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

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**H01L 51/52** (2006.01)

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**H01L 51/5218** (2013.01); **H01L 2227/323**  
(2013.01)

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51/5212; H01L 51/5221; H01L 51/5228  
See application file for complete search history.

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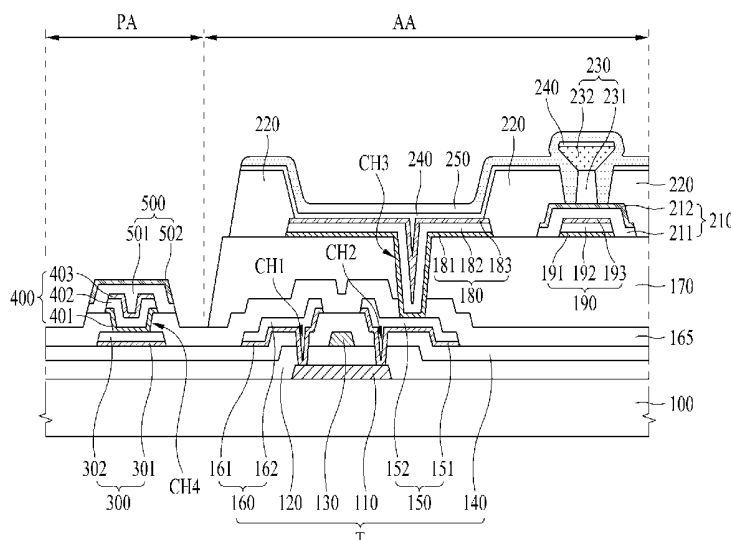
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(57) **ABSTRACT**

An organic light emitting display device is disclosed that includes a substrate including an active area and a pad area; a thin-film transistor (TFT) including a drain electrode, a source electrode, and a gate electrode; an anode electrode; an organic emitting layer; a cathode electrode; and a pad area of the substrate provided with a signal pad that is in a same layer as the drain electrode and the source electrode, the pad area including a first pad electrode on the signal pad, and a second pad electrode on the first pad electrode.

**15 Claims, 6 Drawing Sheets**



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FIG. 1  
RELATED ART

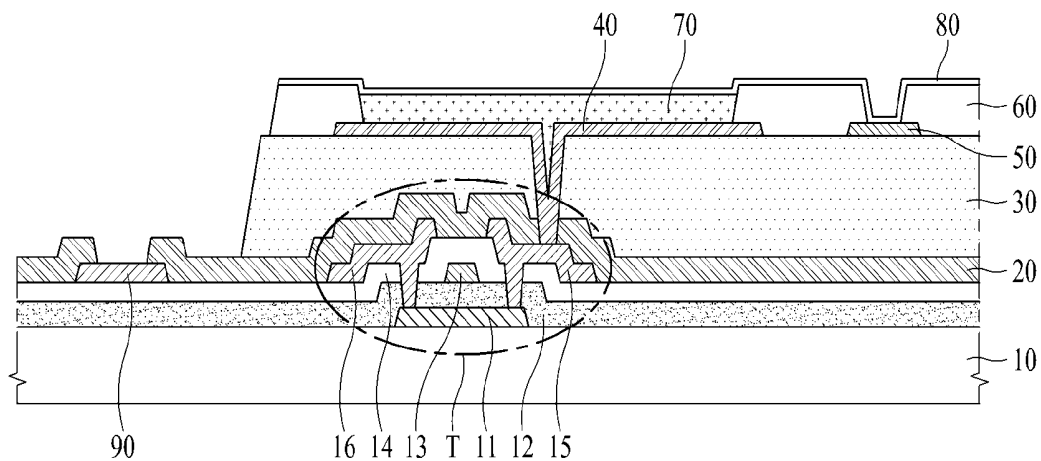


FIG. 2

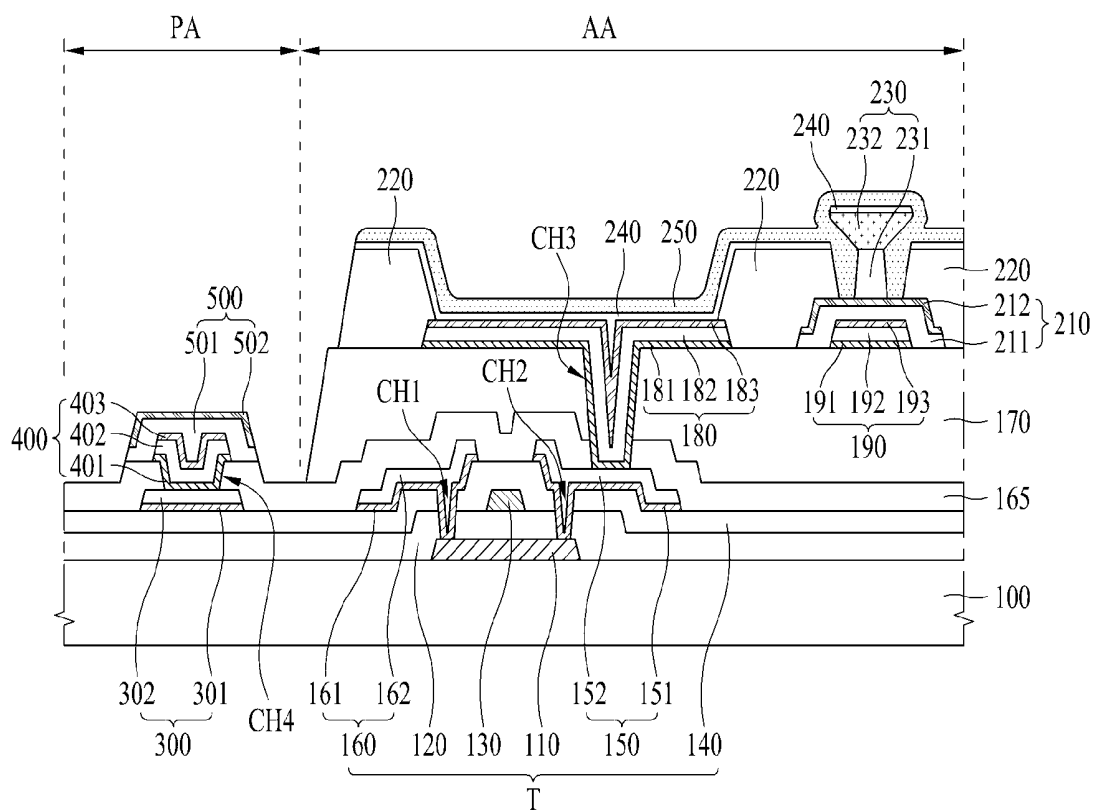


FIG. 3A

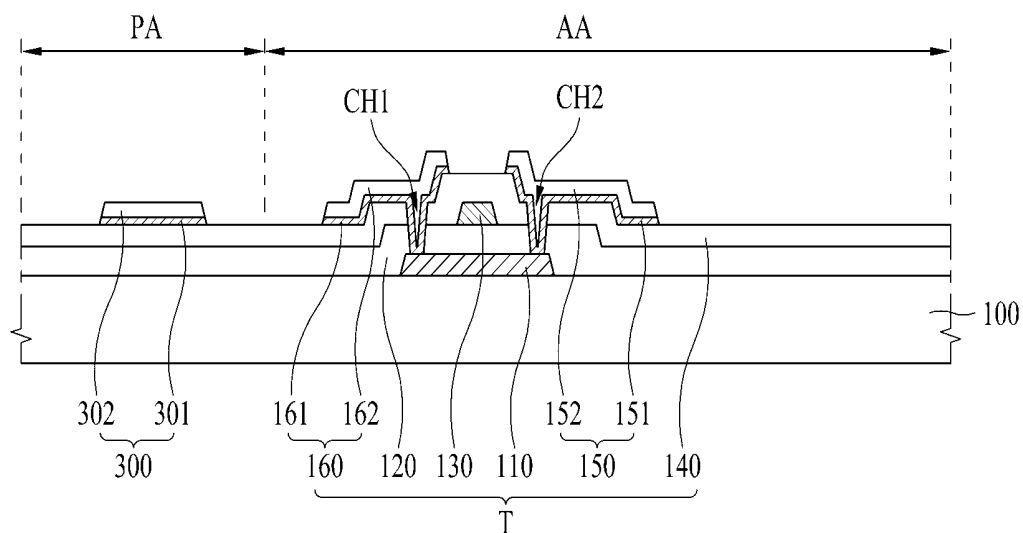


FIG. 3B

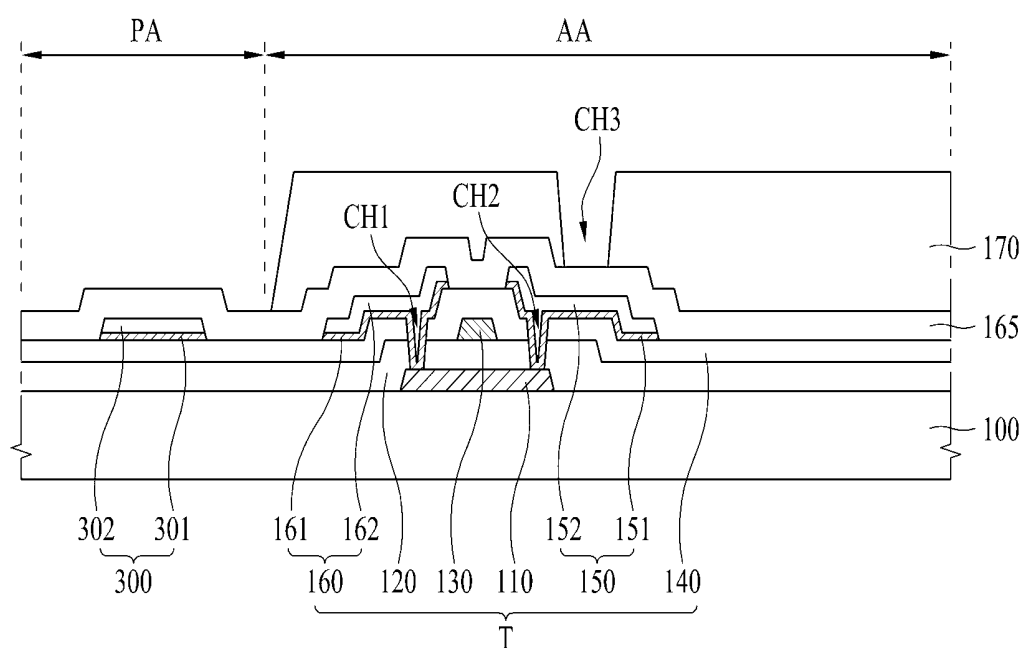


FIG. 3C

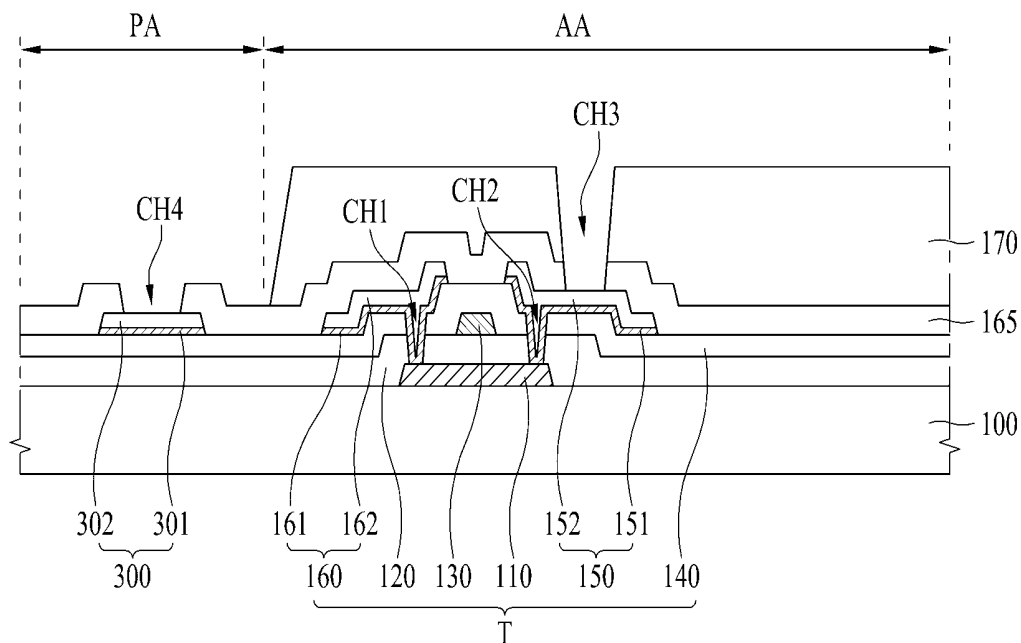


FIG. 3D

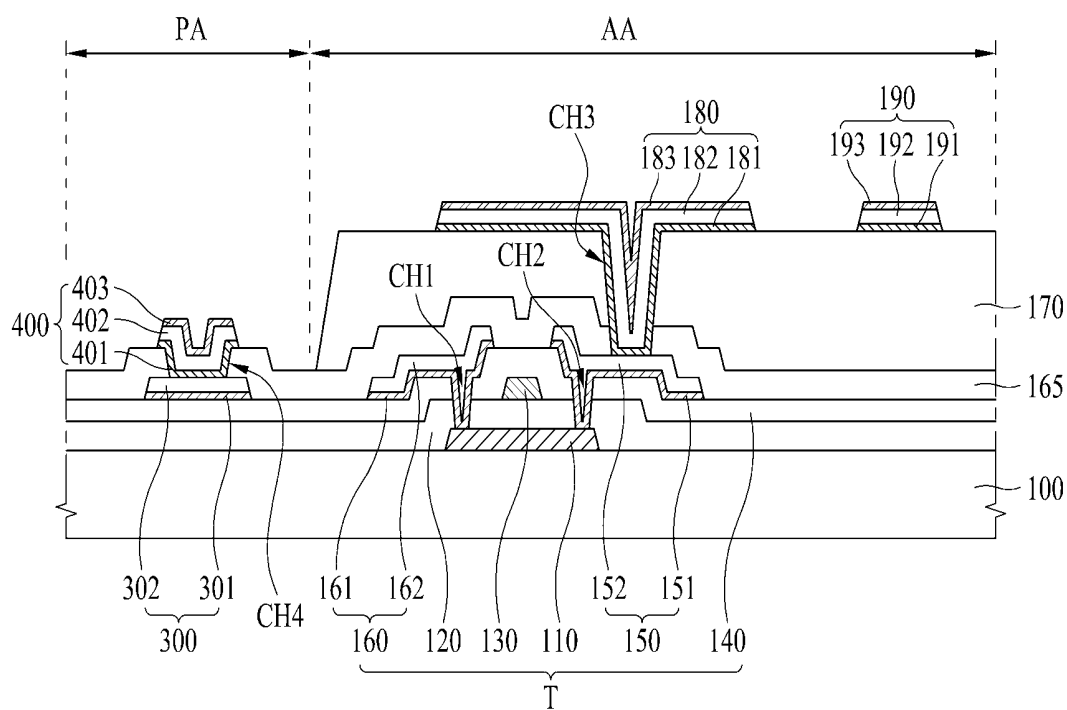


FIG. 3E

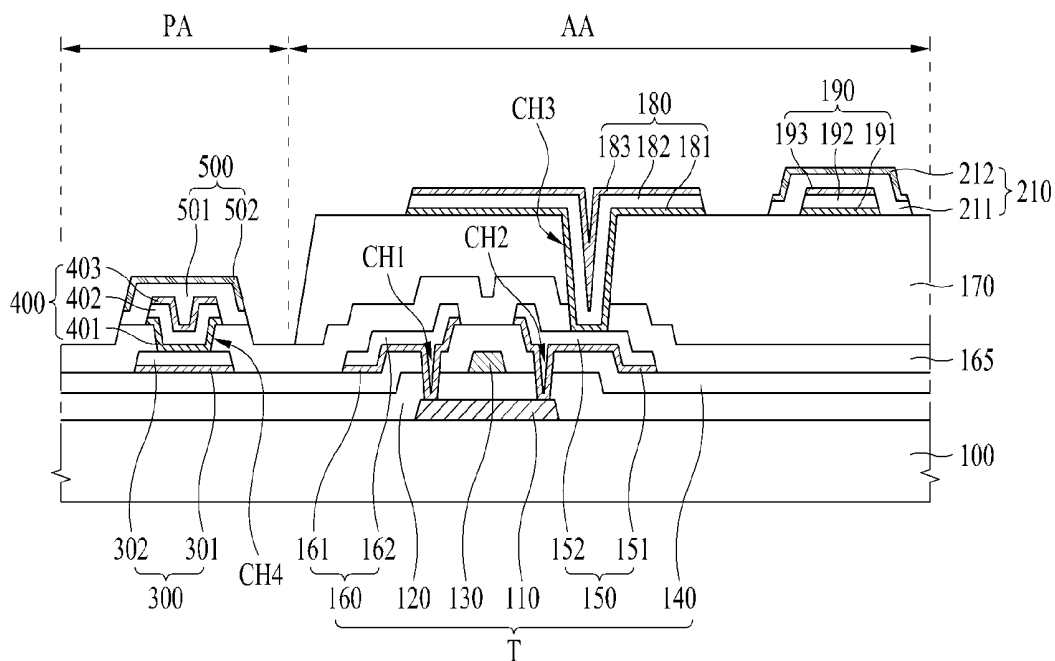
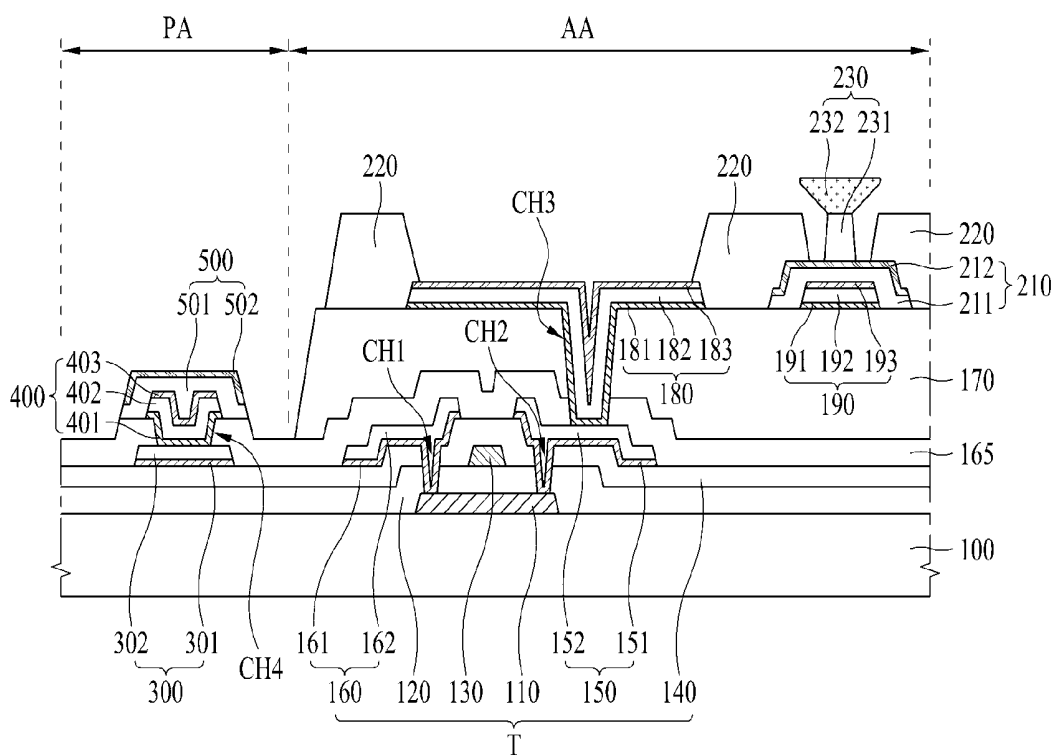


FIG. 3F







# ORGANIC LIGHT EMITTING DISPLAY DEVICE AND METHOD OF MANUFACTURING THE SAME

## CROSS REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of Korean Patent Application No. 10-2015-0160706 filed on Nov. 16, 2015, which is hereby incorporated by reference in its entirety.

## BACKGROUND

### Field of the Disclosure

Embodiments of the present disclosure relate to an organic light emitting display device, and more particularly, to a top emission type organic light emitting display device, and a method of manufacturing the same.

### Discussion of the Related Art

An organic light emitting display (OLED) device, which is a self light emitting display device, has advantages of low power consumption, rapid response speed, high emission efficiency, high luminance and wide viewing angle.

According to a direction of light emitted from an organic light emitting device, the OLED device may be largely classified into a top emission type and a bottom emission type. In case of the bottom emission type, a circuit device is disposed between an emitting layer and an image displaying surface, whereby an aperture ratio may be lowered due to the circuit device. Meanwhile, in case of the top emission type, a circuit device is not disposed between an emitting layer and an image displaying surface, whereby an aperture ratio may be improved.

FIG. 1 is a cross sectional view of a related art top emission type OLED device.

As shown in FIG. 1, a thin film transistor layer (T) including an active layer 11, a gate insulating film 12, a gate electrode 13, an insulating interlayer 14, a source electrode 15, and a drain electrode 16 is provided on an active area (AA) of a substrate 10, and then a passivation layer 20 and a planarization layer 30 are sequentially provided on the thin film transistor layer (T).

Also, an anode electrode 40 and an auxiliary electrode 50 are provided on the planarization layer 30. The auxiliary electrode 50 is provided to lower a resistance of a cathode electrode 80 to be explained later.

On the anode electrode 40 and the auxiliary electrode 50, a bank 60 is provided to define a pixel region. Also, an organic light emitting layer 70 is provided in the pixel region defined by the bank 60, and the cathode electrode 80 is provided on the organic light emitting layer 70.

In case of the top emission type, light emitted from the organic light emitting layer 70 passes through the cathode electrode 80. For this reason, the cathode electrode 80 is formed of a transparent conductive material, which causes the increase of resistance of the cathode electrode 80. In order to lower the resistance of the cathode electrode 80, the cathode electrode 80 is connected with the auxiliary electrode 50.

On a pad area (PA) of the substrate 10, there are the gate insulating film 12 and the insulating interlayer 14. A signal pad 90 is provided on the insulating interlayer 14, and the passivation layer 20 is provided on the signal pad 90. A hole is provided in the passivation layer 20 so that the signal pad 90 is exposed to the external via the hole. In order to connect

the signal pad 90 with an external driving circuit, the hole is provided in the passivation layer 20 so as to expose the signal pad 90 to the external.

However, the related art top emission type organic light emitting display device may have the following disadvantages.

In order to connect the signal pad 90 with the external driving circuit, the upper surface of the signal pad 90 is exposed to the environment. Accordingly, the upper surface of the signal pad 90 may be corroded, and furthermore the corrosion of the signal pad 90 may spread to other regions. In order to prevent the upper surface of the signal pad 90 from being corroded, a metal layer with superior corrosion resistance may be additionally provided on the upper surface of the signal pad 90. In this case, an additional process has to be carried out.

Also, in order to connect the signal pad 90 with the external driving circuit, the hole is provided in the passivation layer 20, and the upper surface of the signal pad 90 is exposed via the hole of the passivation layer 20. In this case, an etchant provided for patterning the anode electrode 40 may flow into the hole provided in the passivation layer 20, whereby the signal pad 90 may be damaged by the etchant. In order to prevent the signal pad 90 from being damaged by the etchant, a process of forming the hole for exposing the upper surface of the signal pad 90 may be carried out additionally after a process of patterning the anode electrode 40, which causes inconvenience of an additional mask process.

## SUMMARY

Accordingly, embodiments of the present disclosure are directed to a top emission type organic light emitting display device that substantially obviates one or more problems due to limitations and disadvantages of the related art.

An aspect of embodiments of the present disclosure is directed to provide a top emission type organic light emitting display device which is capable of minimizing an additional process and preventing a corrosion of a signal pad, and a method of manufacturing the same.

Additional advantages and features of embodiments of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of embodiments of the invention. The objectives and other advantages of embodiments of the invention may be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

To achieve these and other advantages and in accordance with the purpose of embodiments of the invention, as embodied and broadly described herein, there is provided an organic light emitting display device comprising: a substrate including an active area that displays images and a pad area that connects to an external driving circuit; a thin-film transistor (TFT) including a drain electrode, a source electrode, and a gate electrode, the drain electrode and the source electrode in a same layer of the organic light emitting display device; an anode electrode in the active area of the substrate; an organic light emitting layer on the anode electrode; a cathode electrode on the organic light emitting layer; a signal pad on the pad area of the substrate, the signal pad in the same layer as the drain electrode and the source electrode of the TFT; a first pad electrode on the signal pad and connected with the signal pad via a contact hole, the first

pad electrode comprising a same material as the anode electrode; and a second pad electrode covering the first pad electrode.

In another embodiment, an organic light emitting display device comprises: a substrate including an active area that displays images and a pad area that connects to an external driving circuit; an anode electrode in the active area of the substrate; an organic light emitting layer on the anode electrode; a cathode electrode on the organic light emitting layer; an auxiliary electrode connected with the cathode electrode, the auxiliary electrode including: a first auxiliary electrode provided in a same layer as the anode electrode and horizontally spaced apart from the anode electrode; and a second auxiliary electrode on the first auxiliary electrode, the second auxiliary electrode directly connected with the cathode electrode.

In another aspect of embodiments of the present disclosure, there is provided a method of manufacturing an organic light emitting display device that may include simultaneously providing a source electrode of a thin-film-transistor (TFT), a drain electrode of the TFT, and a signal pad on a substrate, the source electrode and the drain electrode provided in an active area of the substrate that displays images and the signal pad provided in a pad area of the substrate that connects to an external driving circuit; providing a passivation layer on the source electrode, the drain electrode, and the signal pad; simultaneously removing a first portion of the passivation layer to create a first contact hole that exposes either a portion of the source electrode or a portion of the drain electrode, and removing a second portion of the passivation layer to create a second contact hole that exposes a portion of the signal pad; simultaneously providing an anode electrode connected with the source electrode or the drain electrode, a first auxiliary electrode in a same layer as the anode electrode and horizontally spaced apart from the anode electrode, and a first pad electrode connected with the signal pad, the first electrode pad covering the exposed portion of the signal pad; simultaneously providing a second auxiliary electrode on the first auxiliary electrode and a second pad electrode on the first pad electrode, the second auxiliary electrode covering side surfaces and an upper surface of the first auxiliary electrode, and the second pad electrode covering side surfaces and an upper surface of the first pad electrode; providing an organic light emitting layer on the anode electrode; and providing a cathode electrode on the organic light emitting layer, the cathode electrode connected with the second auxiliary electrode.

It is to be understood that both the foregoing general description and the following detailed description of embodiments of the present invention are exemplary and intended to provide further explanation of the invention as claimed.

### BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are included to provide a further understanding of embodiments of the invention and are incorporated in and constitute a part of this application, illustrate embodiment(s) of the present disclosure and together with the description serve to explain the principle of embodiments of the invention. In the drawings:

FIG. 1 is a cross sectional view illustrating a related art top emission type organic light emitting display device;

FIG. 2 is a cross sectional view illustrating an organic light emitting display device according to one embodiment of the present disclosure; and

FIGS. 3A to 3H are cross sectional views illustrating a method of manufacturing the organic light emitting display device according to one embodiment of the present disclosure.

### DETAILED DESCRIPTION

Reference will now be made in detail to the exemplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

Advantages and features of the present invention, and implementation methods thereof will be clarified through following embodiments described with reference to the accompanying drawings. The present invention may, however, be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the present invention to those skilled in the art. Further, the present invention is only defined by scopes of claims.

A shape, a size, a ratio, an angle, and a number disclosed in the drawings for describing embodiments of the present invention are merely an example, and thus, the present invention is not limited to the illustrated details. Like reference numerals refer to like elements throughout. In the following description, when the detailed description of the relevant known function or configuration is determined to unnecessarily obscure the important point of the present invention, the detailed description will be omitted. In a case where 'comprise', 'have', and 'include' described in the present specification are used, another part may be added unless 'only~' is used. The terms of a singular form may include plural forms unless referred to the contrary. In construing an element, the element is construed as including an error region although there is no explicit description.

In description of embodiments of the present invention, when a structure (for example, an electrode, a line, a wiring, a layer, or a contact) is described as being formed at an upper portion/lower portion of another structure or on/under the other structure, this description should be construed as including a case where the structures contact each other and moreover, a case where a third structure is disposed there between.

In describing a time relationship, for example, when the temporal order is described as 'after~', 'subsequent~', 'next~', and 'before~', a case which is not continuous may be included unless 'just' or 'direct' is used.

It will be understood that, although the terms "first", "second", etc. may be used herein to describe various elements, these elements should not be limited by these terms. These terms are only used to distinguish one element from another. For example, a first element could be termed a second element, and, similarly, a second element could be termed a first element, without departing from the scope of the present invention.

Features of various embodiments of the present invention may be partially or overall coupled to or combined with each other, and may be variously inter-operated with each other and driven technically as those skilled in the art can sufficiently understand. The embodiments of the present invention may be carried out independently from each other, or may be carried out together in co-dependent relationship.

Hereinafter, an organic light emitting display device according to embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

FIG. 2 is a cross sectional view illustrating an organic light emitting display device according to one embodiment of the present disclosure.

As shown in FIG. 2, the organic light emitting display device according to one embodiment of the present disclosure may include an active area (AA) that displays images and a pad area (PA) on a substrate 100.

In the active area (AA) of the substrate 100, there are a thin film transistor layer (T), a passivation layer 165, a planarization layer 170, an anode electrode 180, a first auxiliary electrode 190, a second auxiliary electrode 210, a bank 220, a partition 230, an organic light emitting layer 240 and a cathode electrode 250.

The thin film transistor layer (T) may include an active layer 110, a gate insulating film 120, a gate electrode 130, an insulating interlayer 140, a source electrode 150 and a drain electrode 160.

The active layer 110 is provided on the substrate 100, wherein the active layer 110 overlaps with the gate electrode 130. The active layer 110 may be formed a silicon-based semiconductor material or oxide-based semiconductor material. Although not shown, a light shielding layer may be additionally provided between the substrate 100 and the active layer 110. In this case, an external light, which is incident on a lower surface of the substrate 100, is blocked by the light shielding layer so that it is possible to prevent the active layer 110 from being damaged by the external light.

The gate insulating film 120 is provided on the active layer 110. The gate insulating film 120 insulates the active layer 110 and the gate electrode 130 from each other. For example, the gate insulating film 120 may be formed of an inorganic insulating material, and more particularly, the gate insulating film 120 may be formed in a single-layered structure of the inorganic insulating material such as silicon oxide SiOx or silicon nitride SiNx, or a multi-layered structure of the above silicon oxide SiOx and silicon nitride SiNx, but not limited to these structures. The gate insulating film 120 may extend to the pad area (PA).

The gate electrode 130 is provided on the gate insulating film 120. The gate electrode 130 overlaps with the active layer 110, and the gate insulating film 120 is interposed between the gate electrode 130 and the active layer 110 being overlapped with each other. The gate electrode 130 may be formed in a single-layered structure or multi-layered structure including molybdenum (Mo), aluminum (Al), chrome (Cr), aurum (Au), titanium (Ti), nickel (Ni), neodymium (Nd), copper (Cu) and their alloys, but not limited to these materials.

The insulating interlayer 140 is provided on the gate electrode 130. The insulating interlayer 140 is formed of the same material as that of the gate insulating film 120. For example, the insulating interlayer 140 may be formed in a single-layered structure of the inorganic insulating material such as silicon oxide SiOx or silicon nitride SiNx, or a multi-layered structure of the above silicon oxide SiOx and silicon nitride SiNx, but not limited to these materials and structures. The insulating interlayer 140 may extend to the pad area (PA).

The source electrode 150 and the drain electrode 160 confronting each other are provided on the insulating interlayer 140. A first contact hole (CH1) for exposing one end portion of the active layer 110 is provided in the aforemen-

tioned gate insulating film 120 and the insulating interlayer 140, and a second contact hole (CH2) for exposing the other end portion of the active layer 110 is provided in the aforementioned gate insulating film 120 and the insulating interlayer 140. The source electrode 150 is connected with the other end portion of the active layer 110 via the second contact hole (CH2), and the drain electrode 160 is connected with one end portion of the active layer 110 via the first contact hole (CH1).

The source electrode 150 may include a lower source electrode 151 and an upper source electrode 152.

The lower source electrode 151 is provided between the insulating interlayer 140 and the upper source electrode 152, wherein the lower source electrode 151 enhances an adhesive strength between the insulating interlayer 140 and the upper source electrode 152. Also, the lower source electrode 151 protects a lower surface of the upper source electrode 152 so that it is possible to prevent the lower surface of the upper source electrode 152 from being corroded. Thus, an oxidation degree of the lower source electrode 151 may be lower than an oxidation degree of the upper source electrode 152. That is, a corrosion resistance in a material of the lower source electrode 151 may be superior to a corrosion resistance in a material of the upper source electrode 152. The lower source electrode 151 functions as an adhesion enhancement layer or a corrosion preventing layer. The lower source electrode 151 may be formed of an alloy MoTi of molybdenum and titanium, but not limited to this material.

The upper source electrode 152 is provided on an upper surface of the lower source electrode 151. The upper source electrode 152 may be formed of a low-resistance metal material such as copper Cu, but not limited to this metal material. The upper source electrode 152 may be formed of a metal material whose resistance is relatively lower than that of the lower source electrode 151. In order to lower a total resistance of the source electrode 150, a thickness of the upper source electrode 152 may be larger than a thickness of the lower source electrode 151, preferably.

In the same way as the aforementioned source electrode 150, the drain electrode 160 may include a lower drain electrode 161 and an upper drain electrode 162.

The lower drain electrode 161 is provided between the insulating interlayer 140 and the upper drain electrode 162, wherein the lower drain electrode 161 enhances an adhesive strength between the insulating interlayer 140 and the upper drain electrode 162. Also, the lower drain electrode 161 prevents a lower surface of the upper drain electrode 162 from being corroded. Thus, an oxidation degree of the lower drain electrode 161 may be lower than an oxidation degree of the upper drain electrode 162. That is, a corrosion resistance in a material of the lower drain electrode 161 may be superior to a corrosion resistance in a material of the upper drain electrode 162. The lower drain electrode 161 may be formed of an alloy MoTi of molybdenum and titanium, but not limited to this material.

The upper drain electrode 162 is provided on an upper surface of the lower drain electrode 161. The upper drain electrode 162 may be formed of the same material as that of the aforementioned upper source electrode 152, for example, copper Cu, but not limited to this material. In order to lower a total resistance of the drain electrode 160, a thickness of the upper drain electrode 162 may be larger than a thickness of the lower drain electrode 161.

The upper drain electrode 162 may be formed of the same material as that of the upper source electrode 152, and the upper drain electrode 162 may be formed in the same

thickness as that of the upper source electrode **152**. The lower drain electrode **161** may be formed of the same material as that of the lower source electrode **151**, and the lower drain electrode **161** may be formed in the same thickness as that of the lower source electrode **151**. In this case, the drain electrode **160** and the source electrode **150** may be simultaneously manufactured in the same process.

A structure of the thin film transistor layer (T) is not limited to the above structure, that is, a structure of the thin film transistor layer (T) may be changed to various shapes generally known to those in the art. For example, the drawing shows a top gate structure where the gate electrode **130** is provided on the active layer **110**, but not necessarily. That is, it is possible to provide a bottom gate structure where the gate electrode **130** is provided below the active layer **110**.

The passivation layer **165** is provided on the thin film transistor layer (T), and more particularly, on upper surfaces of the source electrode **150** and the drain electrode **160**. The passivation layer **165** protects the thin film transistor layer (T). The passivation layer **165** may be formed of an inorganic insulating material, for example, silicon oxide film SiO<sub>x</sub> or silicon nitride film SiN<sub>x</sub>, but not limited to these materials. The passivation layer **165** may extend to the pad area (PA).

The planarization layer **170** is provided on the passivation layer **165**. The planarization layer **170** is provided to planarize an upper surface of the substrate **100** with the thin film transistor layer (T). The planarization layer **170** may be formed of an organic insulating material, for example, acrylic resin, epoxy resin, phenolic resin, polyamide resin, polyimide resin, and etc., but not limited to these materials. The planarization layer **170** may not extend to the pad area (PA).

The anode electrode **180** and the first auxiliary electrode **190** are provided on the planarization layer **170**. That is, the anode electrode **180** and the first auxiliary electrode **190** are formed in the same layer. A third contact hole (CH3) for exposing the source electrode **150** is provided in the aforementioned passivation layer **165** and the planarization layer **170**. The source electrode **150** and the anode electrode **180** are connected with each other via the third contact hole (CH3). If needed, the third contact hole (CH3) provided in the passivation layer **165** and the planarization layer **170** may expose the drain electrode **160**, whereby the drain electrode **160** and the anode electrode **180** may be connected with each other via the third contact hole (CH3).

The anode electrode **180** reflects a light emitted from the organic light emitting layer **240** to an upper direction. In this reason, the anode electrode **180** includes a material with good reflective properties.

The anode electrode **180** may include a lower anode electrode **181**, a central anode electrode **182** and an upper anode electrode **183**.

The lower anode electrode **181** is provided between the planarization layer **170** and the central anode electrode **182**. The lower anode electrode **181** protects a lower surface of the central anode electrode **182** so that it is possible to prevent the lower surface of the central anode electrode **182** from being corroded. Thus, an oxidation degree of the lower anode electrode **181** may be lower than an oxidation degree of the central anode electrode **182**. That is, a corrosion resistance in a material of the lower anode electrode **181** may be superior to a corrosion resistance in a material of the central anode electrode **182**. Also, the lower anode electrode **181** protects an upper surface of the upper source electrode **152** so that it is possible to prevent the upper surface of the upper source electrode **152** from being corroded. Thus, an

oxidation degree of the lower anode electrode **181** may be lower than an oxidation degree of the upper source electrode **152**. That is, a corrosion resistance in a material of the lower anode electrode **181** may be superior to a corrosion resistance in a material of the upper source electrode **152**. The lower anode electrode **181** prevents the upper surface of the upper source electrode **152** from being corroded so that it is possible to provide the aforementioned dual-layered structure in the source electrode **150**.

The lower anode electrode **181** functions as a corrosion preventing layer. The lower anode electrode **181** may be formed of a transparent conductive material such as indium-tin-oxide ITO, but not limited to this material.

The central anode electrode **182** is provided between the lower anode electrode **181** and the upper anode electrode **183**. The central anode electrode **182** is formed of a material with relatively-low resistance and relatively-high reflectance in comparison to the lower anode electrode **181** and the upper anode electrode **183**, for example, argentums Ag, but not limited to this material. In order to lower a total resistance of the anode electrode **180**, a thickness of the central anode electrode **182** with relatively-low resistance may be larger than a thickness in each of the lower anode electrode **181** and the upper anode electrode **183** with relatively-high resistance, preferably.

The upper anode electrode **183** is provided on an upper surface of the central anode electrode **182** so that it is possible to prevent an upper surface of the central anode electrode **182** from being corroded. Thus, an oxidation degree of the upper anode electrode **183** may be lower than an oxidation degree of the central anode electrode **182**. That is, a corrosion resistance in a material of the upper anode electrode **183** may be superior to a corrosion resistance in a material of the central anode electrode **182**. The upper anode electrode **183** may be formed of a transparent conductive material such as indium-tin-oxide ITO, but not limited to this material.

In the same way as the aforementioned anode electrode **180**, the first auxiliary electrode **190** may include a first lower auxiliary electrode **191**, a first central auxiliary electrode **192** and a first upper auxiliary electrode **193**.

The first lower auxiliary electrode **191** is provided between the planarization layer **170** and the first central auxiliary electrode **192**, wherein the first lower auxiliary electrode **191** prevents a lower surface of the first central auxiliary electrode **192** from being corroded. Thus, an oxidation degree of the first lower auxiliary electrode **191** may be lower than an oxidation degree of the first central auxiliary electrode **192**. That is, a corrosion resistance in a material of the first lower auxiliary electrode **191** may be superior to a corrosion resistance in a material of the first central auxiliary electrode **192**. The first lower auxiliary electrode **191** may be formed of the same material as that of the aforementioned lower anode electrode **181**, that is, indium-tin-oxide ITO, but not limited to this material.

The first central auxiliary electrode **192** is provided between the first lower auxiliary electrode **191** and the first upper auxiliary electrode **193**. The first central auxiliary electrode **192** may be formed of the same material as that of the aforementioned central anode electrode **182**, that is, argentums Ag, but not limited to this material. In order to lower a total resistance of the first auxiliary electrode **190**, a thickness of the first central auxiliary electrode **192** with a relatively low resistance may be larger than a thickness of each of the first lower auxiliary electrode **191** and the first upper auxiliary electrode **193** with a relatively high resistance, preferably.

The first upper auxiliary electrode **193** is provided on an upper surface of the first central auxiliary electrode **192**. The first upper auxiliary electrode **193** prevents the upper surface of the first central auxiliary electrode **192** from being corroded. Thus, an oxidation degree of the first upper auxiliary electrode **193** may be lower than an oxidation degree of the first central auxiliary electrode **192**. That is, a corrosion resistance in a material of the first upper auxiliary electrode **193** may be superior to a corrosion resistance in a material of the first central auxiliary electrode **192**. The first upper auxiliary electrode **193** may be formed of the same material as that of the aforementioned upper anode electrode **183**, that is, a transparent conductive material such as indium-tin-oxide ITO, but not limited to this material.

The first upper auxiliary electrode **193** may be formed of the same material as that of the upper anode electrode **183**, and the first upper auxiliary electrode **193** may be formed in the same thickness as that of the upper anode electrode **183**. The first central auxiliary electrode **192** may be formed of the same material as that of the central anode electrode **182**, and the first central auxiliary electrode **192** may be formed in the same thickness as that of the central anode electrode **182**. The first lower auxiliary electrode **191** may be formed of the same material as that of the lower anode electrode **181**, and the first lower auxiliary electrode **191** may be formed in the same thickness as that of the lower anode electrode **181**. In this case, the first auxiliary electrode **190** and the anode electrode **180** may be simultaneously manufactured in the same process.

The second auxiliary electrode **210** is provided on an upper surface of the first auxiliary electrode **190**. In more detail, the second auxiliary electrode **210** is brought in contact with entire upper and lateral surfaces of the first auxiliary electrode **190**. That is, an additional insulating layer is not provided between the first auxiliary electrode **190** and the second auxiliary electrode **210**, whereby there is no need for an additional process of forming an insulating layer and a contact hole. The second auxiliary electrode **210** together with the first auxiliary electrode **190** lowers a resistance of the cathode electrode **250**. In order to lower the resistance of the cathode electrode **250**, the two auxiliary electrodes of the first auxiliary electrode **190** and the second auxiliary electrode **210** are deposited so that it is possible to easily control the resistance properties needed for the auxiliary electrode. In more detail, the first auxiliary electrode **190** is provided in the same layer as the anode electrode **180**. If the first auxiliary electrode **190** is increased in size, the anode electrode **180** is decreased in size, to thereby lower an aperture ratio. Thus, there is a limitation on the increase of size of the first auxiliary electrode **190**. According to one embodiment of the present disclosure, the second auxiliary electrode **210** is deposited on the first auxiliary electrode **190** so that it is possible to efficiently lower the resistance of the cathode electrode **250**. Also, the second auxiliary electrode **210** covers the upper and lateral surfaces of the first auxiliary electrode **190** so that it is possible to prevent the upper and lateral surfaces of the first auxiliary electrode **190** from being corroded.

The second auxiliary electrode **210** may include a second lower auxiliary electrode **211** and a second upper auxiliary electrode **212**.

The second lower auxiliary electrode **211** is provided between the first auxiliary electrode **190** and the second upper auxiliary electrode **212**. The second lower auxiliary electrode **211** covers upper and lateral surfaces of the first auxiliary electrode **190**. The second lower auxiliary elec-

trode **211** is formed of a low-resistance material, for example, copper Cu, but not limited to this material.

The second upper auxiliary electrode **212** is provided on an upper surface of the second lower auxiliary electrode **211**. The second upper auxiliary electrode **212** prevents the upper surface of the second lower auxiliary electrode **211** from being corroded. Thus, an oxidation degree of the second upper auxiliary electrode **212** may be lower than an oxidation degree of the second lower auxiliary electrode **211**. That is, a corrosion resistance in a material of the second upper auxiliary electrode **212** may be superior to a corrosion resistance in a material of the second lower auxiliary electrode **211**. The second upper auxiliary electrode **211** may be formed of an alloy MoTi of molybdenum and titanium, but not limited to this material. In order to lower a total resistance of the second auxiliary electrode **210**, a thickness of the second lower auxiliary electrode **211** with a relatively low resistance may be larger than a thickness of the second upper auxiliary electrode **212**, preferably.

The bank **220** is provided on the anode electrode **180** and the second auxiliary electrode **210**.

The bank **220**, which exposes the upper surface of the anode electrode **180**, is provided on one side and the other side of the anode electrode **180**. According as the bank **220** is provided to expose the upper surface of the anode electrode **180**, it is possible to secure an image-displaying area. Also, the bank **220** is provided on one side and the other side of the anode electrode **180** so that it is possible to prevent the lateral surface of the central anode electrode **182** from being exposed to the environment, wherein the lateral surface of the central anode electrode **182** is relatively vulnerable to corrosion, thereby preventing the lateral surface of the central anode electrode **182** from being corroded.

The bank **220**, which exposes the upper surface of the second auxiliary electrode **210**, is provided on one side and the other side of the second auxiliary electrode **210**. According as the bank **220** is provided to expose the upper surface of the second auxiliary electrode **210**, it is possible to secure an electrical connection space between the second auxiliary electrode **210** and the cathode electrode **250**. Also, the bank **220** is provided on one side and the other side of the second auxiliary electrode **210** so that it is possible to prevent the lateral surface of the second lower auxiliary electrode **211** from being exposed to the external, wherein the lateral surface of the second lower auxiliary electrode **211** is relatively vulnerable to corrosion, thereby preventing the lateral surface of the second lower auxiliary electrode **211** from being corroded.

Also, the bank **220** is provided between the anode electrode **180** and the second auxiliary electrode **210**, to thereby insulate the anode electrode **180** and the second auxiliary electrode **210** from each other. The bank **220** may be formed of an organic insulating material, for example, polyimide resin, acryl resin, benzocyclobutene BCB, and etc., but not limited to these materials.

The partition **230** is provided on the second auxiliary electrode **210**. The partition **230** is provided at a predetermined interval from the bank **220**, and the second auxiliary electrode **210** and the cathode electrode **250** are electrically connected with each other through the space between the partition **230** and the bank **220**. The second auxiliary electrode **210** and the cathode electrode **250** may be electrically connected with each other without forming the partition **230**. However, if forming the partition **230**, it facilitates a deposition process of the organic light emitting layer **240**. This will be described in detail as follows.

In case the partition **230** is not formed, it is necessary to provide a mask pattern for covering the upper surface of the second auxiliary electrode **210** when the organic light emitting layer **240** is deposited to prevent the upper surface of the second auxiliary electrode **210** from being covered. However, if forming the partition **230**, an upper surface of the partition **230** serves as eaves for the deposition process of the organic light emitting layer **240**. Thus, the organic light emitting layer **240** is not deposited in an area below the eaves so that there is no need to provide the mask pattern for covering the upper surface of the second auxiliary electrode **210**. From a front view, if the upper surface of the partition **230** serving as the eaves is configured to cover the space between the partition **230** and the bank **220**, it is possible to prevent the organic light emitting layer **240** from being permeated into the space between the partition **230** and the bank **220**. Thus, the second auxiliary electrode **210** may be exposed in the space between the partition **230** and the bank **220**. Especially, the organic light emitting layer **240** may be manufactured by an evaporation method using a deposition material with superior straightness. Thus, the organic light emitting layer **240** is not deposited in the space between the partition **230** and the bank **220** for the deposition process of the organic light emitting layer **240**.

As described above, in order to provide the partition **230** whose upper surface serves as the eaves, a width in the upper surface of the partition **230** is larger than a width in the lower surface of the partition **230**. The partition **230** may include a first partition **231** and a second partition **232**. The first partition **231** is provided on the upper surface of the second auxiliary electrode **210**. The first partition **231** may be formed of the same material as that of the bank **220**, and the first partition **231** and the bank **220** may be manufactured in the same process. The second partition **232** is provided on an upper surface of the first partition **231**. A width in the upper surface of the second partition **232** is larger than a width in the lower surface of the second partition **232**. Especially, the upper surface of the second partition **232** is configured to cover the space between the partition **230** and the bank **220**, whereby the partition **230** serves as the eaves.

The organic light emitting layer **240** is provided on the anode electrode **180**. The organic light emitting layer **240** may include a hole injecting layer, a hole transporting layer, an emitting layer, an electron transporting layer and an electron injecting layer. A structure of the organic light emitting layer **240** may be changed to various shapes generally known to those in the art.

The organic light emitting layer **240** may extend to the upper surface of the bank **220**. However, when the organic light emitting layer **240** extends to the upper surface of the bank **220**, the upper surface of the second auxiliary electrode **210** is not covered by the organic light emitting layer **240**. If the upper surface of the second auxiliary electrode **210** is covered by the organic light emitting layer **240**, it is difficult to electrically connect the second auxiliary electrode **210** and the cathode electrode **250** with each other. As described above, the organic light emitting layer **240** may be manufactured for the deposition process without using the mask for covering the upper surface of the second auxiliary electrode **210**. In this case, the organic light emitting layer **240** may be provided on the upper surface of the partition **230**.

The cathode electrode **250** is provided on the organic light emitting layer **240**. As the cathode electrode **250** is provided on a surface from which light is emitted, the cathode electrode **250** is formed of a transparent conductive material. Thus, a resistance of the cathode electrode **250** is increased

since the cathode electrode **250** is formed of the transparent conductive material. In order to lower the resistance of the cathode electrode **250**, the cathode electrode **250** is connected with the second auxiliary electrode **210**. That is, the cathode electrode **250** is connected with the second auxiliary electrode **210** via the space between the partition **230** and the bank **220**. The cathode electrode **250** may be manufactured by sputtering, that is, a deposition process using a deposition material with inferior straightness. Accordingly, the cathode electrode **250** may be deposited in the space between the partition **230** and the bank **220** for the deposition process of the cathode electrode **250**.

Although not shown, an encapsulation layer for preventing a permeation of moisture may be additionally provided on the cathode electrode **250**. The encapsulation layer may be formed of various materials generally known to those in the art. Although not shown, a color filter for each pixel may be additionally provided on the cathode electrode **250**. In this case, a white light may be emitted from the organic light emitting layer **240**.

In the pad area (PA) of the substrate **100**, there are a gate insulating film **120**, an insulating interlayer **140**, a signal pad **300**, a passivation layer **165**, a first pad electrode **400** and a second pad electrode **500**.

The gate insulating film **120** is provided on the substrate **100**, and the insulating interlayer **140** is provided on the gate insulating film **120**. The gate insulating film **120** and the insulating interlayer **140**, which extend from the active area (AA), are formed on an entire surface of the pad area (PA).

The signal pad **300** is provided on the insulating interlayer **140**. The signal pad **300** may be formed of the same material as that of the source electrode **150** and the drain electrode **160** of the aforementioned active area (AA).

The signal pad **300** may include a lower signal pad **301** and an upper signal pad **302**.

The lower signal pad **301** is provided between the insulating interlayer **140** and the upper signal pad **302**, wherein the lower signal pad **301** enhances an adhesive strength between the insulating interlayer **140** and the upper signal pad **302**. Also, the lower signal pad **301** prevents a lower surface of the upper signal pad **302** from being corroded. Thus, an oxidation degree of the lower signal pad **301** may be lower than an oxidation degree of the upper signal pad **302**. That is, a corrosion resistance in a material of the lower signal pad **301** may be superior to a corrosion resistance in a material of the upper signal pad **302**. The lower signal pad **301** may be formed of the same material as that of the aforementioned lower source electrode **151** or lower drain electrode **161**, that is, an alloy MoTi of molybdenum and titanium, but not limited to this material.

The upper signal pad **302** is provided on an upper surface of the lower signal pad **301**. The upper signal pad **302** may be formed of a low-resistance metal material such as copper Cu, but not limited to this metal material. The upper signal pad **302** may be formed of a metal material whose resistance is relatively lower than that of the lower signal pad **301**. In order to lower a total resistance of the signal pad **300**, a thickness of the upper signal pad **302** may be larger than a thickness of the lower signal pad **301**, preferably.

The upper signal pad **302** may be formed of the same material as that of the upper source electrode **152** and/or upper drain electrode **162**, and may be formed in the same thickness as the upper source electrode **152** and/or upper drain electrode **162**. The lower signal pad **301** may be formed of the same material as that of the lower source electrode **151** and/or lower drain electrode **161**, and may be formed in the same thickness as the lower source electrode

151 and/or lower drain electrode 161. In this case, the signal pad 300 and the source electrode 150 and/or drain electrode 160 may be simultaneously manufactured in the same process.

The passivation layer 165 is provided on the signal pad 300. The passivation layer 165 extends from the active area (AA). A fourth contact hole (CH4) for exposing a predetermined part of the signal pad 300 is provided in the passivation layer 165.

The first pad electrode 400 is provided on the passivation layer 165. The first pad electrode 400 is connected with the signal pad 300 via the fourth contact hole (CH4).

The first pad electrode 400 protects an upper surface of the signal pad 300. The upper surface of the signal pad 300 is formed of the upper signal pad 302 which is relatively vulnerable to corrosion. In this reason, the first pad electrode 400 is provided to cover the upper surface of the upper signal pad 302 which is exposed via the fourth contact hole (CH4), thereby preventing the upper signal pad 302 from being corroded. The first pad electrode 400 prevents the upper surface of the upper signal pad 302 from being corroded. Thus, it is possible to provide the aforementioned dual-layered structure in the signal pad 300.

In the same way as the aforementioned anode electrode 180 and the first auxiliary electrode 190, the first pad electrode 400 may include a first lower pad electrode 401, a first central pad electrode 402 and a first upper pad electrode 403.

The first lower pad electrode 401 is provided between the upper signal pad 302 and the first central pad electrode 402. The first lower pad electrode 401 prevents an upper surface of the upper signal pad 302 and a lower surface of the first central pad electrode 402 from being corroded. Thus, an oxidation degree of the first lower pad electrode 401 may be lower than an oxidation degree of each of the upper signal pad 302 and the first central pad electrode 402. That is, a corrosion resistance in a material of the first lower pad electrode 401 may be superior to a corrosion resistance in a material of each of the upper signal pad 302 and the first central pad electrode 402. The first lower pad electrode 401 may be formed of the same material as that of the lower anode electrode 181 and the first lower auxiliary electrode 191, that is, a transparent conductive material such as indium-tin-oxide ITO, but not limited to this material.

The first central pad electrode 402 is provided between the first lower pad electrode 401 and the first upper pad electrode 403. The first central pad electrode 402 may be formed of the same material as that of the central anode electrode 182 and the first central auxiliary electrode 192, that is, argentums Ag, but not limited to this material. In order to lower a total resistance of the first pad electrode 400, a thickness of the first central pad electrode 402 with a relatively low resistance may be larger than a thickness of each of the first lower pad electrode 401 and the first upper pad electrode 403 with a relatively high resistance, preferably.

The first upper pad electrode 403 is provided on an upper surface of the first central pad electrode 402 so that it is possible to prevent the upper surface of the first central pad electrode 402 from being corroded. Thus, an oxidation degree of the first upper pad electrode 403 may be lower than an oxidation degree of the first central pad electrode 402. That is, a corrosion resistance in a material of the first upper pad electrode 403 may be superior to a corrosion resistance in a material of the first central pad electrode 402. The first upper pad electrode 403 may be formed of the same material as that of the upper anode electrode 183 and the first

upper auxiliary electrode 193, that is, a transparent conductive material such as indium-tin-oxide ITO, but not limited to this material.

The first upper pad electrode 403 may be formed of the same material as that of each of the upper anode electrode 183 and the first upper auxiliary electrode 193, and may be formed in the same thickness as that of each of the upper anode electrode 183 and the first upper auxiliary electrode 193. The first central pad electrode 402 may be formed of the same material as that of each of the central anode electrode 182 and the first central auxiliary electrode 192, and may be formed in the same thickness as that of each of the central anode electrode 182 and the first central auxiliary electrode 192. The first lower pad electrode 401 may be formed of the same material as that of each of the lower anode electrode 181 and the first lower auxiliary electrode 191, and may be formed in the same thickness as that of each of the lower anode electrode 181 and the first lower auxiliary electrode 191. In this case, the first pad electrode 400, the anode electrode 180 and the first auxiliary electrode 190 may be simultaneously manufactured in the same process.

The second pad electrode 500 is provided on an upper surface of the first pad electrode 400. In more detail, the second pad electrode 500 is brought in contact with entire upper and lateral surfaces of the first pad electrode 400. That is, an additional insulating layer is not provided between the second pad electrode 500 and the first pad electrode 400, whereby there is no need for an additional process of forming an insulating layer and a contact hole. The second pad electrode 500 covers upper and lateral surfaces of the first pad electrode 400, to thereby prevent a corrosion of the first pad electrode 400.

The second pad electrode 500 may include a second lower pad electrode 501 and a second upper pad electrode 502.

The second lower pad electrode 501 is provided between the first pad electrode 300 and the second upper pad electrode 502. The second lower pad electrode 501 covers upper and lateral surfaces of the first pad electrode 300. The second lower pad electrode 501 may be formed of a low-resistance material, for example, copper Cu, but not limited to this material.

The second upper pad electrode 502 is provided on an upper surface of the second lower pad electrode 501. The second upper pad electrode 502 is exposed to the environment, and is connected with an external driver. Since the second upper pad electrode 502 is exposed to the environment, the second upper pad electrode 502 is formed of a material with a superior corrosion resistance, in one embodiment. The second upper pad electrode 502 prevents the upper surface of the second lower pad electrode 501 from being corroded. Thus, an oxidation degree of the second upper pad electrode 502 may be lower than an oxidation degree of the second lower pad electrode 501. That is, a corrosion resistance in a material of the second upper pad electrode 502 may be superior to a corrosion resistance in a material of the second lower pad electrode 501. The second upper pad electrode 502 may be formed of an alloy MoTi of molybdenum and titanium, but not limited to this material.

In order to lower a total resistance of the second pad electrode 500, a thickness of the second lower pad electrode 501 with a relatively-low resistance may be larger than a thickness of the second upper pad electrode 502 with a relatively-high resistance, preferably.

The second upper pad electrode 502 may be formed of the same material as that of the second upper auxiliary electrode 212, and may be formed in the same thickness as that of the second upper auxiliary electrode 212. The second lower pad

electrode **501** may be formed of the same material as that of the second lower auxiliary electrode **211**, and may be formed in the same thickness as that of the second lower auxiliary electrode **211**. In this case, the second pad electrode **500** and the second auxiliary electrode **210** may be simultaneously manufactured in the same process.

FIGS. 3A to 3H are cross sectional views illustrating a method of manufacturing the organic light emitting display device according to one embodiment of the present disclosure, which relate to the organic light emitting display device shown in FIG. 2. Thus, the same reference numbers will be used throughout the drawings to refer to the same or like parts, and a detailed description for the same parts will be omitted.

First, as shown in FIG. 3A, the active layer **110**, the gate insulating film **120**, the gate electrode **130**, the insulating interlayer **140**, the source electrode **150**, the drain electrode **160** and the signal pad **300** are sequentially provided on the substrate **100**.

In more detail, the active layer **110** is provided on the substrate **100**, the gate insulating film **120** is provided on the active layer **110**, the gate electrode **130** is provided on the gate insulating film **120**, the insulating interlayer **140** is provided on the gate electrode **130**, the first and second contact holes (CH1, CH2) are provided in the gate insulating film **120** and the insulating interlayer **140**, the drain electrode **160** connected with one end portion of the active layer **110** via the first contact hole (CH1) is provided, the source electrode **150** connected with the other end portion of the active layer **110** via the second contact hole (CH2) is provided, and the signal pad **300** is provided.

In this case, the active layer **110**, the gate electrode **130**, the source electrode **150** and the drain electrode **160** are provided in the active area (AA), the gate insulating film **120** and the insulating interlayer **140** extend from the active area (AA) to the pad area (PA), and the signal pad **300** is provided in the pad area (PA). By the aforementioned manufacturing process, the thin film transistor layer (T) is formed in the active area (AA), and the signal pad **300** is formed in the pad area (PA).

The source electrode **150** may include the lower source electrode **151** and the upper source electrode **152**. The drain electrode **160** may include the lower drain electrode **161** and the upper drain electrode **162**. The signal pad **300** may include the lower signal pad **301** and the upper signal pad **302**. The source electrode **150**, the drain electrode **160** and the signal pad **300** may be formed of the same material, and may be simultaneously manufactured in the same patterning process.

Then, as shown in FIG. 3B, the passivation layer **165** is provided on the source electrode **150**, the drain electrode **160** and the signal pad **300**. The planarization layer **170** is provided on the passivation layer **165**. The planarization layer **170** is provided to include the third contact hole (CH3).

The passivation layer **165** extends from the active area (AA) to the pad area (PA), and the planarization layer **170** is provided in the active area (AA). The thin film transistor is not formed in the pad area (PA), that is, it is unnecessary to planarize the surface of the pad area (PA). Accordingly, the planarization layer **170** is not provided in the pad area (PA).

Then, as shown in FIG. 3C, the third contact hole (CH3) and the fourth contact hole (CH4) are provided in the passivation layer **165** by removing the predetermined portions of the passivation layer **165**. The source electrode **150** is exposed to the external via the third contact hole (CH3) provided in the passivation layer **165** and the planarization

layer **170**, and the signal pad **300** is exposed to the external via the fourth contact hole (CH4) provided in the passivation layer **165**. Meanwhile, the drain electrode **160** may be exposed to the external via the third contact hole (CH3).

According to one embodiment of the present disclosure, it is possible to form the third contact hole (CH3) for exposing the source electrode **150** to the external and the fourth contact hole (CH4) for exposing the signal pad **300** to the external in the passivation layer **165** at the same time. Accordingly, the third contact hole (CH3) and the fourth contact hole (CH4) may be formed by one mask process, that is, it is possible to prevent the increase of mask processes. This will be described in detail. The upper signal pad **302** exposed via the fourth contact hole (CH4) is vulnerable to corrosion. Thus, it is necessary to prevent the upper signal pad **302** from being in contact with the etchant. According to one embodiment of the present disclosure, the exposed upper signal pad **302** is covered with the first pad electrode **400** by the following process of FIG. 3D, whereby there is no worry about the contact between the upper signal pad **302** and the etchant. Thus, the third contact hole (CH3) and the fourth contact hole (CH4) may be manufactured at the same time.

Then, as shown in FIG. 3D, the anode electrode **180** and the first auxiliary electrode **190** are provided on the planarization layer **170** of the active area (AA), wherein the anode electrode **180** and the first auxiliary electrode **190** are spaced apart from each other. The first pad electrode **400** is provided on the passivation layer **165** of the pad area (PA).

The anode electrode **180** is connected with the source electrode **150** or drain electrode **160** via the third contact hole (CH3), and the first pad electrode **400** is connected with the signal pad **300** via the fourth contact hole (CH4).

The anode electrode **180** may include the lower anode electrode **181**, the central anode electrode **182** and the upper anode electrode **183**. The first auxiliary electrode **190** may include the first lower auxiliary electrode **191**, the first central auxiliary electrode **192** and the first upper auxiliary electrode **193**. The first pad electrode **400** may include the first lower pad electrode **401**, the first central pad electrode **402** and the first upper pad electrode **403**.

The anode electrode **180**, the first auxiliary electrode **190** and the first pad electrode **400** may be formed of the same material, and may be simultaneously manufactured in the same patterning process.

Then, as shown in FIG. 3E, the second auxiliary electrode **210** is provided on the first auxiliary electrode **190** of the active area (AA), and the second pad electrode **500** is provided on the first pad electrode **400** of the pad area (PA).

The second auxiliary electrode **210** is patterned to cover upper and lateral surfaces of the first auxiliary electrode **190**, and the second pad electrode **500** is patterned to cover upper and lateral surfaces of the first pad electrode **400**.

The second pad electrode **500** and the second auxiliary electrode **210** may be formed of the same material, and may be simultaneously manufactured in the same patterning process.

The second auxiliary electrode **210** may include the second lower auxiliary electrode **211** and the second upper auxiliary electrode **212**, and the second pad electrode **500** may include the second lower pad electrode **501** and the second upper pad electrode **502**.

As shown in FIG. 3F, the bank **220**, which exposes the upper surface of the anode electrode **180**, is provided on one side and the other side of the anode electrode **80**. Also, the bank **220**, which exposes the upper surface of the second

auxiliary electrode **210**, is provided on one side and the other side of the second auxiliary electrode **210**.

The first partition **231** and the second partition **232** are sequentially provided on the upper surface of the exposed second auxiliary electrode **210**. The first partition **231** and the bank **220** may be formed of the same material, and may be simultaneously manufactured in the same patterning process. The partition **230** is spaced apart from the bank **220**, whereby the space is prepared between the partition **230** and the bank **220**.

In order to provide the partition **230** whose upper surface serves as the eaves, the width in the upper surface of the partition **230** is larger than the width in the lower surface of the partition **230**. Especially, from a front view, the space between the partition **230** and the bank **220** is covered by the upper surface of the second partition **232** so that it is possible to prevent the organic light emitting layer **240** from being deposited in the space between the partition **230** and the bank **220** for the deposition process of the organic light emitting layer **240**.

As shown in FIG. 3G, the organic light emitting layer **240** is provided on the anode electrode **180**. The organic light emitting layer **240** may be manufactured by an evaporation method using a deposition material with superior straightness. Thus, the organic light emitting layer **240** is deposited on the upper surface of the bank **220** and the partition **230**, however, the organic light emitting layer **240** is not deposited in the space between the bank **220** and the partition **230**. That is, the upper surface of the partition **230** serves as the eaves for the deposition process of the organic light emitting layer **240**, whereby it is possible to prevent the organic light emitting layer **240** from being deposited in the space between the partition **230** and the bank **220** for the deposition process of the organic light emitting layer **240** without using the mask pattern of covering the upper surface of the second auxiliary electrode **210**.

As shown in FIG. 3H, the cathode electrode **250** is provided on the organic light emitting layer **240**.

The cathode electrode **250** is connected with the second auxiliary electrode **210** via the space between the partition **230** and the bank **220**. The cathode electrode **250** may be manufactured by sputtering, that is, a deposition process using a deposition material with inferior straightness. Accordingly, the cathode electrode **250** may be deposited in the space between the partition **230** and the bank **220** for the deposition process of the cathode electrode **250**.

According to the present disclosure, the pad electrode covers the upper surface of the signal pad so that it is possible to prevent the corrosion of the signal pad. Thus, the signal pad is formed in the dual-layered structure including the lower signal pad and the upper signal pad which is vulnerable to corrosion.

Also, the contact hole for exposing the source electrode or drain electrode to the external and the contact hole for exposing the signal pad to the external are formed at the same time in the passivation layer so that it is possible to prevent the increase of mask process.

Furthermore, the anode electrode, the first auxiliary electrode and the first pad electrode are formed at the same time, and the second auxiliary electrode and the second pad electrode are formed at the same time, thereby preventing the increase of mask process.

In order to lower the resistance of the cathode electrode, the two auxiliary electrodes of the first auxiliary electrode and the second auxiliary electrode are deposited so that it is possible to easily control the resistance properties needed for the auxiliary electrode.

It will be apparent to those skilled in the art that various modifications and variations can be made in the present invention without departing from the spirit or scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. An organic light emitting display device comprising:
  - a substrate including an active area that displays images and a pad area that connects to an external driving circuit;
  - a thin-film transistor (TFT) including a drain electrode, a source electrode, and a gate electrode, the drain electrode and the source electrode in a same layer of the organic light emitting display device;
  - an anode electrode in the active area of the substrate;
  - an organic light emitting layer on the anode electrode;
  - a cathode electrode on the organic light emitting layer;
  - a signal pad on the pad area of the substrate, the signal pad in the same layer as the drain electrode and the source electrode of the TFT;
  - a first pad electrode on the signal pad in the pad area and connected with the signal pad via a contact hole, the first pad electrode comprising a same material as the anode electrode; and
  - a second pad electrode covering the first pad electrode in the pad area, the second pad electrode not extending into the active area of the substrate.
2. The organic light emitting display device of claim 1, further comprising:
  - an auxiliary electrode connected with the cathode electrode, the auxiliary electrode including:
    - a first auxiliary electrode provided in a same layer as the anode electrode and horizontally spaced apart from the anode electrode; and
    - a second auxiliary electrode on the first auxiliary electrode, the second auxiliary electrode directly connected with the cathode electrode.
3. The organic light emitting display device according to claim 2, wherein the second auxiliary electrode covers side surfaces and an upper surface of the first auxiliary electrode, and the second pad electrode covers an upper surface and side surfaces of the first pad electrode.
4. The organic light emitting display device according to claim 2, wherein the first auxiliary electrode and the first pad electrode comprises a same material, and the second auxiliary electrode and the second pad electrode comprises a same material.
5. The organic light emitting display device according to claim 2, wherein the first auxiliary electrode includes a first auxiliary electrode portion, a second auxiliary electrode portion on the first auxiliary electrode portion, and a third auxiliary electrode portion on the second auxiliary electrode portion, and the second auxiliary electrode includes a first auxiliary electrode portion and a second auxiliary electrode portion on the first auxiliary portion of the second auxiliary electrode,
  - wherein the first auxiliary electrode portion of the second auxiliary electrode covers side surfaces and an upper surface of the first auxiliary electrode.
6. The organic light emitting display device according to claim 5,
  - wherein the first auxiliary electrode portion and the third auxiliary electrode portion of the first auxiliary electrode have a higher resistance to corrosion than the second auxiliary electrode portion of the first auxiliary

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electrode, and wherein a thickness of the second auxiliary electrode portion of the first auxiliary electrode is greater than thicknesses of the first auxiliary electrode portion and the third auxiliary electrode portion of the first auxiliary electrode; and

wherein the second auxiliary electrode portion of the second auxiliary electrode has a higher resistance to corrosion than the first auxiliary electrode portion of the second auxiliary electrode, and wherein a thickness of the first auxiliary electrode portion of the second auxiliary electrode is greater than a thickness of the second auxiliary electrode portion of the second auxiliary electrode.

7. The organic light emitting display device according to claim 1, wherein the signal pad further comprises:

- a first signal pad; and
- a second signal pad on the first signal pad;

wherein the first signal pad has a higher resistance to corrosion than the second signal pad, and wherein a thickness of the second signal pad is greater than a thickness of the first signal pad.

8. The organic light emitting display device according to claim 2, wherein the second auxiliary electrode includes a first end and a second end that is opposite the first end, and the organic light emitting display device further comprising:

- a first bank over the first end of the second auxiliary electrode;
- a second bank over the second end of the second auxiliary electrode; and
- a partition on the second auxiliary electrode and positioned between the first bank and the second bank;

wherein the cathode electrode is connected with the second auxiliary electrode via a first space between the first bank and the partition and a second space between the second bank and the partition.

9. The organic light emitting display device according to claim 1, wherein the first pad electrode comprises:

- a first pad electrode portion;
- a second pad electrode portion on the first pad electrode portion; and
- a third pad electrode portion on the second pad electrode portion;

wherein the first pad electrode portion and the third pad electrode portion have a higher resistance to corrosion than the second pad electrode portion, and wherein a thickness of the second pad electrode portion is greater than thicknesses of the first pad electrode portion and the third pad electrode portion.

10. The organic light emitting display device according to claim 9, wherein the second pad electrode comprises:

- a first pad electrode portion over side surfaces and an upper surface of the first pad electrode; and
- a second pad electrode portion on the first pad electrode portion;

wherein the second pad electrode portion has a higher resistance to corrosion than the first pad electrode portion, and wherein a thickness of the first pad electrode portion is greater than a thickness of the second pad electrode portion.

11. An organic light emitting display device comprising:

- a substrate including an active area that displays images and a pad area that connects to an external driving circuit;
- an anode electrode in the active area of the substrate;

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- an organic light emitting layer on the anode electrode;
- a cathode electrode on the organic light emitting layer;
- an auxiliary electrode connected with the cathode electrode, the auxiliary electrode including:
  - a first auxiliary electrode provided in a same layer as the anode electrode and horizontally spaced apart from the anode electrode; and
  - a second auxiliary electrode on the first auxiliary electrode, the second auxiliary electrode directly connected with the cathode electrode extending over the second auxiliary electrode.

12. The organic light emitting display device according to claim 11, wherein the second auxiliary electrode covers side surfaces and an upper surface of the first auxiliary electrode.

13. The organic light emitting display device according to claim 11, wherein the first auxiliary electrode includes a first auxiliary electrode portion, a second auxiliary electrode portion on the first auxiliary electrode portion, and a third auxiliary electrode portion on the second auxiliary electrode portion, and the second auxiliary electrode includes a first auxiliary electrode portion and a second auxiliary electrode portion on the first auxiliary portion of the second auxiliary electrode,

- wherein the first auxiliary electrode portion of the second auxiliary electrode covers side surfaces and an upper surface of the first auxiliary electrode.

14. The organic light emitting display device according to claim 13,

- wherein the first auxiliary electrode portion and the third auxiliary electrode portion of the first auxiliary electrode have a higher resistance to corrosion than the second auxiliary electrode portion of the first auxiliary electrode, and wherein a thickness of the second auxiliary electrode portion of the first auxiliary electrode is greater than thicknesses of the first auxiliary electrode portion and the third auxiliary electrode portion of the first auxiliary electrode; and
- wherein the second auxiliary electrode portion of the second auxiliary electrode has a higher resistance to corrosion than the first auxiliary electrode portion of the second auxiliary electrode, and wherein a thickness of the first auxiliary electrode portion of the second auxiliary electrode is greater than a thickness of the second auxiliary electrode portion of the second auxiliary electrode.

15. The organic light emitting display device according to claim 11, wherein the second auxiliary electrode includes a first end and a second end that is opposite the first end, and the organic light emitting display device further comprising:

- a first bank over the first end of the second auxiliary electrode;
- a second bank over the second end of the second auxiliary electrode; and
- a partition on the second auxiliary electrode and positioned between the first bank and the second bank;

wherein the cathode electrode is connected with the second auxiliary electrode via a first space between the first bank and the partition and a second space between the second bank and the partition.

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|                |                                                                                      |         |            |
|----------------|--------------------------------------------------------------------------------------|---------|------------|
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| [标]申请(专利权)人(译) | 乐金显示有限公司                                                                             |         |            |
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| 外部链接           | <a href="#">USPTO</a>                                                                |         |            |

# 摘要(译)

公开了一种有机发光显示装置，其包括包括有源区和衬垫区的衬底；薄膜晶体管（TFT）包括漏电极，源电极和栅电极；阳极；有机发光层；阴极；所述基板的焊盘区域设置有信号焊盘，所述信号焊盘与所述漏电极和所述源电极位于同一层中，所述焊盘区域包括所述信号焊盘上的第一焊盘电极，以及所述第一焊盘电极上的第二焊盘电极。

