocyclobutene (BCBs), acryl-based photoresist, phenol-based photoresist and polyimide-based photoresist. These may be used alone or in a combination thereof.

[0045] Referring to FIG. **2**G, the portion of the gate insulating layer **250** in the pixel region a exposed by the pixel defining layer **270** is partially removed, thereby partially exposing the second conductive layer **240** in the pixel region a.

[0046] Afterwards, referring to FIG. **2**H, the second conductive layer **240** exposed by the pixel defining layer **270** is completely etched, thereby exposing the first conductive layer **230** and forming a first electrode **230***a* and source and drain electrodes **240***a* and **240***b* in the pixel region a.

[0047] Here, the first electrode **230***a* is made out of a first conductive layer **230**, and the source and drain electrodes **240***a* and **240***b* are made out of a second conductive layer **240**

and a first conductive layer **230** which are sequentially formed in the source and drain regions **220***a* and **220***b* of the semiconductor layer **220**.

[0048] Referring to FIG. **2**I, an organic layer **275**, including an organic emission layer, is formed on the exposed portion of the first electrode **230***a*, and a second electrode **280** is formed on the entire surface of the substrate **200**. Thus, the OLED display device according to the second non-limiting example embodiment of the present invention is completed. The second electrode **280** can be made out of a reflective conductive layer, such as Al, Mo, Ag or an alloy thereof. These may be used alone or in a combination thereof.

[0049] The OLED display device according to the second non-limiting example embodiment of the present invention can be fabricated by a simpler process than the conventional 5- or 6-mask process by using four masks for patterning the semiconductor layer, the first electrode and the source and drain electrodes, and the gate electrode, and forming the pixel defining layer.

[0050] An OLED display device and a method of fabricating the same are provided, in which a first electrode is made out of an interconnection metal, thereby simplifying a process for forming a top or bottom light-emitting device, and increasing production efficiency.

[0051] Although the present invention has been described with reference to predetermined non-limiting example embodiments thereof, it will be understood by those skilled in the art that a variety of modifications and variations can be made to the non-example embodiments of the present invention without departing from the spirit or scope of the present invention defined in the appended claims and their equivalents.

What is claimed is:

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

a substrate having a pixel region and a non-pixel region;

a buffer layer arranged on the substrate;

a semiconductor layer arranged in the non-pixel region of the substrate;

a first electrode arranged in the non-pixel region and in the pixel region and electrically connected to the semiconductor layer;

a gate insulating layer arranged on an entire surface of the substrate and partially exposing the first electrode in the pixel region;

a gate electrode arranged on the gate insulating layer to correspond to the semiconductor layer;

a pixel defining layer partially exposing the first electrode;

an organic layer arranged on the first electrode; and

a second electrode arranged on the entire surface of the substrate.

2. The OLED display device of claim **1**, wherein the first electrode comprises a source electrode and a drain electrode, both including a metal.

3. The OLED display device of claim **1**, wherein the first electrode is arranged on source and drain regions of the semiconductor layer.

4. The OLED display device of claim **1**, wherein the second electrode is a transparent conductive layer.

5. The OLED display device of claim **1**, wherein the gate electrode does not overlap the first electrode.

6. An OLED display device, comprising:

a substrate having a pixel region and a non-pixel region;

a buffer layer arranged on the substrate;

a semiconductor layer arranged in the non-pixel region of the substrate;

a first electrode arranged in the pixel region and electrically connected to the semiconductor layer;

source and drain electrodes arranged on the semiconductor layer in the non-pixel region;

a gate insulating layer partially exposing the first electrode in the pixel region and arranged on an entire surface of the substrate;

a gate electrode arranged on the gate insulating layer to correspond to the semiconductor layer;

a pixel defining layer partially exposing the first electrode;

an organic layer arranged on the first electrode; and

a second electrode arranged on the entire surface of the substrate, wherein the source and drain electrodes are comprised of a substantially same material as the first electrode.

7. The OLED display device of claim **6**, wherein the source and drain electrodes comprise a double layer structure.

8. The OLED display device of claim **7**, wherein the double layer structure of the source and drain electrodes includes a lower layer extending from the first electrode.

9. The OLED display device of claim **7**, wherein the double layer structure of the source and drain electrodes includes a lower layer including a substantially same material as the first electrode.

10. The OLED display device of claim **7**, wherein the double layer structure of the source and drain electrodes include a lower layer including a transparent conductive material and an upper layer including an opaque metal.

11. The OLED display device of claim **6**, wherein the first electrode includes a transparent conductive layer.

12. The OLED display device of claim **6**, wherein the second electrode includes a reflective conductive layer.

13. A method of fabricating an OLED display device, comprising:

providing a substrate having a pixel region and a non-pixel region;

forming a buffer layer on an entire surface of the substrate;

forming a semiconductor layer on the buffer layer in the non-pixel region;

forming a first electrode in the pixel region and in the non-pixel region, the first electrode being connected to the semiconductor layer;

forming a gate insulating layer partially exposing the first electrode;

forming a gate electrode on the gate insulating layer to correspond to the semiconductor layer;

forming a pixel defining layer partially exposing the first electrode;

forming an organic layer on the exposed first electrode; and

forming a second electrode on the entire surface of the substrate.

14. The method of claim **13**, wherein the first electrode is patterned to correspond to source and drain regions of the semiconductor layer.

15. The method of claim **13**, wherein the first electrode is produced by patterning a metal layer for source and drain electrodes.

16. The method of claim **13**, wherein the second electrode includes a transparent conductive material.

17. A method of fabricating an OLED display device, comprising:

providing a substrate having a pixel region and a non-pixel region;

forming a buffer layer on an entire surface of the substrate;

forming a semiconductor layer on the buffer layer in the non-pixel region;

forming first and second conductive layers connected to the semiconductor layer in the pixel region and in the non-pixel region;

forming a gate insulating layer partially exposing the second conductive layer;

forming a gate electrode on the gate insulating layer to correspond to the semiconductor layer;

forming a pixel defining layer partially a portion of the second conductive layer;

forming a first electrode by removing the exposed portion of the second conductive layer;

forming an organic layer on the first electrode; and

forming a second electrode on the entire surface of the substrate.

18. The method of claim **17**, further comprising:

simultaneously patterning the first and second conductive layers that cover an entirety of the semiconductor layer;

forming a gate insulating layer on the entire surface of the substrate;

forming a pixel defining layer on the substrate, the pixel defining layer exposing a portion of the gate insulating layer in the pixel region;

exposing a portion of the second conductive layer in the pixel region by removing the exposed portion of the gate insulating layer; and

forming a first electrode connected to source and drain electrodes by removing the exposed portion of the second conductive layer in the pixel region.

19. The method of claim **18**, wherein the source and drain electrodes have a double layer structure.

20. The method of claim **19**, wherein the double layer structure of the source and drain electrodes include a lower layer including a first conductive layer and an upper layer including a second conductive layer.

21. The method of claim **20**, wherein the first conductive layer is a transparent conductive layer and the second conductive layer is an opaque metal layer.

22. The method of claim **20**, wherein the lower layer of the source and drain electrodes includes a substantially same material as the first electrode.

23. The method of claim **17**, wherein the gate electrode is arranged to correspond to a channel region of the semiconductor layer.

24. The method of claim **17**, wherein the first electrode includes a transparent conductive layer.

25. The method of claim **17**, wherein the second electrode includes a reflective conductive layer.

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摘要(译)

有机发光二极管（OLED）显示装置及其制造方法。 OLED显示装置包括具有像素区域和非像素区域的基板，布置在基板上的缓冲层，布置在基板的非像素区域中的半导体层，布置在非像素区域中的第一电极在像素区域中并且电连接到半导体层，栅极绝缘层布置在基板的整个表面上并且部分地暴露像素区域中的第一电极，栅极电极布置在栅极绝缘层上以对应于半导体层，部分暴露第一电极的像素限定层，设置在第一电极上的有机层;第二电极设置在基板的整个表面上。