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(54) **ACTIVE MATRIX ORGANIC LIGHT EMITTING DIODE PANEL**

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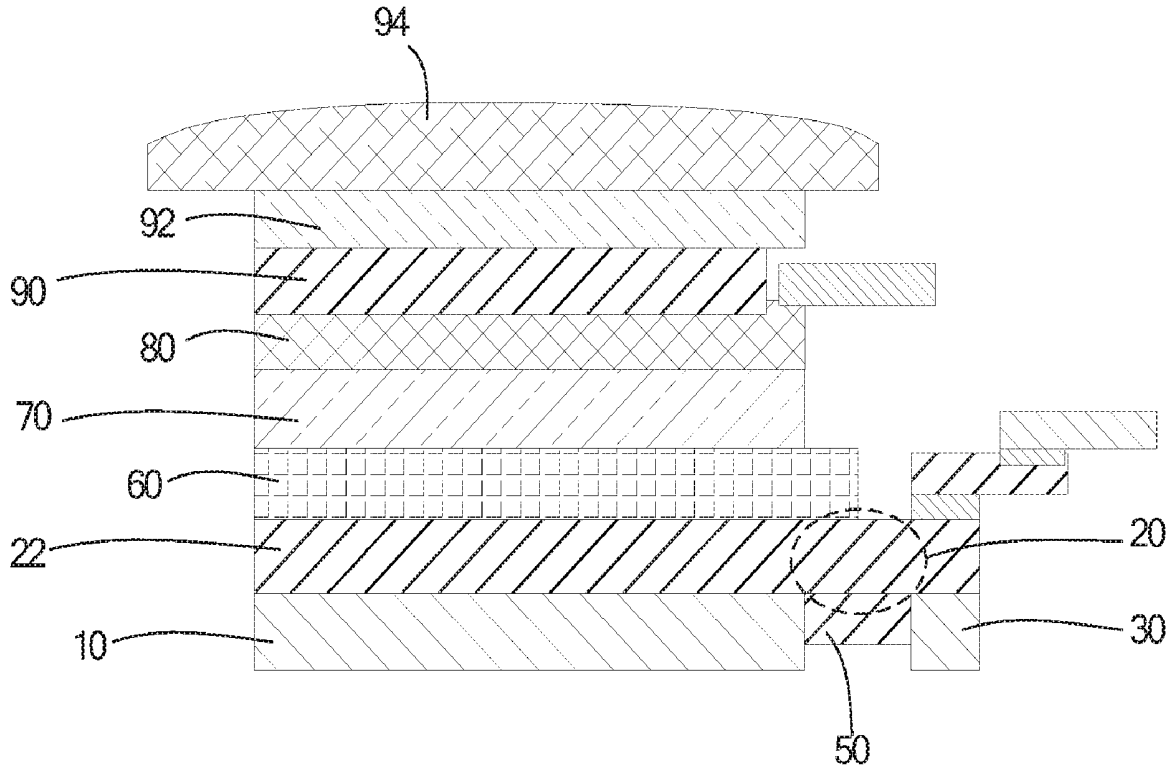
CPC ***H01L 51/5253*** (2013.01); ***H01L 51/0097*** (2013.01); ***H01L 27/323*** (2013.01); ***H01L 51/5281*** (2013.01); *H01L 2251/558* (2013.01); ***H01L 51/56*** (2013.01); ***H01L 27/3244*** (2013.01); *H01L 2251/5338* (2013.01); ***H01L 51/5246*** (2013.01)

(57) **ABSTRACT**

The present disclosure provides an AMOLED panel provided with a hydrogel layer on a bent portion between a first backing plate and a second backing plate. The hydrogel layer can increase structural strength and toughness of a fillet of the bent portion formed by folding the bent portion, Therefore, the bent portion can maintain its structural strength and shape when it is folded and is not easily deformed, broken or cracked, thereby improving the product quality and durability of the AMOLED panel.



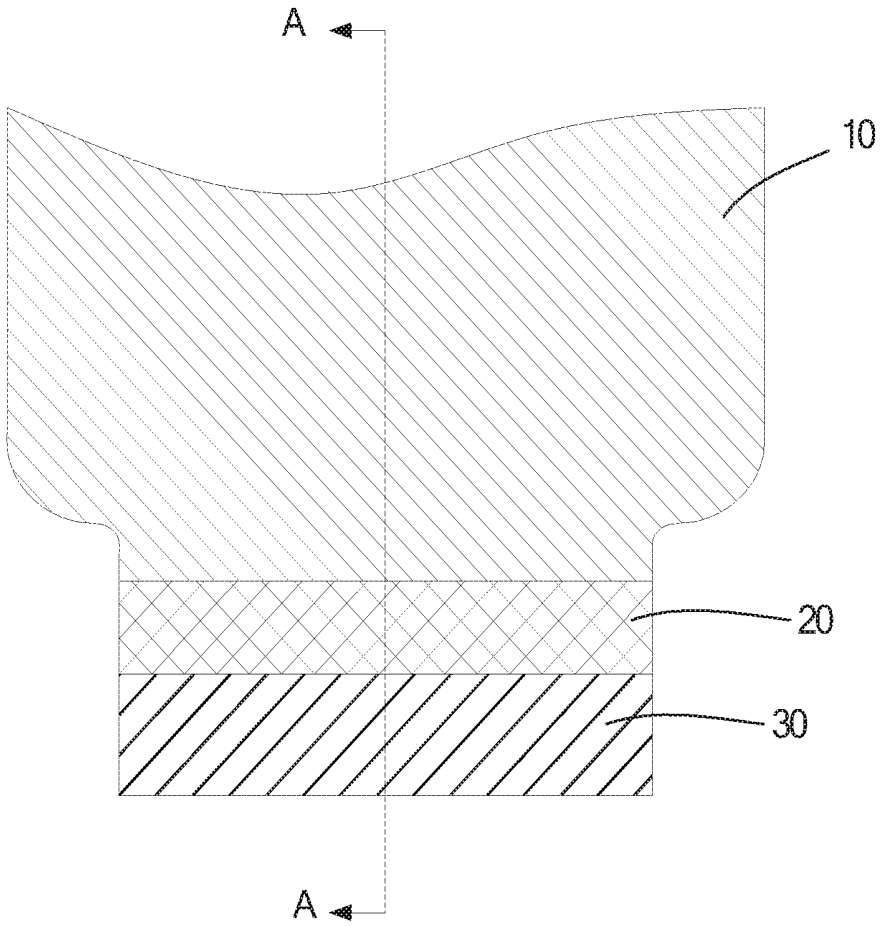


FIG. 1

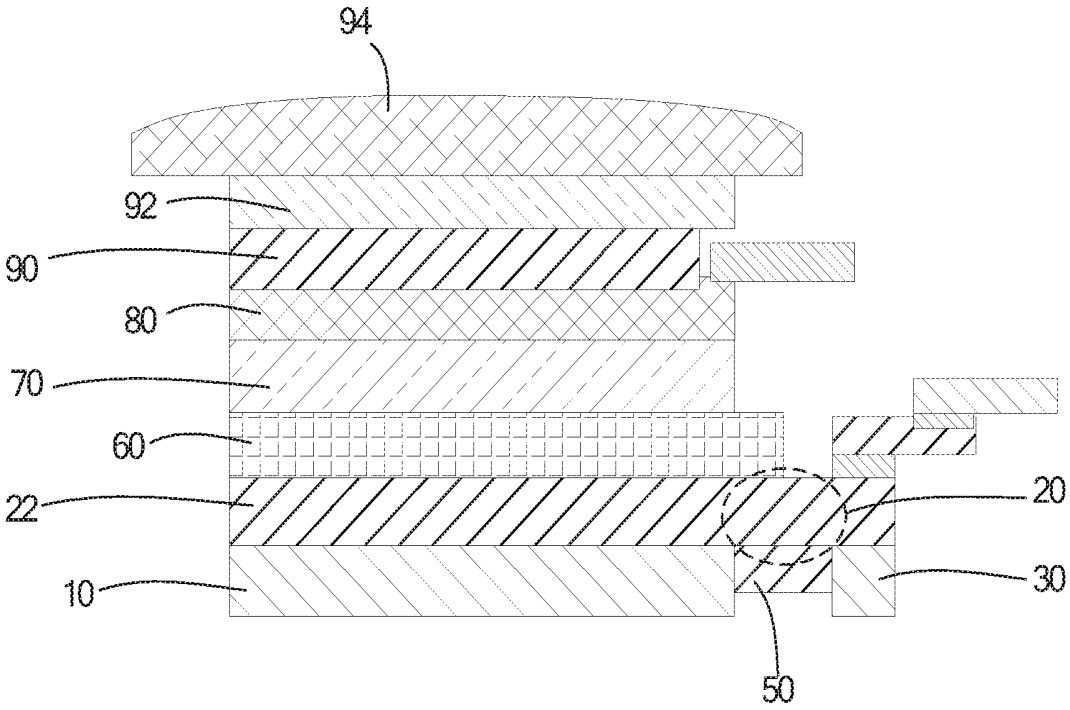


FIG. 2

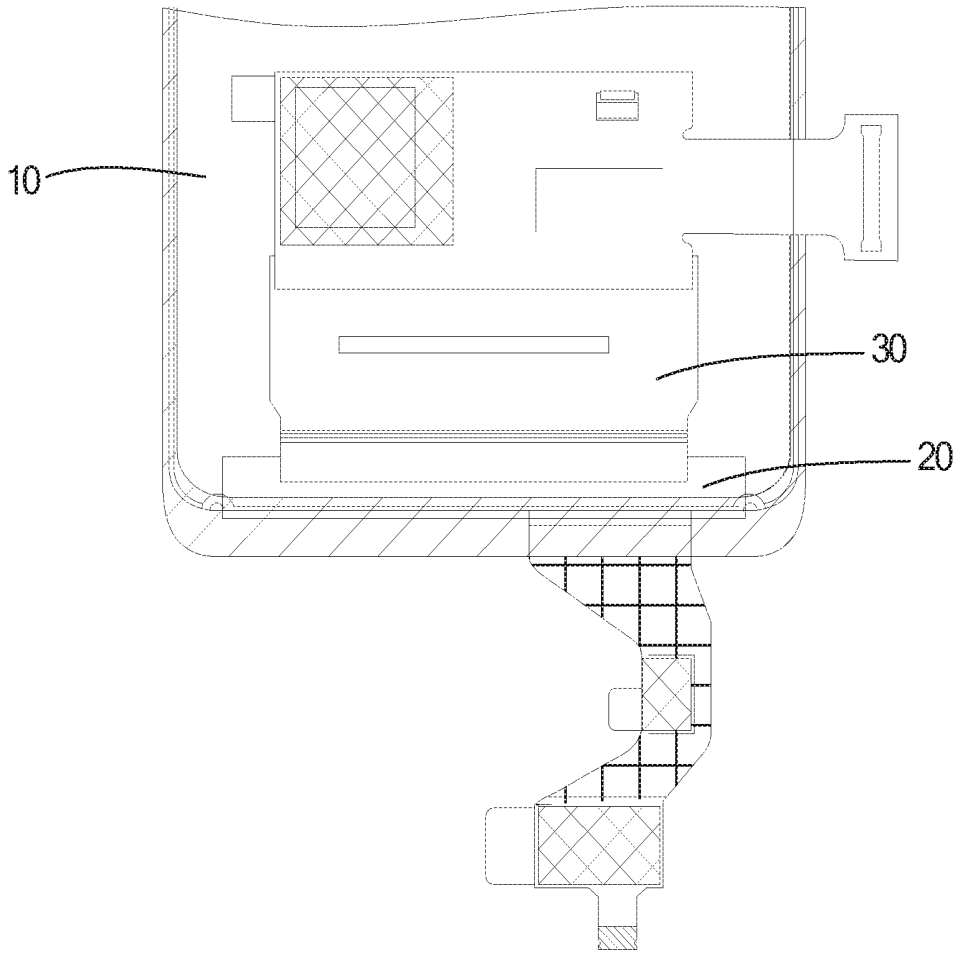


FIG. 3

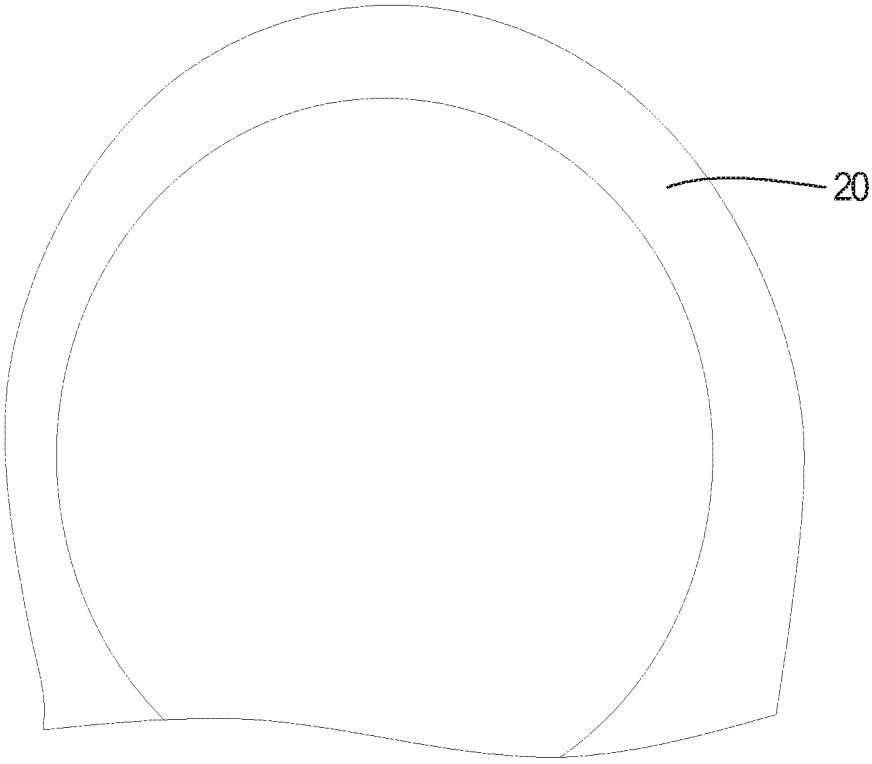


FIG. 4

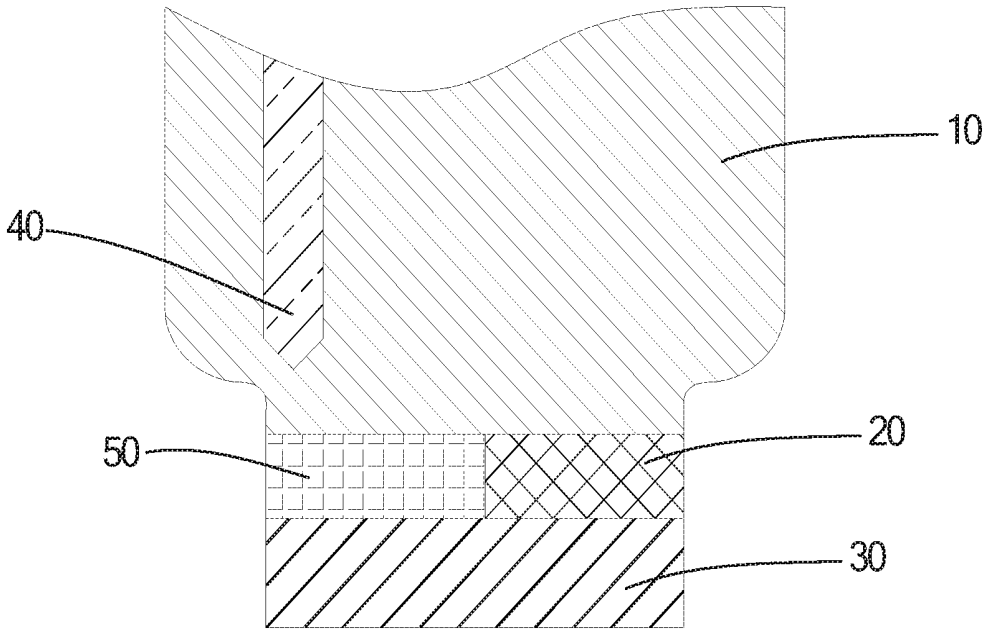


FIG. 5

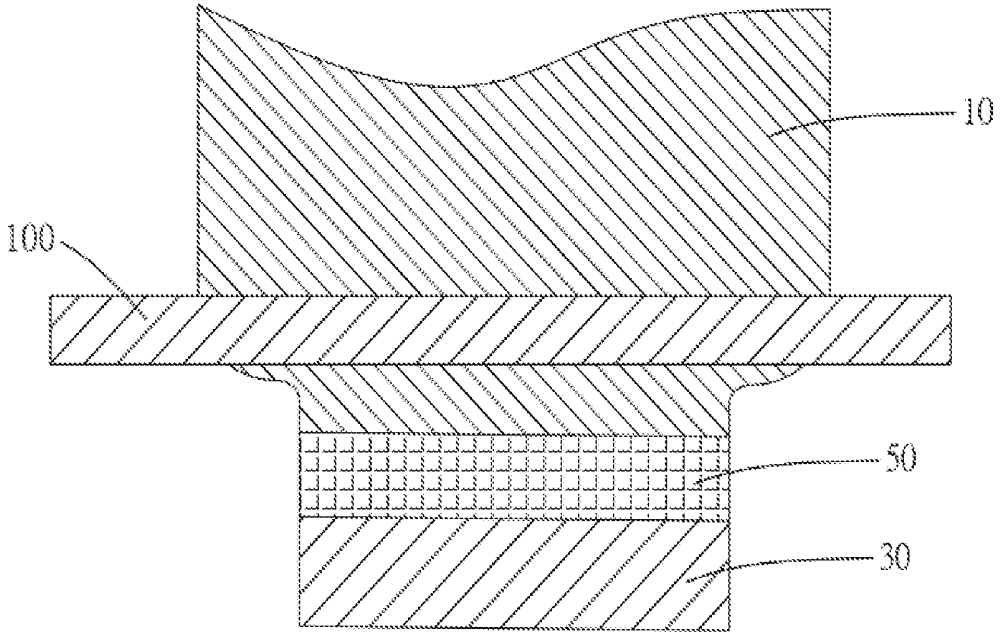


FIG. 6

ACTIVE MATRIX ORGANIC LIGHT EMITTING DIODE PANEL

FIELD OF INVENTION

[0001] The present disclosure relates to a field of active matrix organic light emitting diode (AMOLED) panel technology, and particularly to an AMOLED panel whose bent portion is strengthened.

BACKGROUND

[0002] Compared with traditional liquid crystal display screens, active matrix organic light emitting diode (AMOLED) screens have advantages of fast response times, self-illumination, wide viewing angles, good display effect, and low power consumption. In order to reduce product size, AMOLED panels typically require a pad bending process that is to fold a flexible printed circuit (FPC) along a bent portion. After the FPC is folded, the bent portion forms a fillet. The fillet will affect product quality. This is because the bent portion is subjected to larger stress, so that the fillet of the bent portion is prone to quality problems such as deformation or breakage during product production and use.

[0003] Therefore, it is necessary to propose a new AMOLED panel to solve the quality problem that the existing AMOLED panels are prone to deformation or breakage at the bent portions thereof.

SUMMARY OF DISCLOSURE

[0004] To solve the aforementioned technical problem, the present disclosure provides an AMOLED panel capable of solving the problem that the existing AMOLED panels are prone to deformation or breakage at the bent portions thereof.

[0005] The present disclosure provides an AMOLED panel, comprising:

[0006] an insulating substrate layer having a bent portion;

[0007] a first backing plate and a second backing plate disposed on the insulating substrate layer and separated by the bent portion;

[0008] a hydrogel coated on the bent portion between the first backing plate and the second backing plate;

[0009] an organic light emitting diode (OLED) layer disposed on a surface of the insulating substrate layer opposite to the surface on which the first backing plate and the second backing plate are disposed;

[0010] a touch plate optical clear adhesive layer disposed on a surface of the OLED layer opposite to the surface on which the insulating substrate layer is disposed;

[0011] a touch plate layer disposed on a surface of the touch plate optical clear adhesive layer opposite to the surface on which the OLED layer is disposed;

[0012] a polarizer layer disposed on a surface of the touch plate layer opposite to the surface on which the touch plate optical clear adhesive layer is disposed;

[0013] an optical clear adhesive layer disposed on a surface of the polarizer layer opposite to the surface on which the touch plate layer is disposed; and

[0014] a cover glass layer disposed on a surface of the optical clear adhesive layer opposite to the surface on which the polarizer layer is disposed.

[0015] In an embodiment, an area of the second backing plate is less than that of the first backing plate, and when the insulating substrate layer is folded at the bent portion, an orthographic projection area of the second backing plate all falls on a surface of the first backing plate facing the second backing plate.

[0016] In an embodiment, when the bent portion is in a folded state, its bending angle is 180 degrees.

[0017] In an embodiment, the hydrogel layer has a thickness of 20-50 μm.

[0018] In an embodiment, the insulating substrate layer is made of a polyimide (PI) material.

[0019] The present disclosure further provides a method of manufacturing an AMOLED panel, comprising:

[0020] Step 1: uniformly coating the hydrogel layer on the bent portion between the first backing plate and the second backing plate;

[0021] Step 2: irradiating the hydrogel layer with ultraviolet to solidify the hydrogel layer; and

[0022] Step 3: folding the first backing plate and the second backing plate deposited on the insulating substrate layer at the bent portion, such that a bending angle of the bent portion is 180 degrees when the bent portion is in a folded state.

[0023] In an embodiment, an area of the second backing plate is less than that of the first backing plate, and when the insulating substrate layer is folded at the bent portion, an orthographic projection area of the second backing plate all falls on a surface of the first backing plate facing the second backing plate.

[0024] The present disclosure provides an AMOLED panel provided with a hydrogel layer on a bent portion between a first backing plate and a second backing plate. The hydrogel layer can increase structural strength and toughness of a fillet of the bent portion formed by folding the bent portion, Therefore, the bent portion can maintain its structural strength and shape when it is folded and is not easily deformed, broken or cracked, thereby improving the product quality and durability of the AMOLED panel.

BRIEF DESCRIPTION OF DRAWINGS

[0025] In order to more clearly illustrate the technical solutions in the embodiments of the present disclosure, a brief description of accompanying drawings used in the description of the embodiments of the present disclosure will be given below. Obviously, the accompanying drawings in the following description are merely some embodiments of the present disclosure. For those skilled in the art, other drawings may be obtained from these accompanying drawings without creative labor.

[0026] FIG. **1** is a structural schematic diagram of an AMOLED panel according to an embodiment of the present disclosure.

[0027] FIG. **2** is a cross-sectional view of the AMOLED panel according to the embodiment of the present disclosure taken along a line A-A shown in FIG. **1**.

[0028] FIG. **3** is a structural schematic diagram showing that a bent portion of the AMOLED panel according to the embodiment of the present disclosure is folded.

[0029] FIG. **4** is a schematic diagram of a fillet formed by folding bent portion **20** of the AMOLED panel according to the embodiment of the present disclosure.

[0030] FIG. **5** is a schematic diagram showing that the bent portion of the AMOLED panel according to the embodiment of the present disclosure is coated with a hydrogel.

[0031] FIG. **6** is a schematic diagram showing that the hydrogel coated on the bent portion of the AMOLED panel according to the embodiment of the present disclosure is cured by an ultraviolet (UV) lamp.

DETAILED DESCRIPTION

[0032] Reference throughout this specification to "an embodiment" means that a particular feature, structure, or characteristic described in connection with the indicated embodiment is included in at least one embodiment of the present disclosure. The same terms appearing in different places in the specification are not necessarily limited to the same embodiments, but should be understood as independent or alternative embodiments to other embodiments. In view of the technical solutions disclosed in the embodiments of the present disclosure, those skilled in the art should understand that the embodiments described in the present disclosure may have other combinations or modifications in accordance with the embodiments of the present disclosure.

[0033] The following description of various embodiments of the present disclosure with reference to the accompanying drawings is used to illustrate specific embodiments that can be practiced. Directional terms mentioned in the present disclosure, such as "above", "below", "front", "rear", "left", "right", "inside", "outside", "side", "vertical", "horizontal", etc., are merely used to indicate the direction of the accompanying drawings. Therefore, the directional terms are used for illustrating and understanding the present disclosure rather than limiting the present disclosure.

[0034] FIG. **1** is a structural schematic diagram of an active matrix organic light emitting diode (AMOLED) panel according to an embodiment of the present disclosure. A first backing plate **10**, a bent portion **20**, and a second backing plate **30** are disposed on an insulating substrate layer of the AMOLED panel. The second backing plate **30** is coupled to the first backing plate **10** by the bent portion **20**. An area of the second backing plate **30** is less than that of the first backing plate **10**, and when the insulating substrate layer is folded, an orthographic projection area of the second backing plate **30** all falls on a surface of the first backing plate **10** facing the second backing plate **30**. The first backing plate **10** and the second backing plate **30** have a thickness of 95 μm.

[0035] FIG. **2** is a cross-sectional view of the AMOLED panel according to the embodiment of the present disclosure taken along a line A-A shown in FIG. **1**. The first backing plate **10** and the second backing plate **30** are disposed on the insulating substrate layer **22** and separated by the bent portion **20**. The bent portion **20** between the first backing plate **10** and the second backing plate **30** is coated with a hydrogel layer **50**. When the second backing plate **30** and the first backing plate **10** are in a folded state, the hydrogel layer **50** can increase structural strength of the bent portion **20**. The insulating substrate layer **22** may be made of a polyimide (PI) material. The hydrogel layer **50** may be made of a photocurable material such as an ultraviolet (UV) curable material. A thickness of the hydrogel layer **50** may be set between 20 μm and 50 μm. A width of the hydrogel layer **50** may be the same as the width of the bent portion **20**. The hydrogel layer **50** can support and protect the bent portion **20**. An organic light emitting diode (OLED) layer **60** is disposed on a surface of the insulating substrate layer **22** opposite to the surface on which the first backing plate **10** and the second backing plate **30** are disposed. The OLED layer **60** further comprises a thin film transistor layer (TFT layer) and a thin film encapsulation layer (TFE layer). A touch plate optical clear adhesive layer (TP OCA layer) **70** is disposed on a surface of the OLED layer **60** opposite to the surface on which the insulating substrate layer **22** is disposed. A touch plate layer (TP layer) **80** is disposed on a surface of the touch plate optical clear adhesive layer **70** opposite to the surface on which the OLED layer **60** is disposed. A polarizer layer (POL layer) **90** is disposed on a surface of the touch plate layer **80** opposite to the surface on which the touch plate optical clear adhesive layer **70** is disposed. An optical clear adhesive layer **92** disposed on a surface of the polarizer layer **90** opposite to the surface on which the touch plate layer is disposed **80**. A cover glass layer **94** disposed on a surface of the optical clear adhesive layer **92** opposite to the surface on which the polarizer layer **90** is disposed.

[0036] FIG. **3** is a structural schematic diagram showing that a bent portion **20** of the AMOLED panel according to the embodiment of the present disclosure is folded. Because an area of the second backing plate is less than that of the first backing plate, when the insulating substrate layer is folded, an orthographic projection area of the second backing plate all falls on a surface of the first backing plate facing the second backing plate. The hydrogel layer **50**, coated on the bent portion **20** between the first backing plate **10** and the second backing plate **30**, can increase structural strength of the bent portion **20** when the second backing plate **30** and the first backing plate **10** are in a folded state. Therefore, the bent portion **20** is not easily deformed, broken or cracked.

[0037] FIG. **4** is a schematic diagram of a fillet formed by folding bent portion **20** of the AMOLED panel according to the embodiment of the present disclosure. Since a bending angle of the fillet formed by folding the bent portion **20** may be up to 180 degrees, the fillet of the folded bent portion **20** will continue to be subjected to larger bending stress. However, the hydrogel layer **50**, coated on the bent portion **20** between the first backing plate **10** and the second backing plate **30**, can increase structural strength of the fillet of the bent portion **20**. Therefore, the bent portion **20** is not easily deformed, broken or cracked.

[0038] FIG. **5** is a schematic diagram showing that the bent portion of the AMOLED panel according to the embodiment of the present disclosure is coated with a hydrogel **50**. FIG. **6** is a schematic diagram showing that the hydrogel layer **50** coated on the bent portion of the AMOLED panel according to the embodiment of the present disclosure is cured by an ultraviolet lamp. First, the hydrogel layer **50** is uniformly coated on the bent portion **20** between the second backing plate **30** and the first backing plate **10** by a hydrogel coating needle **40**. Next, the hydrogel layer **50** is irradiated with UV light by a UV lamp **60** to cure the hydrogel layer **50**. After the hydrogel layer **50** is cured by UV light irradiation, it can provide sufficient structural strength and toughness to the bent portion **20**. Therefore, the bent portion **20** can maintain its structural strength and shape when it is folded. Finally, the first backing plate **10** and the second backing plate **30** are folded at the bent portion **20** to be in an installed state that can be installed in a product.

[0039] The present disclosure provides an AMOLED panel provided with a hydrogel layer on a bent portion between a first backing plate and a second backing plate. The hydrogel layer can increase structural strength and toughness of a fillet of the bent portion formed by folding the bent

portion, Therefore, the bent portion can maintain its structural strength and shape when it is folded and is not easily deformed, broken or cracked, thereby improving the product quality and durability of the AMOLED panel.

[0040] The present disclosure has been disclosed in the above preferred embodiments, but the preferred embodiments are not intended to limit the present disclosure. Those skilled in the art can make various modifications to the above embodiments without departing from the technical idea of the present disclosure, and the modifications are all within the scope defined by the claims of the present disclosure.

What is claimed is:

1. An active matrix organic light emitting diode (AMOLED) panel, comprising:

an insulating substrate layer having a bent portion;

a first backing plate and a second backing plate disposed on the insulating substrate layer and separated by the bent portion;

a hydrogel layer coated on the bent portion between the first backing plate and the second backing plate;

an organic light emitting diode (OLED) layer disposed on a surface of the insulating substrate layer opposite to the surface on which the first backing plate and the second backing plate are disposed;

a touch plate optical clear adhesive layer disposed on a surface of the OLED layer opposite to the surface on which the insulating substrate layer is disposed;

a touch plate layer disposed on a surface of the touch plate optical clear adhesive layer opposite to the surface on which the OLED layer is disposed;

a polarizer layer disposed on a surface of the touch plate layer opposite to the surface on which the touch plate optical clear adhesive layer is disposed;

an optical clear adhesive layer disposed on a surface of the polarizer layer opposite to the surface on which the touch plate layer is disposed; and

a cover glass layer disposed on a surface of the optical clear adhesive layer opposite to the surface on which the polarizer layer is disposed.

2. The AMOLED panel according to claim **1**, wherein an area of the second backing plate is less than that of the first backing plate, and when the insulating substrate layer is folded at the bent portion, an orthographic projection area of the second backing plate all falls on a surface of the first backing plate facing the second backing plate.

3. The AMOLED panel according to claim **2**, wherein when the bent portion is in a folded state, its bending angle is 180 degrees.

4. The AMOLED panel according to claim **1**, wherein the first backing plate and the second backing plate have a thickness of 95 μm.

5. The AMOLED panel according to claim **1**, wherein the OLED layer further comprises a thin film transistor layer (TFT layer) and a thin film encapsulation layer (TFE layer).

6. The AMOLED panel according to claim **1**, wherein the hydrogel layer has a thickness of 20-50 μm.

7. The AMOLED panel according to claim **1**, wherein the insulating substrate layer is made of a polyimide (PI) material.

8. The AMOLED panel according to claim **1**, wherein the hydrogel layer is made of a photocurable material.

9. The AMOLED panel according to claim **1**, wherein the hydrogel layer is made of an ultraviolet curable material.

10. A method of manufacturing an active matrix organic light emitting diode (AMOLED) panel, wherein the AMOLED panel comprises:

an insulating substrate layer having a bent portion;

a first backing plate and a second backing plate disposed on the insulating substrate layer and separated by the bent portion;

a hydrogel layer coated on the bent portion between the first backing plate and the second backing plate;

an organic light emitting diode (OLED) layer disposed on a surface of the insulating substrate layer opposite to the surface on which the first backing plate and the second backing plate are disposed;

a touch plate optical clear adhesive layer disposed on a surface of the OLED layer opposite to the surface on which the insulating substrate layer is disposed;

a touch plate layer disposed on a surface of the touch plate optical clear adhesive layer opposite to the surface on which the OLED layer is disposed;

a polarizer layer disposed on a surface of the touch plate layer opposite to the surface on which the touch plate optical clear adhesive layer is disposed;

an optical clear adhesive layer disposed on a surface of the polarizer layer opposite to the surface on which the touch plate layer is disposed; and

a cover glass layer disposed on a surface of the optical clear adhesive layer opposite to the surface on which the polarizer layer is disposed; and

wherein the method comprises:

Step 1: uniformly coating the hydrogel layer on the bent portion between the first backing plate and the second backing plate;

Step 2: irradiating the hydrogel layer with ultraviolet to solidify the hydrogel layer;

Step 3: folding the first backing plate and the second backing plate deposited on the insulating substrate layer at the bent portion, such that a bending angle of the bent portion is 180 degrees when the bent portion is in a folded state.

11. The method of manufacturing the AMOLED panel according to claim **10**, wherein an area of the second backing plate is less than that of the first backing plate, and when the insulating substrate layer is folded at the bent portion, an orthographic projection area of the second backing plate all falls on a surface of the first backing plate facing the second backing plate.

12. The method of manufacturing the AMOLED panel according to claim **10**, wherein the first backing plate and the second backing plate have a thickness of 95 μm.

13. The method of manufacturing the AMOLED panel according to claim **10**, wherein the OLED layer further comprises a thin film transistor layer (TFT layer) and a thin film encapsulation layer (TFE layer).

14. The method of manufacturing the AMOLED panel according to claim **10**, wherein the hydrogel layer has a thickness of 20-50 μm.

15. The method of manufacturing the AMOLED panel according to claim **10**, wherein the insulating substrate layer is made of a polyimide (PI) material.

16. The method of manufacturing the AMOLED panel according to claim **10**, wherein the hydrogel layer is made of a photocurable material.

17. The method of manufacturing the AMOLED panel according to claim **10**, wherein the hydrogel layer is made of an ultraviolet curable material.

* * * * *

专利名称(译)	有源矩阵有机发光二极管面板		
公开(公告)号	US20200185645A1	公开(公告)日	2020-06-11
申请号	US16/477888	申请日	2019-03-05
发明人	E, SHUANG		
IPC分类号	H01L51/52 H01L51/00 H01L27/32 H01L51/56		
CPC分类号	H01L51/5253 H01L51/56 H01L2251/558 H01L51/0097 H01L2251/5338 H01L51/5246 H01L27/3244 H01L51/5281 H01L27/323		
优先权	201811486981.X 2018-12-06 CN		
外部链接	Espacenet USPTO		

摘要(译)

本公开提供了一种在第一背板和第二背板之间的弯曲部分上设有水凝胶层的AMOLED面板。 水凝胶层可以增加通过折叠弯曲部分而形成的弯曲部分的圆角的结构强度和韧性，因此，弯曲部分在折叠时可以保持其结构强度和形状，并且不容易变形，破裂或破裂，从而 提高了AMOLED面板的产品质量和耐用性。