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(54) **OLED COMPONENT, METHOD FOR MANUFACTURING THE SAME AND OLED DISPLAY**

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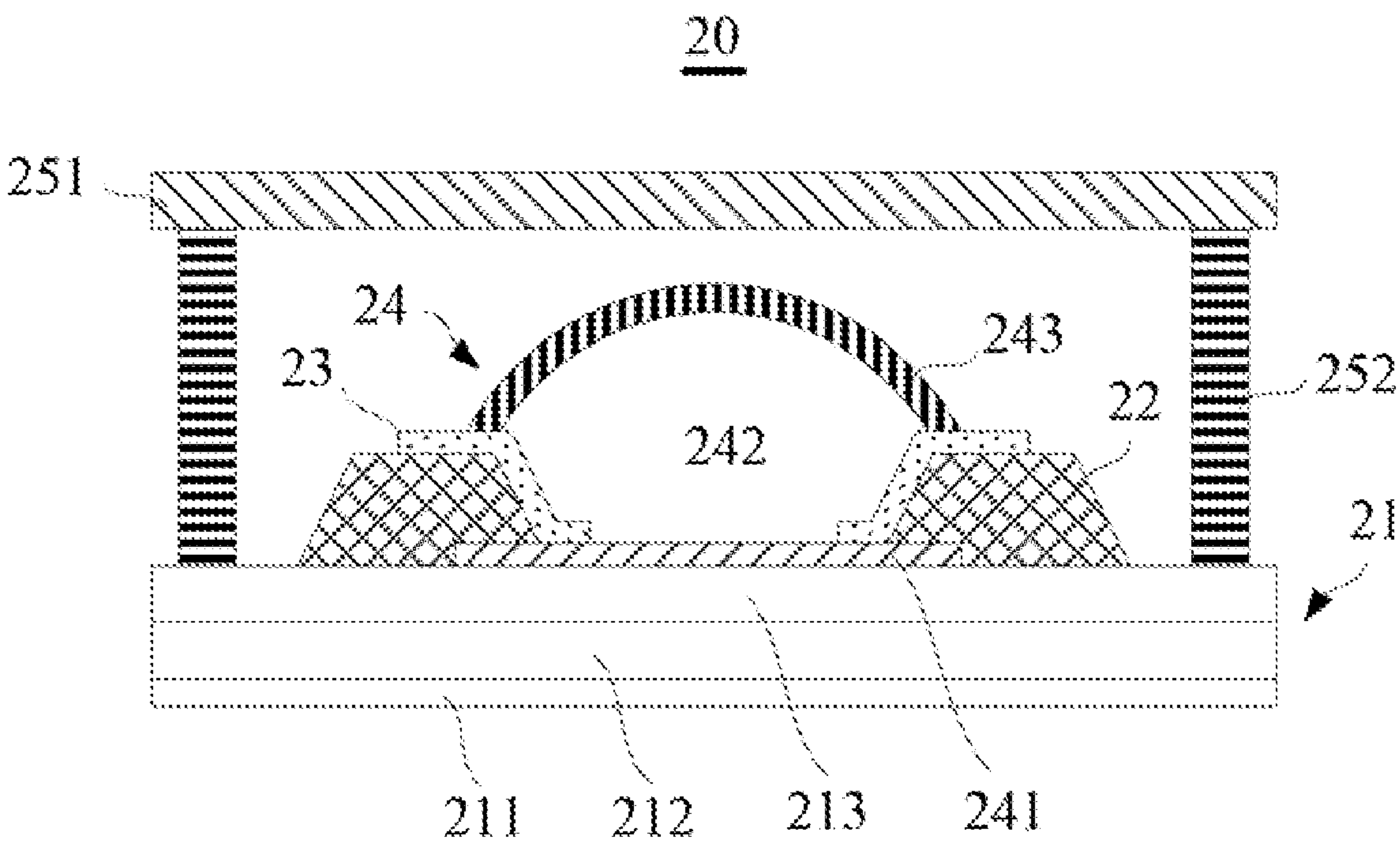
(57) **ABSTRACT**

The present disclosure provides an OLED component, a method for manufacturing the same and an OLED display. The OLED component includes a baseplate; a pixel define layer, an insulation layer and an organic light-emitting unit successively disposed on the baseplate; wherein the pixel define layer defines a light-emitting area, the organic light-emitting unit is located in the light-emitting area, and the insulation layer is arranged between the pixel define layer and the organic light-emitting unit. Therefore, the implementation of the present disclosure may prevent impurities in the pixel define layer from entering into the organic light-emitting unit.



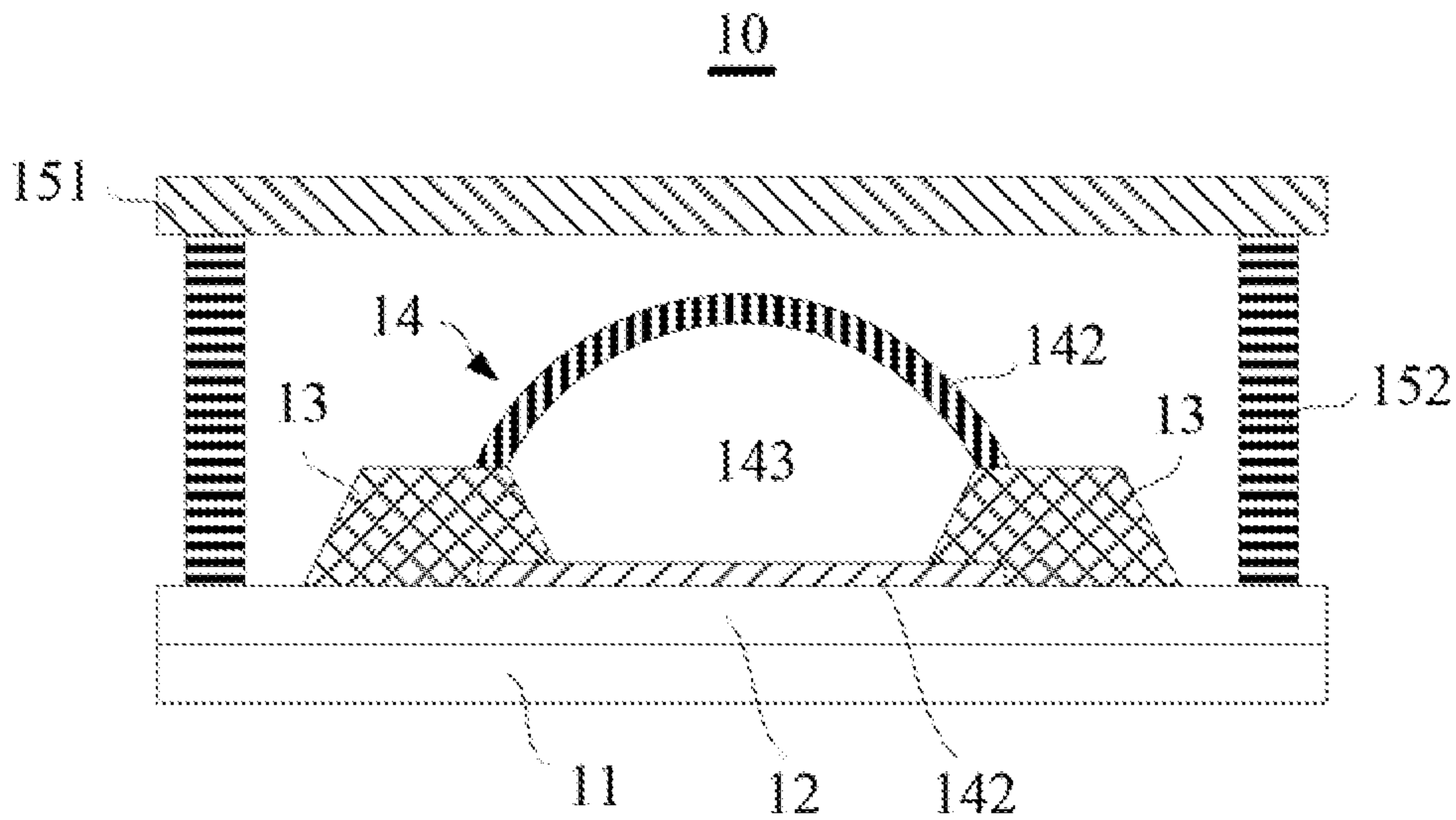



FIG. 1 (related art)

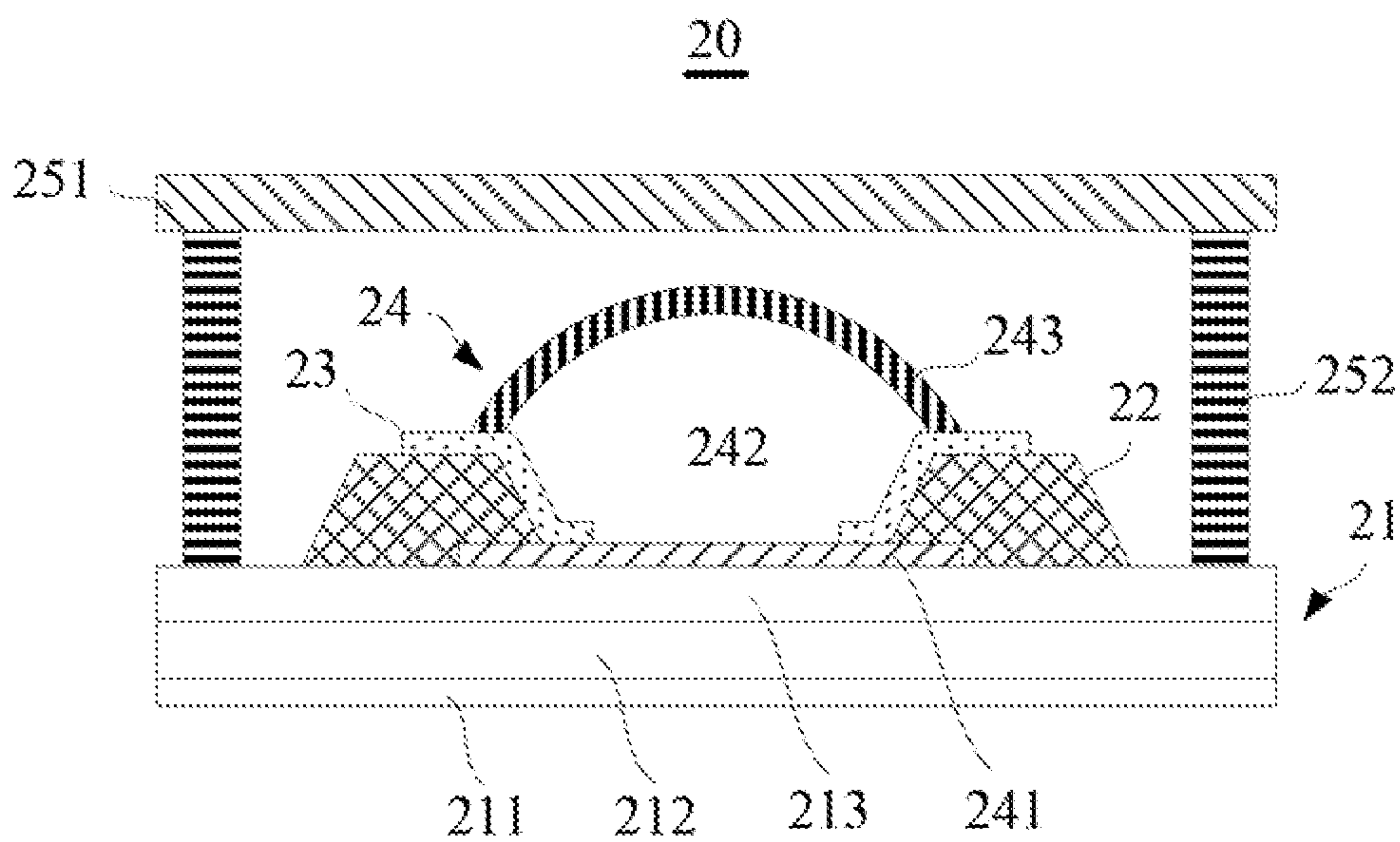



FIG. 2

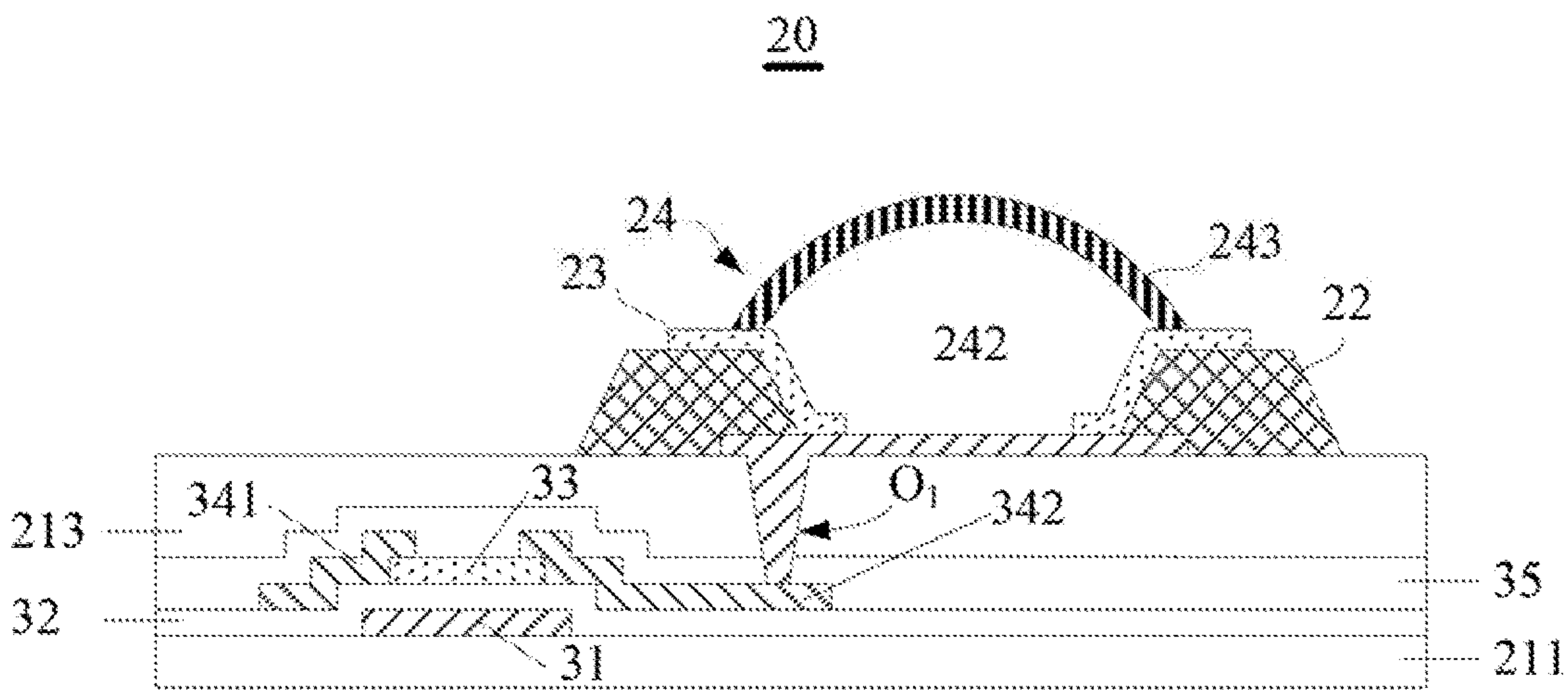

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FIG. 3

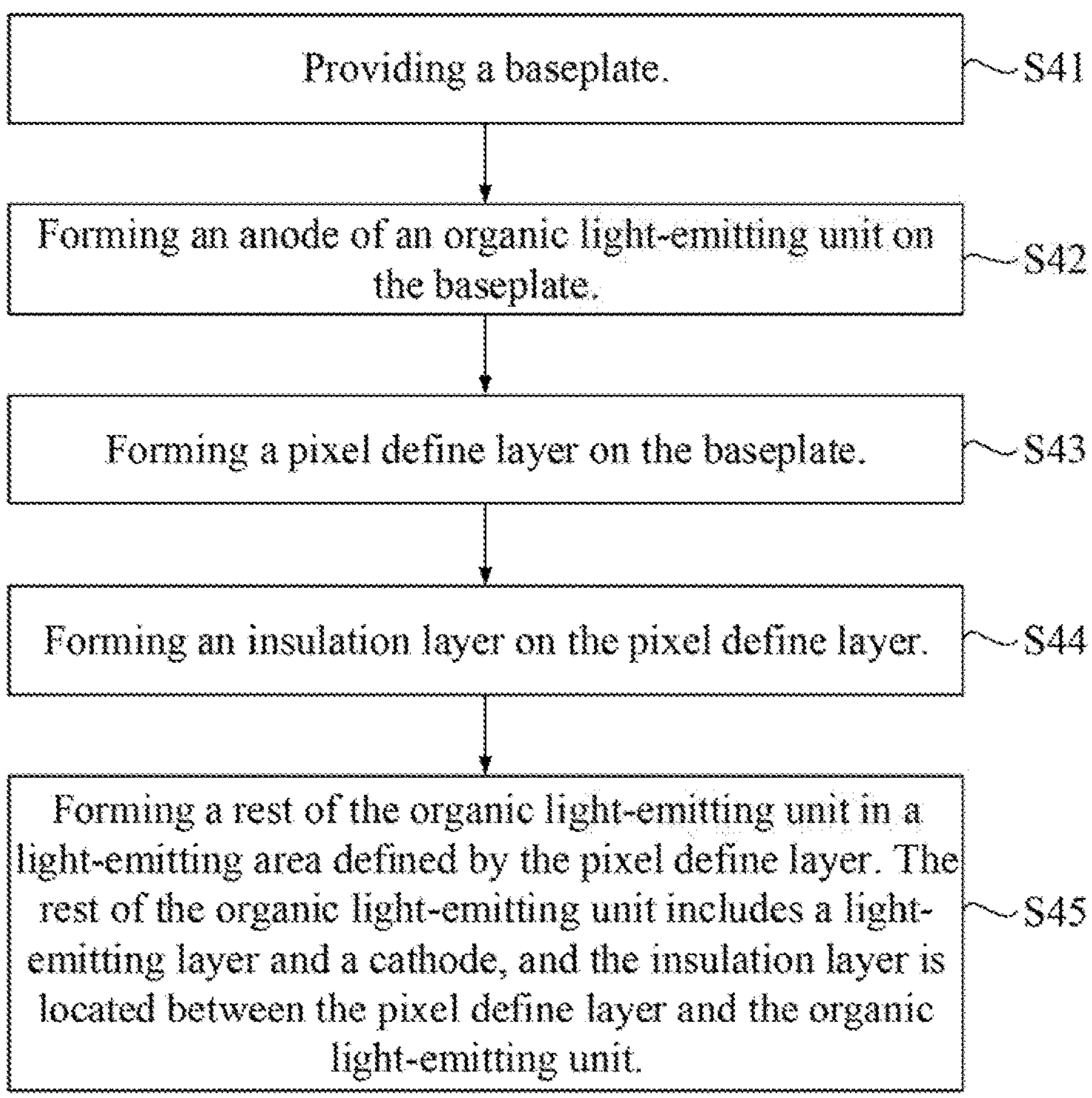
Providing a baseplate.
S41
Forming an anode of an organic light-emitting unit on the baseplate.
S42
Forming a pixel define layer on the baseplate.
S43
Forming an insulation layer on the pixel define layer.
S44
Forming a rest of the organic light-emitting unit in a light-emitting area defined by the pixel define layer. The rest of the organic light-emitting unit includes a light-emitting layer and a cathode, and the insulation layer is located between the pixel define layer and the organic light-emitting unit.
S45

FIG. 4

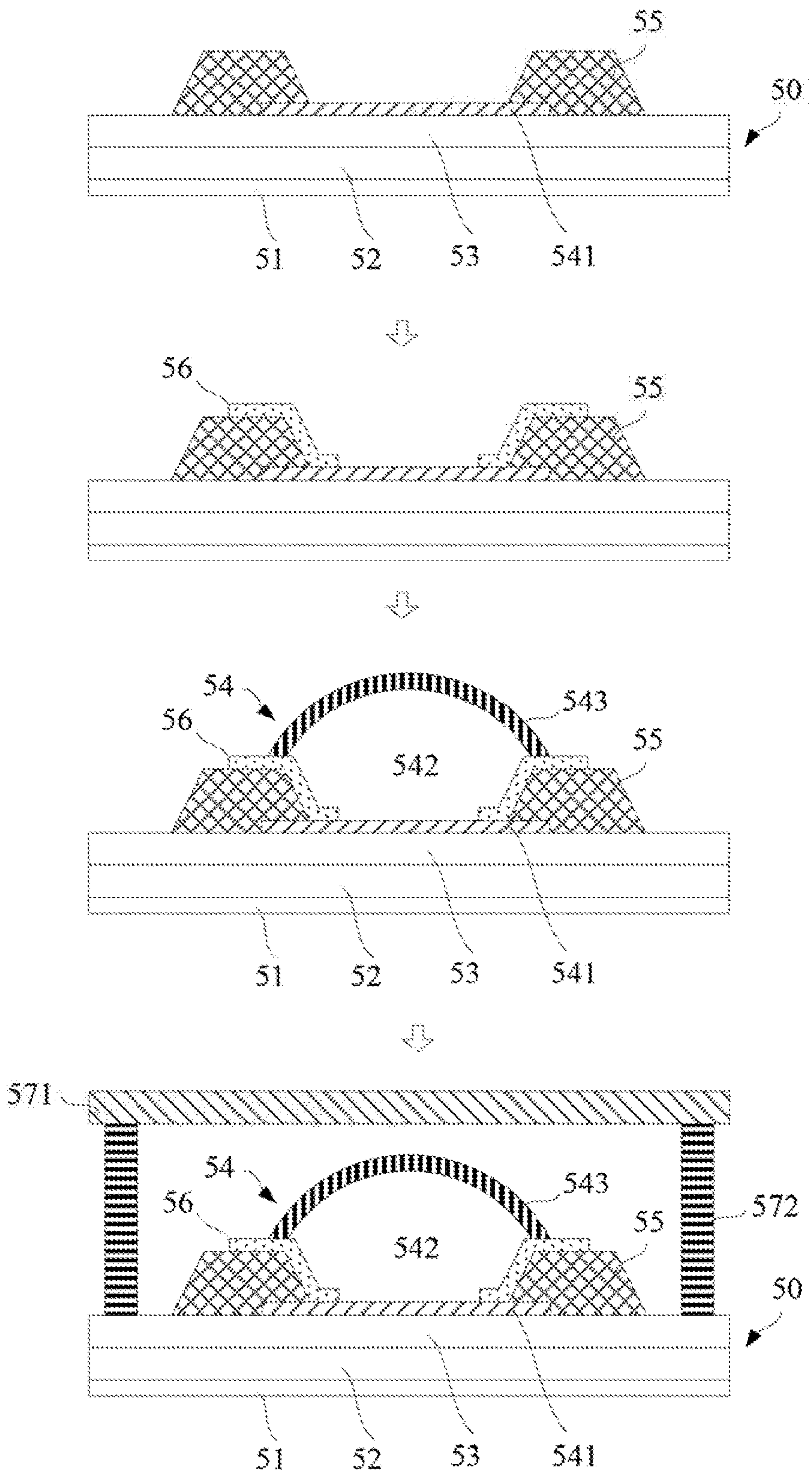
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FIG. 5

# OLED COMPONENT, METHOD FOR MANUFACTURING THE SAME AND OLED DISPLAY

## CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** The present application is a continuation-application of International (PCT) Patent Application No. PCT/CN2018/092070, field on Jun. 21, 2018, which claims foreign priority of Chinese Patent Application No. 201810367806.2, field on Apr. 23, 2018 in the State Intellectual Property Office of China, the entire contents of which are hereby incorporated by reference.

## TECHNICAL FIELD

**[0002]** The present disclosure generally relates to the display technique field, and in particular to an organic light-emitting diode (OLED) component, a method for manufacturing the same and an OLED display.

## BACKGROUND

**[0003]** Compared with traditional LCD displays, the OLED display panel can provide fast response, high contrast and wide field of view, and is considered as the next generation display technology. As shown in FIG. **1**, an OLED component **10** may generally include a thin film transistor (TFT) baseplate **11**. It may further include a planarization (PLN) layer **12**, a pixel define layer (PDL) **13**, and an organic light-emitting unit **14** disposed on the TFT baseplate **11**. The OLED component **10** may also include a cover glass **151** and a dam **152** as enclosure.

**[0004]** The working principle of the OLED component can be explained as follows in reference to FIG. **1**. When a voltage is applied across the anode **141** and the cathode **142** of the organic light-emitting unit **14**, electrons and holes driven by the voltage move respectively from the cathode **142** and the anode **141** to the electron transmission layer and the hole transmission layer, and then to the light-emitting layer **143**. The electrons and the holes meet at the light-emitting layer **143** to form the exciton and emit visible light. The light-emitting unit **14** is very sensitive to impurities such as moisture and oxygen. Since the organic light-emitting unit **14** is disposed next to the pixel define layer **13**, impurities such as moisture and oxygen in the pixel define layer **13** may probably enter into the organic light-emitting unit **14**. In this condition, the photoelectric performance of the organic light-emitting unit **14** will be reduced, as well as the service life of the OLED component **10**.

## SUMMARY

**[0005]** Accordingly, the present disclosure provides an OLED component, a method for manufacturing the same and an OLED display so as to prevent impurities in the pixel define layer from entering into the organic light-emitting unit.

**[0006]** The present disclosure provides an OLED component. The OLED component includes a baseplate; a pixel define layer, an insulation layer and an organic light-emitting unit successively disposed on the baseplate; wherein the pixel define layer defines a light-emitting area, the organic light-emitting unit is located in the light-emitting area, and the insulation layer is arranged between the pixel define layer and the organic light-emitting unit.

**[0007]** The present disclosure provides an OLED display with an OLED component. The OLED component includes a baseplate; a pixel define layer, an insulation layer and an organic light-emitting unit successively disposed on the baseplate; wherein the pixel define layer defines a light-emitting area, the organic light-emitting unit is located in the light-emitting area, and the insulation layer is arranged between the pixel define layer and the organic light-emitting unit.

**[0008]** The present disclosure provides a method for manufacturing an OLED component. The method includes: providing a baseplate; forming an anode of an organic light-emitting unit on the baseplate; forming a pixel define layer on the baseplate; forming an insulation layer on the pixel define layer; forming a rest of the organic light-emitting unit in a light-emitting area defined by the pixel define layer, wherein the rest of the organic light-emitting unit comprises a light-emitting layer and a cathode, and the insulation layer is located between the pixel define layer and the organic light-emitting unit.

**[0009]** By disposing an insulation layer between the pixel define layer and the organic light-emitting unit, the present disclosure may prevent impurities in the pixel define layer from entering into the organic light-emitting unit.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0010]** FIG. **1** is a schematic diagram of an OLED component according to related art.

**[0011]** FIG. **2** shows a schematic diagram of an OLED component according to an embodiment of the present disclosure.

**[0012]** FIG. **3** shows a schematic diagram of the OLED component of FIG. **2** with a bottom type thin film transistor.

**[0013]** FIG. **4** is a flow chart of a manufacturing method for an OLED component according to an embodiment of the present disclosure.

**[0014]** FIG. **5** shows the process of the method for manufacturing the OLED component of FIG. **4**.

## DETAILED DESCRIPTION

**[0015]** The purpose of the present disclosure is to provide, for a display with OLED component, an insulation layer between the pixel define layer and the organic light-emitting unit. The insulation layer is utilized to prevent impurities such as moisture and oxygen from entering into the organic light-emitting unit. Thus, the implementation of the present disclosure may prevent impurities in the pixel define layer from entering into the organic light-emitting unit so as to improve the photoelectric performance of the organic light-emitting unit and the service life of the OLED component.

**[0016]** The disclosure will now be described in detail with reference to the accompanying drawings and examples. The following embodiments and the features in the embodiments can be combined with each other as long as no conflict is caused. Moreover, the directional terms used in the entire application, such as "up" and "down", are all for better describing the technical solutions of various embodiments, and are not intended to limit the protection scope of the present application.

**[0017]** FIG. **2** shows a schematic diagram of an OLED component according to an embodiment of the present disclosure. As shown in FIG. **2**, the OLED component **20** may include a baseplate **21**, a pixel define layer **22**, an insulation layer **23**, an organic light-emitting unit **24**, a cover glass **251** and a dam **252**. The pixel define layer **22**, the insulation layer **23** and the organic light-emitting unit **24** may be successively disposed on the baseplate **21**. The cover glass **251** and the dam **252** may be utilized as enclosure.

**[0018]** The pixel define layer **22** may be utilized to define a light-emitting area of the OLED component **20**. The insulation layer **23** may be disposed on the pixel define layer **22**. The organic light-emitting unit **24** may be located in the light-emitting area. The organic light-emitting unit **24** may be in direct contact with the insulation layer **23** and may not touch the pixel define layer **22**. Specifically, the organic light-emitting unit **24** may include an anode **241**, a light-emitting layer **242**, a cathode **243**, an electron transmission layer and a hole transmission layer. The anode **241** may be disposed on the baseplate **21**. The light-emitting layer **242**, the electron transmission layer and the hole transmission layer may be arranged between the anode **241** and the cathode **243**. The light-emitting layer **242** may be in direct contact with the insulation layer **23**, and may not touch the pixel define layer **22**.

**[0019]** The insulation layer **23** may be made of transparent insulating material which is capable of insulating water and oxygen, such as silicon dioxide ($SiO_2$), silicon nitride ($SiN_x$), indium tin oxide (ITO) etc. The insulation layer **23** may have a single-layer structure or a multi-layer structure.

**[0020]** Since the insulation layer **23** is located between the organic light-emitting unit **24** and the pixel define layer **22**, the insulation layer **23** is capable of insulating impurities such moisture and oxygen emitted from the pixel define layer **22**. Thus, the present disclosure may prevent impurities such as moisture and oxygen in the pixel define layer **22** from entering into the organic light-emitting unit **24** so as to improve the photoelectric performance of the organic light-emitting unit **24** and service life of the OLED component **20**.

**[0021]** In this embodiment, the insulation layer **23** may only cover a portion of the organic light-emitting unit **24** which is next to the organic light-emitting unit **24**, i.e., the insulation layer **23** may not cover the whole outer surface of the pixel define layer **22**. In other embodiments, for better insulating water and oxygen, the insulation layer **23** may also cover the whole outer surface of the pixel define layer **22**.

**[0022]** Referring to FIG. **2**, the baseplate **21** may be a TFT baseplate, which includes a substrate **211**, a TFT layer **212** and a planarization layer **213**. The TFT layer **212** and the planarization layer **213** may be disposed successively on the substrate **211**. The above-mentioned pixel define layer **22**, the insulation layer **23** and the organic light-emitting unit **24** may all be disposed on the planarization layer **213**. The TFT layer **212** may include a gate electrode, a source electrode, a drain electrode and an active layer etc. The planarization layer **213** may define a via hole which exposes the drain electrode of the TFT layer **212**. The anode **241** of the organic light-emitting unit **24** may cover the via hole so as to be in contact with the drain electrode of the TFT layer **212**.

**[0023]** The structure design and material for the thin film transistor in the TFT layer **212** are not limited in the present disclosure. For example, the thin film transistor may be of a bottom gate type or a top gate type. The metal wires or pattern in the TFT may be made of one of or a combination of ITO, molybdenum (MO), aluminum (AL), titanium (Ti), copper (Cu) and so on. The structure of the OLED component **20** will be further described in reference to the TFT structure shown in FIGS. **3** and **4**.

**[0024]** FIG. **3** shows a schematic diagram of the OLED component of FIG. **2** with a bottom type thin film transistor. As shown in FIG. **3**, the TFT layer **212** may include multiple layers formed successively on the substrate **211**, i.e., the gate electrode **31**, the gate insulation (GI) layer **32**, the active layer **33**, a source-drain electrode layer consisting of the source electrode **341** and the drain electrode **342** and a passivation (PV) layer **35**.

**[0025]** The gate electrode **31**, the gate insulation layer **32**, the active layer **33**, the source electrode **341**, the drain electrode **342** and the passivation layer **35** may constitute the thin film transistor in the TFT layer **212**. Given that the gate electrode **31** is located below the active layer **33**, the OLED component **20** may be consider to have a bottom gate type thin film transistor.

**[0026]** As shown in FIGS. **2** and **3**, the planarization layer **213** may cover the passivation layer **35**. The planarization layer **213** and the passivation layer **35** of the TFT cooperatively define a via hole $O_1$ passing therethrough. The via hole $O_1$ may expose the upper surface of the drain electrode **342**. The anode **241** of the organic light-emitting unit **24** may cover the via hole $O_1$ so as to be in contact with the drain electrode **342**. Therefore, the organic light-emitting unit **24** may be electrically connected to the drain electrode **342** of the TFT.

**[0027]** It should be understood, the TFT layer **212** may alternatively have a top gate type thin film transistor. The design of a top gate type thin film transistor can be found in prior art and will not be described hereon.

**[0028]** FIG. **4** is a flow chart of a manufacturing method for an OLED component according to an embodiment of the present disclosure. FIG. **5** shows the process of the method for manufacturing the OLED component of FIG. **4**. As shown in FIGS. **4** and **5**, the method for manufacturing the OLED component may include blocks S**41**~S**45**.

**[0029]** S**41**: Providing a baseplate.

**[0030]** As shown in FIG. **5**, the baseplate **50** may be a TFT baseplate, which includes a substrate **51**, a TFT layer **52** and a planarization layer **53**. The TFT layer **52** and the planarization layer **53** may be disposed successively on the substrate **51**. The TFT layer **52** may include a gate electrode, a source electrode, a drain electrode and an active layer etc. The planarization layer **53** may define a via hole which exposes the drain electrode of the TFT layer **52**.

**[0031]** The substrate **51** may be a transparent substrate such as glass substrate, plastic substrate and flexible substrate. The structure design and material for the thin film transistor in the TFT layer **52** are not limited in the present disclosure. For example, the thin film transistor may be of a bottom gate type or a top gate type.

**[0032]** For a bottom type TFT layer **52**, the process provided by the present disclosure for manufacturing the TFT may include following blocks.

**[0033]** First, a metal layer may be formed on one surface of the substrate **51** by physical vapor deposition (PVD). Then the metal layer may be patterned and only a portion of the metal layer located in a pre-determined region is kept so as to form the gate electrode. The patterning process may include light resistance material coating, exposing, developing, etching etc. Details of the process may be found in prior art and will not be described hereon.

[0034] Second, a gate insulation layer completely covering one surface of the gate electrode may be formed by chemical vapor deposition (CVD). The gate insulation layer may be made of oxide of silicon ($SiO_x$). Or, the gate insulation layer may alternatively include a layer of oxide of silicon and a layer of silicon nitride successively disposed on the gate electrode, such as a layer of $SiO_2$ and a layer of $Si_3N_4$, so as to make the gate insulation layer more durable and to improve its insulating performance.

[0035] Then, an active layer may be formed by CVD. The active layer may be patterned such that only a portion of the active layer corresponding to the location of the gate electrode is kept. Alternatively, the active layer may directly be formed and patterned by CVD under a mask with the pre-determined pattern.

[0036] At last, the source electrode and the drain electrode can be acquired by the same process as that utilized for manufacturing the gate electrode. Also the passivation layer covering the source electrode and the drain electrode may be formed.

[0037] Therefore, the required TFT can be obtained by above-described processes.

[0038] The planarization layer **53** may cover a whole surface of the TFT. The planarization layer **53** may be formed by CVD or polyimide (PI) coating. Then the via hole exposing the drain electrode may be formed by etching the planarization layer **53** corresponding to the location of the drain electrode of the TFT.

[0039] S**42**: Forming an anode of an organic light-emitting unit on the baseplate.

[0040] As shown in FIG. **5**, the anode **541** may be formed by a patterning process including light resistance material coating, exposing, developing and etching. Specifically, one surface of the planarization layer **53** may be coated with a metal layer. Then the metal layer may be coated with light resistance material. The light resistance material may be exposed under a mask such that one pre-determined region of the light resistance material is exposed while the other portion is covered by the mask and not exposed. After developing, the portion of light resistance material exposed may be removed while the other portion which is not exposed may be kept. By etching the metal layer, one portion of the metal layer which is not covered by the rest light resistance material may be removed while the other portion of the metal layer may be kept. Thus the patterned anode **541** can be acquired. The anode **541** may cover the via hole of the planarization layer **53** so as to be in contact with the drain electrode of the TFT.

[0041] S**43**: Forming a pixel define layer on the baseplate.

[0042] The pixel define layer **55** may be utilized for defining a light-emitting area of the OLED component. The pixel define layer **55** may cover a portion of the anode **541**. The pixel define layer **55** may be formed by a patterning process including light resistance material coating, exposing, developing and etching.

[0043] S**44**: Forming an insulation layer on the pixel define layer.

[0044] The insulation layer **56** may only cover a portion of the pixel define layer **55** which is next to the organic light-emitting unit **54**, i.e., the insulation layer **56** may only covers a portion of the outer surface of the pixel define layer **55**. It should be noticed, for better insulating water and oxygen, the insulation layer **56** may cover the whole outer surface of the pixel define layer **55**.

[0045] The insulation layer **56** may be formed by CVD or a patterning process including light resistance material coating, exposing, developing and etching. Alternatively, the insulation layer **56** may be deposited on the pixel define layer **55** by evaporation under a mask.

[0046] S**45**: Forming a rest of the organic light-emitting unit in a light-emitting area defined by the pixel define layer. The rest of the organic light-emitting unit may include a light-emitting layer and a cathode, and the insulation layer may be located between the pixel define layer and the organic light-emitting unit.

[0047] The light-emitting layer **542** and the cathode **543** may be formed by evaporation or printing according to the present disclosure. Obviously, the organic light-emitting unit **54** may further include other structures, such as electron transmission layer and hole transmission layer. These structures can be acquired according to prior art and thus are not shown in the figures.

[0048] Furthermore, the cover glass **571** and the dam **572** may be formed so as to encapsulate the structures formed in blocks S**41**~S**45**. Specifically, the dam **572** may be arranged on the planarization layer **53** and surrounding the organic light-emitting unit **54**. The cover glass **571** may be disposed on the dam **572** and corresponding to the location of the planarization layer **53**. The cover glass **571**, the dam **572** and the baseplate **50** cooperatively define a confined chamber in which the other elements of the OLED components **20** may be disposed.

[0049] The OLED component manufactured according to the manufacturing method described in this embodiment may have the same structure as the foregoing OLED component **20**. Thus, similar advantageous may be achieved.

[0050] The foregoing is merely embodiments of the present disclosure, and is not intended to limit the scope of the disclosure. Any transformation of equivalent structure or equivalent process which uses the specification and the accompanying drawings of the present disclosure, or directly or indirectly application in other related technical fields, are likewise included within the scope of the protection of the present disclosure.

What is claimed is:

**1**. An OLED component, comprising:

a baseplate;

a pixel define layer, an insulation layer and an organic light-emitting unit successively disposed on the baseplate;

wherein the pixel define layer defines a light-emitting area, the organic light-emitting unit is located in the light-emitting area, and the insulation layer is arranged between the pixel define layer and the organic light-emitting unit.

**2**. The OLED component of claim **1**, wherein

the insulation layer covers a whole outer surface of the pixel define layer; or

the insulation layer covers a portion of the pixel define layer corresponding to a location of the organic light-emitting unit.

**3**. The OLED component of claim **1**, wherein the insulation layer comprises transparent insulating material.

**4**. The OLED component of claim **3**, wherein the insulation layer has a single-layer structure or a multi-layer structure.

**5**. The OLED component of claim **1**, wherein the baseplate comprises:

a substrate;

a TFT layer and a planarization layer successively disposed on the substrate;

wherein the pixel define layer, the insulation layer and the organic light-emitting layer are set on the planarization layer, the planarization layer defines a via hole exposing a drain electrode of the TFT layer, and an anode of the organic light-emitting unit covers the via hole so as to be in contact with the drain electrode.

**6**. An OLED display with an OLED component, wherein the OLED component comprises:

a baseplate;

a pixel define layer, an insulation layer and an organic light-emitting unit successively disposed on the baseplate;

wherein the pixel define layer defines a light-emitting area, the organic light-emitting unit is located in the light-emitting area, and the insulation layer is arranged between the pixel define layer and the organic light-emitting unit.

**7**. The OLED display of claim **6**, wherein

the insulation layer covers a whole outer surface of the pixel define layer; or

the insulation layer covers a portion of the pixel define layer corresponding to a location of the organic light-emitting unit.

**8**. The OLED display of claim **6**, wherein the insulation layer comprises transparent insulating material.

**9**. The OLED display of claim **8**, wherein the insulation layer has a single-layer structure or a multi-layer structure.

**10**. The OLED display of claim **6**, wherein the baseplate comprises:

a substrate;

a TFT layer and a planarization layer successively disposed on the substrate;

wherein the pixel define layer, the insulation layer and the organic light-emitting layer are set on the planarization layer, the planarization layer defines a via hole exposing a drain electrode of the TFT layer, and an anode of the organic light-emitting unit covers the via hole so as to be in contact with the drain electrode.

**11**. A method for manufacturing an OLED component, comprising:

providing a baseplate;

forming an anode of an organic light-emitting unit on the baseplate;

forming a pixel define layer on the baseplate;

forming an insulation layer on the pixel define layer; and

forming a rest of the organic light-emitting unit in a light-emitting area defined by, the pixel define layer, wherein the rest of the organic light-emitting unit comprises a light-emitting layer and a cathode, and the insulation layer is located between the define layer and the organic light-emitting unit.

**12**. The method of claim **11**, wherein the forming an insulation layer comprises:

forming the insulation layer by a patterning process including light resistance material coating, exposing, developing and etching; or

depositing the insulation layer on the pixel define layer by evaporation under a mask.

**13**. The method of claim **11**, wherein

the insulation layer covers a whole outer surface of the pixel define layer; or

the insulation layer covers a portion of the pixel define layer corresponding to a location of the organic light-emitting unit.

**14**. The method of claim **11**, wherein the insulation layer comprises transparent insulating material.

**15**. The method of claim **14**, wherein the insulation layer has a single-layer structure or a multi-layer structure.

**16**. The method of claim **11**, wherein the baseplate comprises:

a substrate;

a TFT layer and a planarization layer successively disposed on the substrate;

wherein the pixel define layer, the insulation layer and the organic light-emitting layer are set on the planarization layer, the planarization layer defines a via hole exposing a drain electrode of the TFT layer, and an anode of the organic light-emitting unit covers the via hole so as to be in contact with the drain electrode.

* * * * *