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(54) **OLED DISPLAY PANEL AND METHOD FOR MANUFACTURING SAME**

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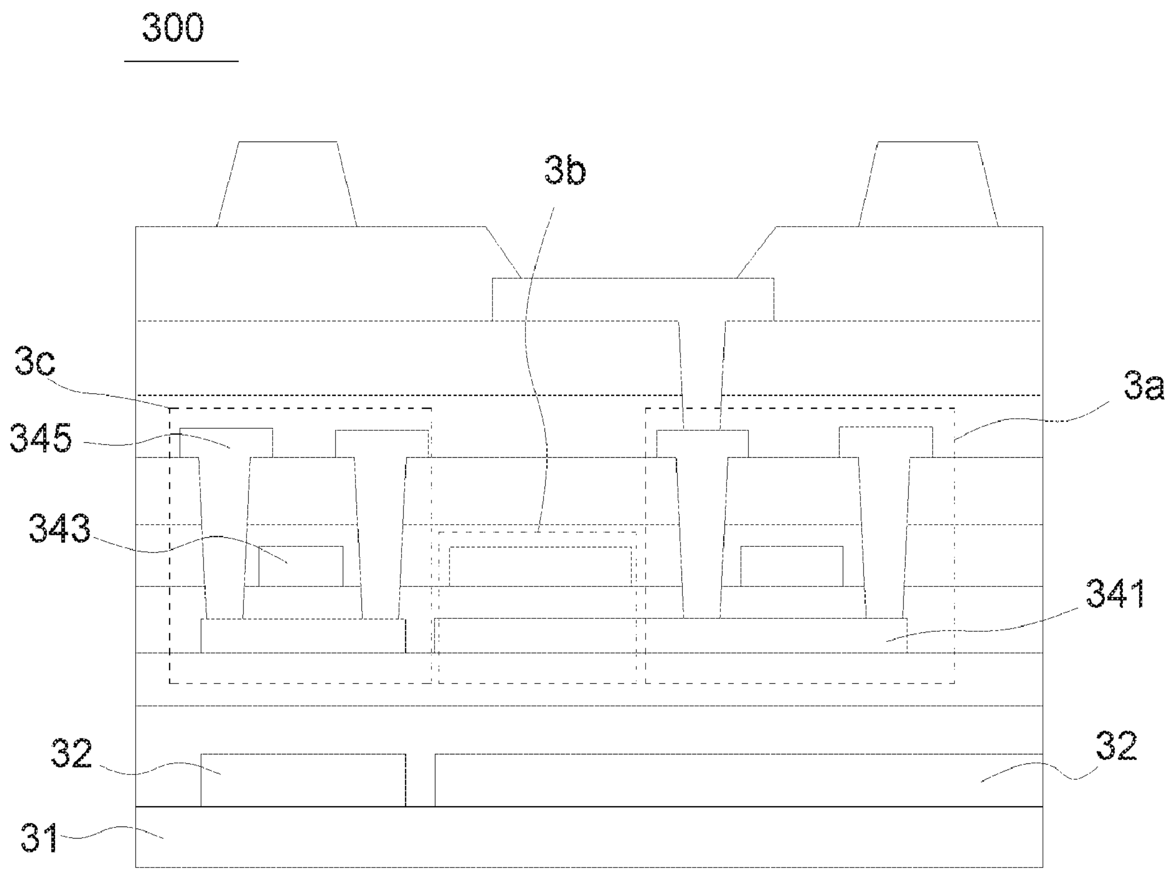
(57) **ABSTRACT**

The present disclosure provides an organic light emitting diode (OLED) display panel and a method for manufacturing same. The OLED display panel includes a substrate, a thermal insulating layer, a buffer, a driving TFT, and a storage capacitor. The substrate includes an arrangement area. The thermal insulating layer is disposed in the arrangement area. The buffer layer is disposed on the substrate. Both the driving TFT and the storage capacitor are disposed on the buffer layer to correspond to the arrangement area. According to the present disclosure, the thermal insulating layer prevents heat in the amorphous silicon layer from dissipating rapidly when an annealing treatment is performed for the amorphous silicon layer to have amorphous silicon crystallize.



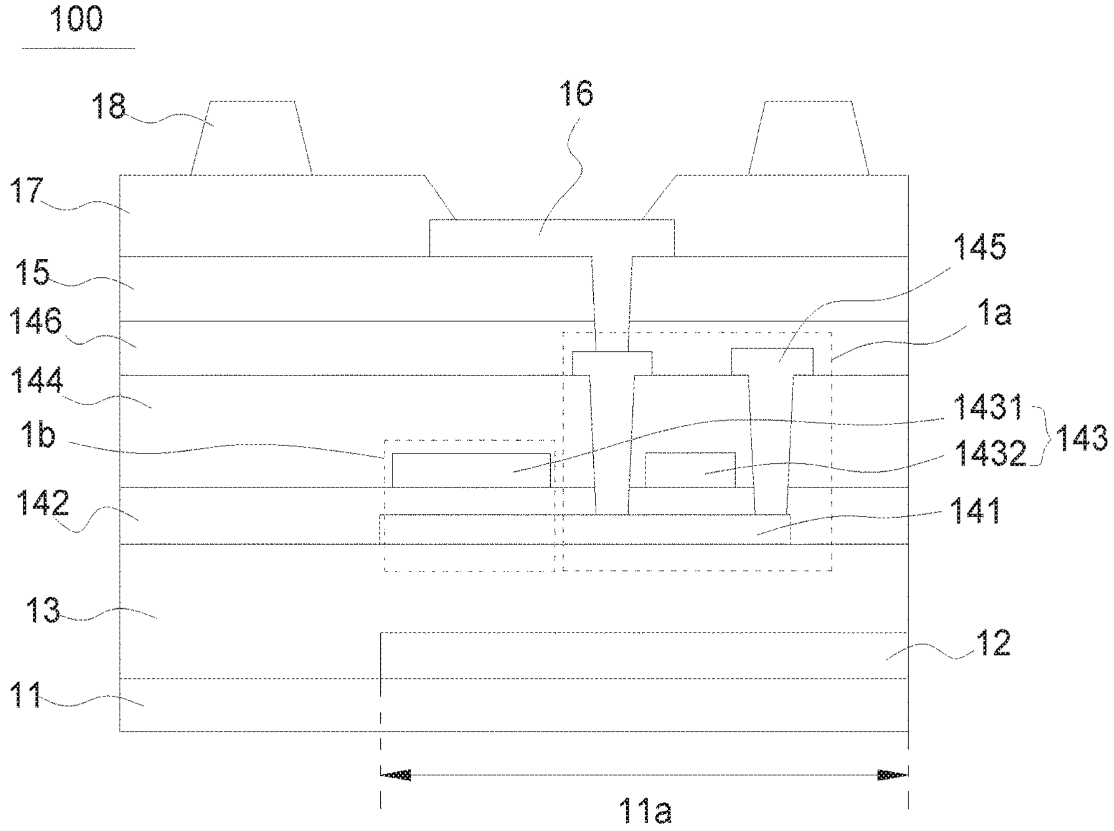

100
18
16
17
15
146
145
1a
144
1b
1431
1432
143
142
141
13
12
11
11a

FIG. 1

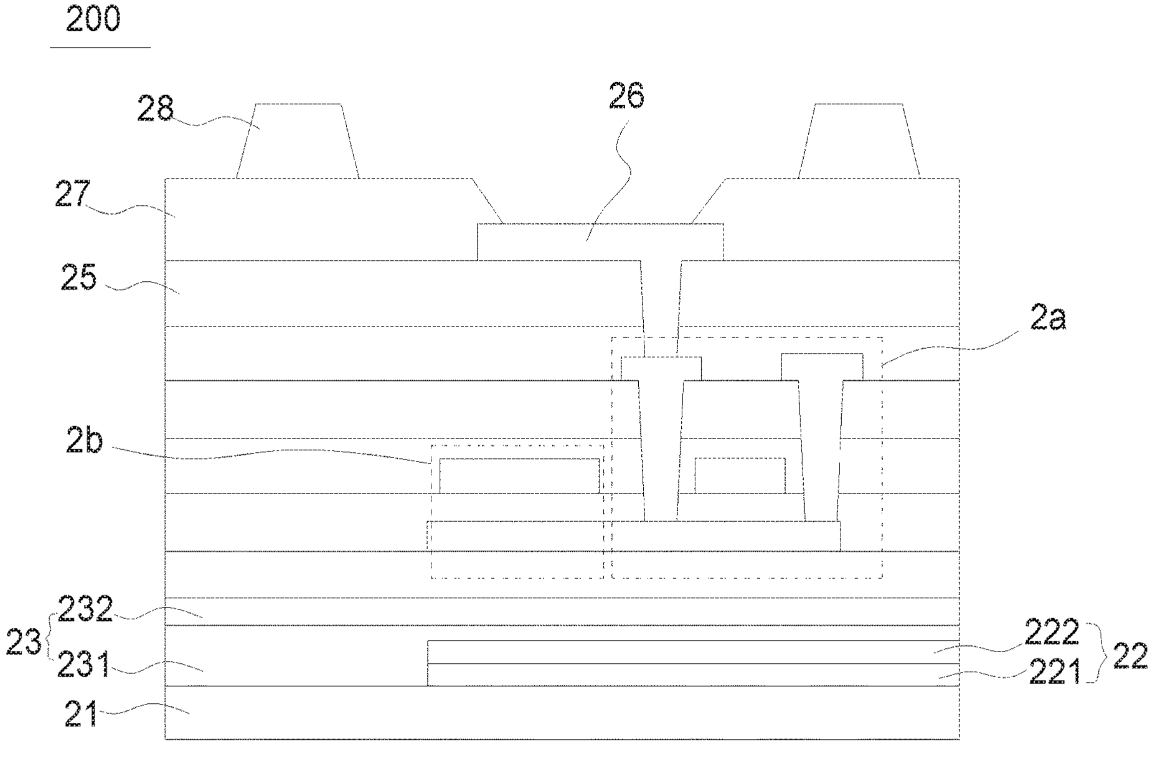

200
28
26
27
25
2a
2b
232
23
231
222
221
22
21

FIG. 2

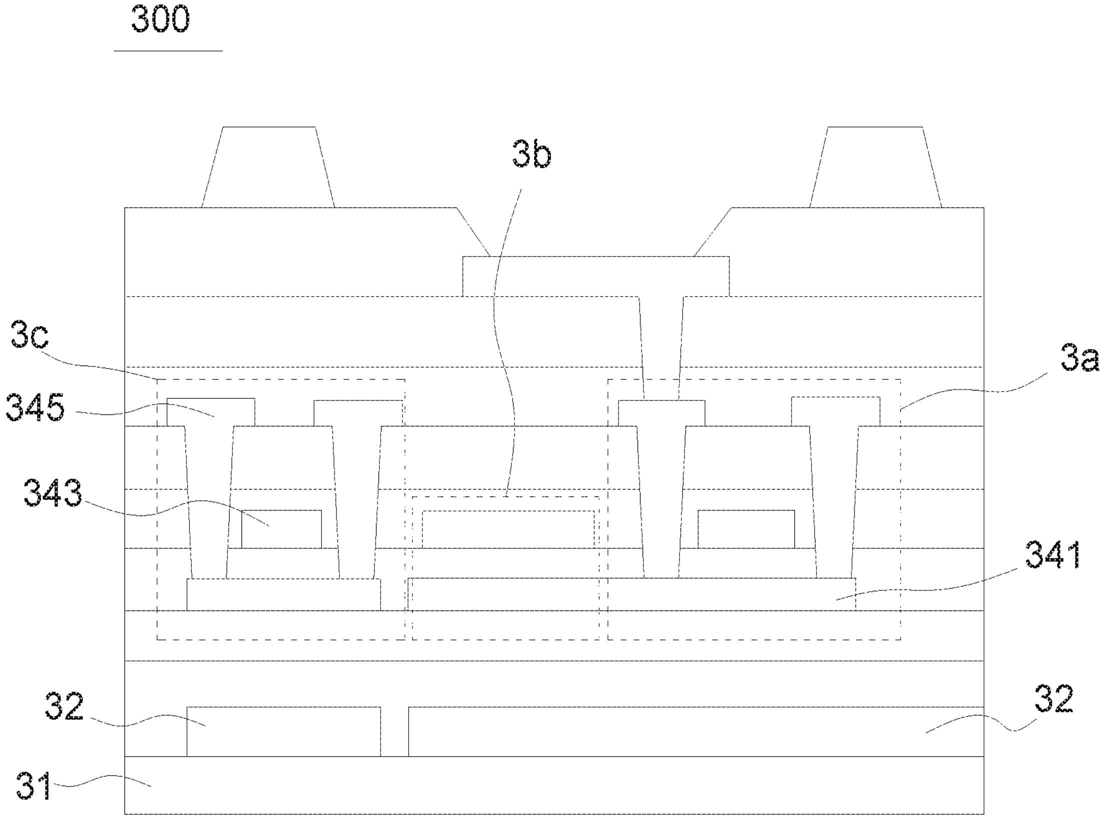
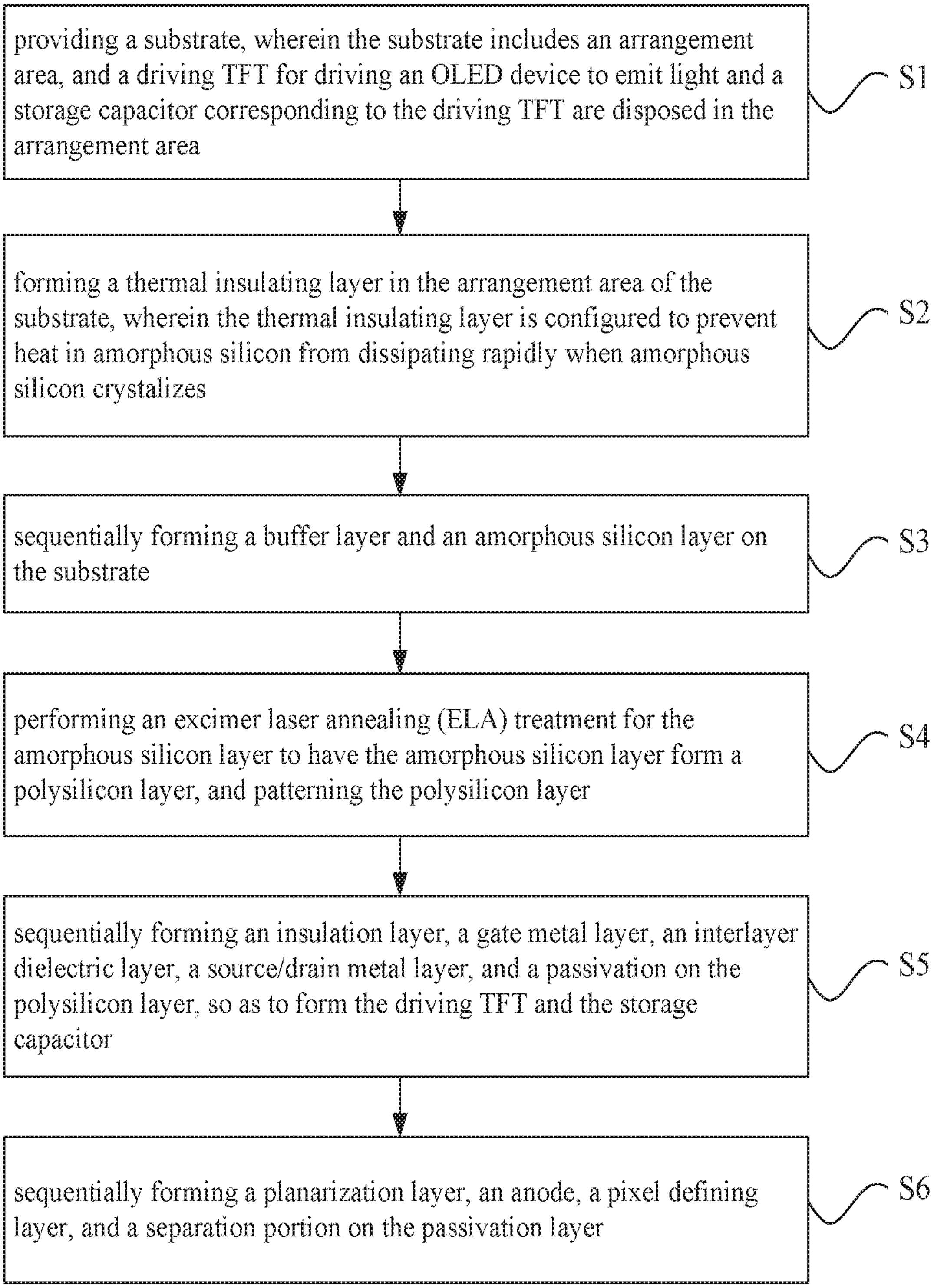


FIG. 3



S1: providing a substrate, wherein the substrate includes an arrangement area, and a driving TFT for driving an OLED device to emit light and a storage capacitor corresponding to the driving TFT are disposed in the arrangement area

S2: forming a thermal insulating layer in the arrangement area of the substrate, wherein the thermal insulating layer is configured to prevent heat in amorphous silicon from dissipating rapidly when amorphous silicon crystalizes

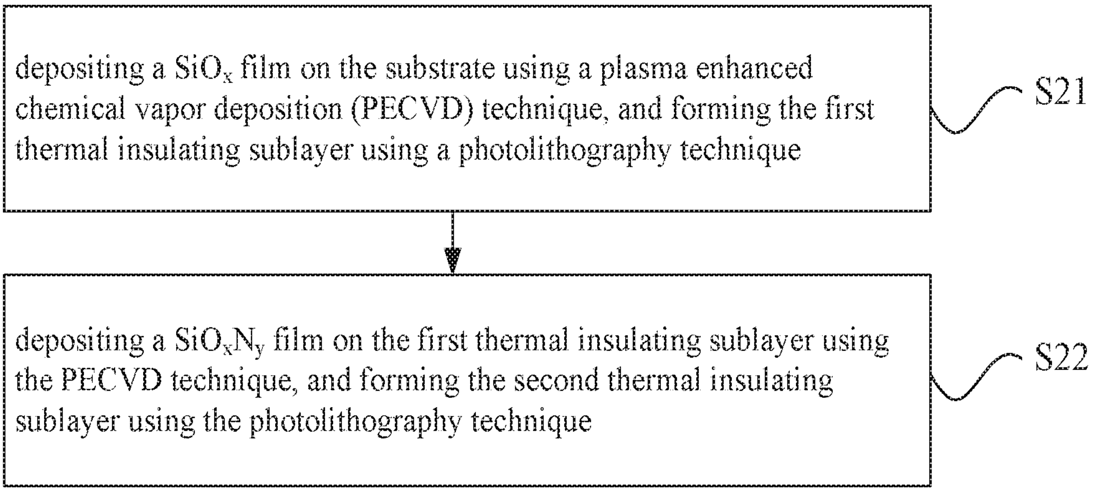
S3: sequentially forming a buffer layer and an amorphous silicon layer on the substrate

S4: performing an excimer laser annealing (ELA) treatment for the amorphous silicon layer to have the amorphous silicon layer form a polysilicon layer, and patterning the polysilicon layer

S5: sequentially forming an insulation layer, a gate metal layer, an interlayer dielectric layer, a source/drain metal layer, and a passivation on the polysilicon layer, so as to form the driving TFT and the storage capacitor

S6: sequentially forming a planarization layer, an anode, a pixel defining layer, and a separation portion on the passivation layer

FIG. 4



depositing a SiO_x film on the substrate using a plasma enhanced chemical vapor deposition (PECVD) technique, and forming the first thermal insulating sublayer using a photolithography technique

depositing a SiO_xN_y film on the first thermal insulating sublayer using the PECVD technique, and forming the second thermal insulating sublayer using the photolithography technique

FIG. 5

OLED DISPLAY PANEL AND METHOD FOR MANUFACTURING SAME

FIELD OF INVENTION

[0001] The present disclosure relates to a field of display technology, and more particularly to an organic light emitting diode (OLED) display panel and a method for manufacturing same.

BACKGROUND

[0002] In conventional methods for forming low temperature polycrystalline silicon thin film transistors (LTPS-TFTs), a buffer layer of three-layered structure that includes a SiN_x film, a SiO_x film, and an amorphous silicon (a-Si) film is first deposited on a substrate, then an excimer laser annealing (ELA) treatment is performed for a-Si film to have a-Si film crystallize to form LTPS. However, sizes of LTPS grains formed according to the conventional methods have poor uniformity, and there are too many grain boundaries between LTPS grains. This results in poor uniformity of electrical properties between switch TFTs and driving TFTs. In particular, uniformity of electrical properties of driving TFTs is severely influenced. Manufacturing yield of LTPS is severely influenced as well because driving TFTs directly affect light-emitting characteristics of organic light emitting diode (OLED) devices.

SUMMARY OF DISCLOSURE

[0003] The present disclosure provides an organic light emitting diode (OLED) display panel and a method for manufacturing same in order to solve the problems encountered by the prior art, where uniformity of sizes of LTPS grains in LTPS-TFTs is poor, there are too many grain boundaries between LTPS grains, and uniformity of electrical properties of driving TFTs is poor.

[0004] To solve the aforementioned problems, the present disclosure provides an organic light emitting diode (OLED) display panel, comprising:

[0005] a substrate including an arrangement area, wherein a driving thin film transistor (TFT) for driving an OLED device to emit light and a storage capacitor corresponding to the driving TFT are disposed in the arrangement area;

[0006] a thermal insulating layer including at least one thermal insulating sublayer disposed in the arrangement area;

[0007] a buffer layer disposed on the substrate and covering the thermal insulating layer;

[0008] the driving TFT disposed on the buffer layer to correspond to the arrangement area; and

[0009] the storage capacitor disposed on the buffer layer to correspond to the arrangement area;

[0010] wherein both the driving TFT and the storage capacitor include a polysilicon layer disposed on the buffer layer, the thermal insulating layer is configured to enhance, when amorphous silicon crystallizes to form the polysilicon layer, heat stability in the amorphous silicon;

[0011] wherein the thermal insulating layer includes a first thermal insulating sublayer disposed on the substrate and a second thermal insulating sublayer disposed on the first thermal insulating sublayer, the first thermal insulating sublayer is made of a material different from that of the second thermal insulating sublayer; and

[0012] wherein the thermal insulating layer has a thickness ranging from 50 micrometers to 100 micrometers.

[0013] In the OLED display panel of the present disclosure, the buffer layer includes a first buffer sublayer covering the second thermal insulating sublayer and a second buffer sublayer disposed on the first buffer sublayer, the first buffer sublayer is made of SiN_x, the first thermal insulating sublayer is made of SiO_x, and the second thermal insulating sublayer is made of SiO_xN_y.

[0014] In the OLED display panel of the present disclosure, in the second thermal insulating sublayer, oxygen has a quantity greater than that of nitrogen.

[0015] In the OLED display panel of the present disclosure, the thermal insulating layer is made of SiO_x, SiO_xN_y, or a combination thereof.

[0016] In the OLED display panel of the present disclosure, the OLED display panel further comprises a switch TFT functioning as a switch, the thermal insulating layer is disposed on the substrate to correspond to the switch TFT.

[0017] In addition, the present disclosure provides an organic light-emitting diode (OLED) display panel, comprising:

[0018] a substrate including an arrangement area, wherein a driving thin film transistor (TFT) for driving an OLED device to emit light and a storage capacitor corresponding to the driving TFT are disposed in the arrangement area;

[0019] a thermal insulating layer including at least one thermal insulating sublayer disposed in the arrangement area;

[0020] a buffer layer disposed on the substrate and covering the thermal insulating layer;

[0021] the driving TFT disposed on the buffer layer to correspond to the arrangement area; and

[0022] the storage capacitor disposed on the buffer layer to correspond to the arrangement area;

[0023] wherein both the driving TFT and the storage capacitor include a polysilicon layer disposed on the buffer layer, the thermal insulating layer is configured to enhance, when amorphous silicon crystallizes to form the polysilicon layer, heat stability in the amorphous silicon.

[0024] In the first embodiment of the OLED display panel of the present disclosure, the thermal insulating layer is consisted of a single thermal insulating sublayer.

[0025] In the second embodiment of the OLED display panel of the present disclosure, the thermal insulating layer includes a first thermal insulating sublayer disposed on the substrate and a second thermal insulating sublayer disposed on the first thermal insulating sublayer, the first thermal insulating sublayer is made of a material different from that of the second thermal insulating sublayer.

[0026] In the second embodiment of the OLED display panel of the present disclosure, the buffer layer includes a first buffer sublayer covering the second thermal insulating sublayer and a second buffer sublayer disposed on the first buffer sublayer, the first buffer sublayer is made of SiN_x, the first thermal insulating sublayer is made of SiO_x, and the second thermal insulating sublayer is made of SiO_xN_y.

[0027] In the second embodiment of the OLED display panel of the present disclosure, in the second thermal insulating sublayer, oxygen has a quantity greater than that of nitrogen.

[0028] In the third embodiment of the OLED display panel of the present disclosure, the OLED display panel further comprises a switch TFT functioning as a switch, the thermal insulating layer is disposed on the substrate to correspond to the switch TFT.

[0029] In the OLED display panel of the present disclosure, the thermal insulating layer has a thickness ranging from 50 micrometers to 100 micrometers.

[0030] In the OLED display panel of the present disclosure, the thermal insulating layer is made of SiO_x, SiO_xN_y, or a combination thereof.

[0031] Moreover, the present disclosure provides a method for manufacturing an organic light emitting diode (OLED) display panel, comprising:

[0032] a step S1 of providing a substrate, wherein the substrate includes an arrangement area, and a driving thin film transistor (TFT) for driving an OLED device to emit light and a storage capacitor corresponding to the driving TFT are disposed in the arrangement area;

[0033] a step S2 of forming a thermal insulating layer in the arrangement area of the substrate, wherein the thermal insulating layer is configured to prevent heat in amorphous silicon from dissipating rapidly when amorphous silicon crystallizes;

[0034] a step S3 of sequentially forming a buffer layer and an amorphous silicon layer on the substrate;

[0035] a step S4 of performing an excimer laser annealing (ELA) treatment for the amorphous silicon layer to have the amorphous silicon layer form a polysilicon layer, and patterning the polysilicon layer;

[0036] a step S5 of sequentially forming an insulation layer, a gate metal layer, an interlayer dielectric layer, a source/drain metal layer, and a passivation on the polysilicon layer, so as to form the driving TFT and the storage capacitor; and

[0037] a step S6 of sequentially forming a planarization layer, an anode, a pixel defining layer, and a separation portion on the passivation layer.

[0038] In the method for manufacturing the OLED display panel of the present disclosure, the step S2 comprises:

[0039] a step S21 of depositing a SiO_x film on the substrate using a plasma enhanced chemical vapor deposition (PECVD) technique, and forming the first thermal insulating sublayer using a photolithography technique; and

[0040] a step S22 of depositing a SiO_xN_y film on the first thermal insulating sublayer using the PECVD technique, and forming the second thermal insulating sublayer using the photolithography technique.

[0041] In the method for manufacturing the OLED display panel of the present disclosure, a reaction condition in the step S21 of depositing the SiO_x film is controlled to have a temperature of 400° C.-440° C., an energy of 10 KW-20 KW, a pressure of 40 Pa-80 Pa, a flow ratio of $SiH_4:N_2O$ ranging from 1:100 to 1:50, and a reaction time of 20 sec-40 sec; and

[0042] a reaction condition in the step S22 of depositing the SiO_xN_y film is controlled to have a temperature of 400° C.-440° C., an energy of 10 KW-20 KW, a pressure of 40 Pa-80 Pa, a flow ratio of $SiH_4:N_2O:NH_3$ ranging from 1:100:80 to 1:100:120, and a reaction time of 20 sec-40 sec.

[0043] In the method for manufacturing the OLED display panel of the present disclosure, in the second thermal insulating sublayer, oxygen has a quantity greater than that of nitrogen.

[0044] In the method for manufacturing the OLED display panel of the present disclosure, the thermal insulating layer has a thickness ranging from 50 micrometers to 100 micrometers.

[0045] Compared to conventional OLED display panel and conventional method for manufacturing same, the present disclosure provides an OLED display panel and a method for manufacturing same. By disposing the thermal insulating layer in the arrangement area of the substrate, the present disclosure prevents heat in the amorphous silicon layer from dissipating rapidly when an annealing treatment is performed for the amorphous silicon layer to have amorphous silicon crystallize. This makes the amorphous silicon layer completely crystallize to form the polysilicon layer of the driving TFTs and the storage capacitors. Thus, the present disclosure increases sizes of grains, and increases uniformity of grain sizes. Uniformity of electrical properties of driving TFTs is increased as well, improving light emission uniformity of OLED devices. Therefore, the present disclosure solves the problems encountered by the prior art, where uniformity of sizes of LTPS grains in LTPS-TFTs is poor, there are too many grain boundaries between LTPS grains, and uniformity of electrical properties of driving TFTs is poor.

BRIEF DESCRIPTION OF DRAWINGS

[0046] FIG. **1** is a cross-sectional view of a structure of an OLED display panel according to a first embodiment of the present disclosure.

[0047] FIG. **2** is a cross-sectional view of a structure of an OLED display panel according to a second embodiment of the present disclosure.

[0048] FIG. **3** is a cross-sectional view of a structure of an OLED display panel according to a third embodiment of the present disclosure.

[0049] FIG. **4** shows a flowchart of a method for manufacturing an OLED display panel according to one embodiment of the present disclosure.

[0050] FIG. **5** shows a flowchart of a step S2 in a method for manufacturing an OLED display panel according to one embodiment of the present disclosure.

DETAILED DESCRIPTION

[0051] Please refer to the accompanying drawings, where the same reference symbol represents the same components. The following description is provided based on the illustrated embodiments, which do not limit other embodiments that are not provided herein.

[0052] Please see FIG. **1**, which is a cross-sectional view of a structure of an OLED display panel according to a first embodiment of the present disclosure. According to the first embodiment of the present disclosure, the organic light emitting diode (OLED) display panel **100** includes a substrate **11**, a thermal insulating layer **12**, a buffer layer **13**, a driving TFT (thin film transistor) **1***a*, a storage capacitor **1***b*, a planarization layer **15**, an anode **16**, a pixel defining layer **17**, and a separation portion **18**.

[0053] The substrate **11** includes an arrangement area **11***a*, wherein the driving TFT **1***a* for driving an OLED device to emit light and the storage capacitor **1***b* corresponding to the driving TFT **1***a* are disposed in the arrangement area **11***a*. The thermal insulating layer **12** includes at least one thermal insulating sublayer disposed in the arrangement area **11***a*.

The buffer layer **13** is disposed on the substrate **11**, and covers the thermal insulating layer **12**. The driving TFT **1***a* is disposed on the buffer layer **13** to correspond to the arrangement area **11***a*, and the storage capacitor **1***b* is disposed on the buffer layer **13** to correspond to the arrangement area **11***a*.

[0054] Both the driving TFT **1***a* and the storage capacitor **1***b* include a polysilicon layer **141** disposed on the buffer layer **13**. The thermal insulating layer **12** is configured to enhance heat stability in amorphous silicon when amorphous silicon crystallizes to form the polysilicon layer **141**.

[0055] In the first embodiment of the present disclosure, the thermal insulating layer **12** is disposed in the arrangement area **11***a* of the substrate **11**, in order to prevent heat in the amorphous silicon layer from dissipating rapidly when an annealing treatment is performed for the amorphous silicon layer to have amorphous silicon crystallize. Thus, the amorphous silicon layer could completely crystallize to form the polysilicon layer **141** of the driving TFT **1***a* and the storage capacitor **1***b*. This not only increases sizes of grains, but increases uniformity of grain sizes. Therefore, uniformity of electrical properties of driving TFTs **1***a* is increased, improving light emission uniformity of OLED devices.

[0056] In the first embodiment of the present disclosure, the OLED display panel **100** includes the polysilicon layer **141** disposed on the buffer layer **13**, an insulation layer **142** disposed on the polysilicon layer **141**, a gate metal layer **143** disposed on the insulation layer **142**, an interlayer dielectric layer **144** disposed on the gate metal layer **143**, a source/drain metal layer **145** disposed on the interlayer dielectric layer **144**, a passivation layer **146** disposed on the source/drain metal layer **145**, and the planarization layer **15** disposed on the passivation layer **146**. In addition, the OLED display panel **100** further includes the anode **16**, the pixel defining layer **17**, and the separation portion **18** sequentially disposed on the planarization layer **15**.

[0057] The polysilicon layer **141** includes an active layer of the driving TFT **1***a* and a lower electrode plate of the storage capacitor **1***b*. The lower electrode plate is formed by performing ion implantation into the polysilicon layer **141**. The gate metal layer includes an upper electrode plate **1431** corresponding to the lower electrode plate and a gate electrode **1432** of the driving TFT **1***a*.

[0058] Thus, the active layer, the gate electrode **1432**, and the source/drain electrode of the source/drain metal layer **145** constitute the driving TFT **1***a*. The upper electrode plate **1431** and the lower electrode plate **1432** constitute the storage capacitor **1***b*.

[0059] In the first embodiment, the thermal insulating layer **12** is consisted of a single thermal insulating sublayer. The thermal insulating layer **12** has a thickness ranging from 50 micrometers to 100 micrometers. Such configuration can ensure that the thermal insulating layer **12** maintains temperature, and stress difference between the thermal insulating layer **12** and adjacent layers adhered thereto is not influenced. Thus, joining stability between the thermal insulating layer **12** and adjacent layers adhered thereto is raised.

[0060] Optionally, the thermal insulating layer **12** is made of SiO_x, SiO_xN_y, or a combination thereof, wherein x and y represents number, such as 1, 2, or etc.

[0061] To form the polysilicon layer **141** of the first embodiment, a SiO_x film is deposited on the substrate **11** first. (As an example, the thermal insulating layer **12** in the first embodiment is made of SiO_x.) Next, a thermal insulating layer **12** is formed in the arrangement area **11***a* using the photolithography technique. Thereafter, a buffer layer **13** and an amorphous silicon layer are sequentially formed on the thermal insulating layer **12**. Finally, an excimer laser annealing (ELA) treatment is performed for the amorphous silicon layer to have the amorphous silicon layer crystallize to from the polysilicon layer **141**.

[0062] During crystallization of the amorphous silicon layer, the thermal insulating layer **12** functions to prevent heat in the amorphous silicon layer from dissipating rapidly. Therefore, the amorphous silicon layer, to which the thermal insulating layer **12** corresponds, can completely crystallize to form the polysilicon layer. This increases uniformity of grain sizes, and further increases uniformity of electrical properties of driving TFTs.

[0063] Please refer to FIG. **2**, which is a cross-sectional view of a structure of an OLED display panel according to a second embodiment of the present disclosure. According to the second embodiment of the present disclosure, the organic light emitting diode (OLED) display panel **200** includes a substrate **21**, a thermal insulating layer **22**, a buffer layer **23**, a driving TFT **2***a*, a storage capacitor **2***b*, a planarization layer **25**, an anode **26**, a pixel defining layer **27**, and a separation portion **28**. The second embodiment differs from the first embodiment in those described below.

[0064] The thermal insulating layer **22** includes a first thermal insulating sublayer **221** disposed on the substrate **21** and a second thermal insulating sublayer **222** disposed on the first thermal insulating sublayer **221**. The first thermal insulating sublayer **221** is made of a material different from that of the second thermal insulating sublayer **222**.

[0065] The buffer layer **23** includes a first buffer sublayer **231** covering the second thermal insulating sublayer **222** and a second buffer sublayer **232** disposed on the first buffer sublayer **231**. The first buffer sublayer **231** is made of SiN_x, the second buffer sublayer **232** is made of SiO_x, the first thermal insulating sublayer **221** is made of SiO_x, and the second thermal insulating sublayer **222** is made of SiO_xN_y.

[0066] The second thermal insulating sublayer **222** is sandwiched between the first thermal insulating sublayer **221** and the first buffer sublayer **231**, thus raising the joining stability between the thermal insulating layer **22** and the buffer layer **23**. Specifically, stress difference between the first buffer sublayer **231** and the first thermal insulating sublayer **221** is large. The second thermal insulating sublayer **222** has a value of stress between that of the first buffer sublayer **231** and that of the first thermal insulating sublayer **221**, and thus the second thermal insulating sublayer **222** functions as a transition body.

[0067] Moreover, in the second thermal insulating sublayer **222**, oxygen has a quantity greater than that of nitrogen. Such design raises adhering ability of the second thermal insulating sublayer **222** to organic/inorganic layers, thus raising the joining stability between the thermal insulating layer **22** and the buffer layer **23**.

[0068] The second thermal insulating sublayer **222** is formed using a plasma enhanced chemical vapor deposition (PECVD) technique, where quantity of oxygen and nitrogen contained in the second thermal insulating sublayer **222** could be controlled by adjusting ratio of film formation gases and applied energy.

[0069] Please refer to FIG. **3**, which is a cross-sectional view of a structure of an OLED display panel according to a third embodiment of the present disclosure. The third embodiment differs from the first embodiment in those described below.

[0070] The OLED display panel **300** further includes a switch TFT **3***c* functioning as a switch. The thermal insulating layer **32** is disposed on the substrate **31** to correspond to the switch TFT **3***c*. By disposing the thermal insulating layer **32** directly under all of the driving TFT **3***a*, the storage capacitor **3***b*, and the switch TFT **3***c*, uniformity of sizes of crystallized grains in the polysilicon layer **341** is increased. Therefore, uniformity of electrical properties of driving TFTs **3***a* and switch TFTs **3***c* is increased, improving light emission uniformity of OLED devices.

[0071] The switch TFT **3***c* includes an active layer constituting the polysilicon layer **341**, a gate electrode of the gate metal layer **343**, and a source/drain electrode of the source/drain metal layer **345**.

[0072] As shown in FIG. **4**, the present disclosure further provides a method for manufacturing an organic light emitting diode (OLED) display panel, which includes:

[0073] a step S1 of providing a substrate, wherein the substrate includes an arrangement area, and a driving TFT for driving an OLED device to emit light and a storage capacitor corresponding to the driving TFT are disposed in the arrangement area;

[0074] a step S2 of forming a thermal insulating layer in the arrangement area of the substrate, wherein the thermal insulating layer is configured to prevent heat in amorphous silicon from dissipating rapidly when amorphous silicon crystallizes;

[0075] a step S3 of sequentially forming a buffer layer and an amorphous silicon layer on the substrate;

[0076] a step S4 of performing an excimer laser annealing (ELA) treatment for the amorphous silicon layer to have the amorphous silicon layer form a polysilicon layer, and patterning the polysilicon layer;

[0077] a step S5 of sequentially forming an insulation layer, a gate metal layer, an interlayer dielectric layer, a source/drain metal layer, and a passivation on the polysilicon layer, so as to form the driving TFT and the storage capacitor; and

[0078] a step S6 of sequentially forming a planarization layer, an anode, a pixel defining layer, and a separation portion on the passivation layer.

[0079] As shown in FIG. **5**, in the method for manufacturing an OLED display panel according to the present embodiment, the step S2 includes:

[0080] a step S21 of depositing a SiO_x film on the substrate using a plasma enhanced chemical vapor deposition (PECVD) technique, and forming the first thermal insulating sublayer using a photolithography technique; and

[0081] a step S22 of depositing a SiO_xN_y film on the first thermal insulating sublayer using the PECVD technique, and forming the second thermal insulating sublayer using the photolithography technique.

[0082] In the method for manufacturing an OLED display panel according to the present embodiment, a reaction condition in the step S21 of depositing the SiO_x film is controlled to have a temperature of 400° C.-440° C., an energy of 10 KW-20 KW, a pressure of 40 Pa-80 Pa, a flow ratio of SiH_4:N_2O ranging from 1:100 to 1:50, and a reaction time of 20 sec-40 sec.

[0083] A reaction condition in the step S22 of depositing the SiO_xN_y film is controlled to have a temperature of 400° C.-440° C., an energy of 10 KW-20 KW, a pressure of 40 Pa-80 Pa, a flow ratio of SiH_4:N_2O:NH_3 ranging from 1:100:80 to 1:100:120, and a reaction time of 20 sec-40 sec.

[0084] In the method for manufacturing an OLED display panel according to the present embodiment, in the second thermal insulating sublayer, oxygen has a quantity greater than that of nitrogen.

[0085] In the method for manufacturing an OLED display panel according to the present embodiment, the thermal insulating layer has a thickness ranging from 50 micrometers to 100 micrometers.

[0086] Compared to conventional OLED display panel and conventional method for manufacturing same, the present disclosure provides an OLED display panel and a method for manufacturing same. By disposing the thermal insulating layer in the arrangement area of the substrate, the present disclosure prevents heat in the amorphous silicon layer from dissipating rapidly when an annealing treatment is performed for the amorphous silicon layer to have amorphous silicon crystallize. This makes the amorphous silicon layer completely crystallize to form the polysilicon layer of the driving TFTs and the storage capacitors. Thus, the present disclosure increases sizes of grains, and increases uniformity of grain sizes. Uniformity of electrical properties of driving TFTs is increased as well, improving light emission uniformity of OLED devices. Therefore, the present disclosure solves the problems encountered by the prior art, where uniformity of sizes of LTPS grains in LTPS-TFTs is poor, there are too many grain boundaries between LTPS grains, and uniformity of electrical properties of driving TFTs is poor.

[0087] While the present disclosure has been described with the aforementioned preferred embodiments, it is preferable that the above embodiments should not be construed as limiting of the present disclosure. Anyone having ordinary skill in the art can make a variety of modifications and variations without departing from the spirit and scope of the present disclosure as defined by the following claims.

What is claimed is:

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

a substrate including an arrangement area, wherein a driving thin film transistor (TFT) for driving an OLED device to emit light and a storage capacitor corresponding to the driving TFT are disposed in the arrangement area;

a thermal insulating layer including at least one thermal insulating sublayer disposed in the arrangement area;

a buffer layer disposed on the substrate and covering the thermal insulating layer;

the driving TFT disposed on the buffer layer to correspond to the arrangement area; and

the storage capacitor disposed on the buffer layer to correspond to the arrangement area;

wherein both the driving TFT and the storage capacitor include a polysilicon layer disposed on the buffer layer, the thermal insulating layer is configured to enhance, when amorphous silicon crystallizes to form the polysilicon layer, heat stability in the amorphous silicon;

wherein the thermal insulating layer includes a first thermal insulating sublayer disposed on the substrate and a second thermal insulating sublayer disposed on the first thermal insulating sublayer, the first thermal insulating sublayer is made of a material different from that of the second thermal insulating sublayer; and

wherein the thermal insulating layer has a thickness ranging from 50 micrometers to 100 micrometers.

2. The OLED display panel according to claim **1**, wherein the buffer layer includes a first buffer sublayer covering the second thermal insulating sublayer and a second buffer sublayer disposed on the first buffer sublayer, the first buffer sublayer is made of SiN_x, the first thermal insulating sublayer is made of SiO_x, and the second thermal insulating sublayer is made of SiO_xN_y.

3. The OLED display panel according to claim **2**, wherein in the second thermal insulating sublayer, oxygen has a quantity greater than that of nitrogen.

4. The OLED display panel according to claim **1**, wherein the thermal insulating layer is made of SiO_x, SiO_xN_y, or a combination thereof.

5. The OLED display panel according to claim **1**, wherein the OLED display panel further comprises a switch TFT functioning as a switch, the thermal insulating layer is disposed on the substrate to correspond to the switch TFT.

6. An organic light-emitting diode (OLED) display panel, comprising:

a substrate including an arrangement area, wherein a driving thin film transistor (TFT) for driving an OLED device to emit light and a storage capacitor corresponding to the driving TFT are disposed in the arrangement area;

a thermal insulating layer including at least one thermal insulating sublayer disposed in the arrangement area;

a buffer layer disposed on the substrate and covering the thermal insulating layer;

the driving TFT disposed on the buffer layer to correspond to the arrangement area; and

the storage capacitor disposed on the buffer layer to correspond to the arrangement area;

wherein both the driving TFT and the storage capacitor include a polysilicon layer disposed on the buffer layer, the thermal insulating layer is configured to enhance, when amorphous silicon crystallizes to form the polysilicon layer, heat stability in the amorphous silicon.

7. The OLED display panel according to claim **6**, wherein the thermal insulating layer is consisted of a single thermal insulating sublayer.

8. The OLED display panel according to claim **6**, wherein the thermal insulating layer includes a first thermal insulating sublayer disposed on the substrate and a second thermal insulating sublayer disposed on the first thermal insulating sublayer, the first thermal insulating sublayer is made of a material different from that of the second thermal insulating sublayer.

9. The OLED display panel according to claim **7**, wherein the buffer layer includes a first buffer sublayer covering the second thermal insulating sublayer and a second buffer sublayer disposed on the first buffer sublayer, the first buffer sublayer is made of SiN_x, the first thermal insulating sublayer is made of SiO_x, and the second thermal insulating sublayer is made of SiO_xN_y.

10. The OLED display panel according to claim **8**, wherein in the second thermal insulating sublayer, oxygen has a quantity greater than that of nitrogen.

11. The OLED display panel according to claim **6**, wherein the thermal insulating layer has a thickness ranging from 50 micrometers to 100 micrometers.

12. The OLED display panel according to claim **6**, wherein the thermal insulating layer is made of SiO_x, SiO_xN_y, or a combination thereof.

13. The OLED display panel according to claim **6**, wherein the OLED display panel further comprises a switch TFT functioning as a switch, the thermal insulating layer is disposed on the substrate to correspond to the switch TFT.

14. A method for manufacturing an organic light emitting diode (OLED) display panel, comprising:

a step S1 of providing a substrate, wherein the substrate includes an arrangement area, and a driving thin film transistor (TFT) for driving an OLED device to emit light and a storage capacitor corresponding to the driving TFT are disposed in the arrangement area;

a step S2 of forming a thermal insulating layer in the arrangement area of the substrate, wherein the thermal insulating layer is configured to prevent heat in amorphous silicon from dissipating rapidly when amorphous silicon crystallizes;

a step S3 of sequentially forming a buffer layer and an amorphous silicon layer on the substrate;

a step S4 of performing an excimer laser annealing (ELA) treatment for the amorphous silicon layer to have the amorphous silicon layer form a polysilicon layer, and patterning the polysilicon layer;

a step S5 of sequentially forming an insulation layer, a gate metal layer, an interlayer dielectric layer, a source/drain metal layer, and a passivation on the polysilicon layer, so as to form the driving TFT and the storage capacitor; and

a step S6 of sequentially forming a planarization layer, an anode, a pixel defining layer, and a separation portion on the passivation layer.

15. The method for manufacturing the OLED display panel according to claim **14**, wherein the step S2 comprises:

a step S21 of depositing a SiO_x film on the substrate using a plasma enhanced chemical vapor deposition (PECVD) technique, and forming the first thermal insulating sublayer using a photolithography technique; and

a step S22 of depositing a SiO_xN_y film on the first thermal insulating sublayer using the PECVD technique, and forming the second thermal insulating sublayer using the photolithography technique.

16. The method for manufacturing the OLED display panel according to claim **15**, wherein a reaction condition in the step S21 of depositing the SiO_x film is controlled to have a temperature of 400° C.-440° C., an energy of 10 KW-20 KW, a pressure of 40 Pa-80 Pa, a flow ratio of SiH_4:N_2O ranging from 1:100 to 1:50, and a reaction time of 20 sec-40 sec; and

a reaction condition in the step S22 of depositing the SiO_xN_y film is controlled to have a temperature of 400° C.-440° C., an energy of 10 KW-20 KW, a pressure of 40 Pa-80 Pa, a flow ratio of SiH_4:N_2O:NH_3 ranging from 1:100:80 to 1:100:120, and a reaction time of 20 sec-40 sec.

17. The method for manufacturing the OLED display panel according to claim **15**, wherein in the second thermal insulating sublayer, oxygen has a quantity greater than that of nitrogen.

18. The method for manufacturing the OLED display panel according to claim **14**, wherein the thermal insulating layer has a thickness ranging from 50 micrometers to 100 micrometers.

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专利名称(译)	OLED显示面板及其制造方法		
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摘要(译)

本公开提供了一种有机发光二极管显示面板及其制造方法。 OLED显示面板包括基板，绝热层，缓冲器，驱动TFT和存储电容器。 基板包括布置区域。 隔热层布置在布置区域中。 缓冲层设置在基板上。 驱动TFT和存储电容器均布置在缓冲层上以对应于布置区域。 根据本公开，当对非晶硅层进行退火处理以使非晶硅结晶时，绝热层防止非晶硅层中的热量快速散发。