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(54) **ORGANIC LIGHT EMITTING DIODE
DISPLAY PANEL ELEMENT AND METHOD
FOR MANUFACTURING THE SAME**

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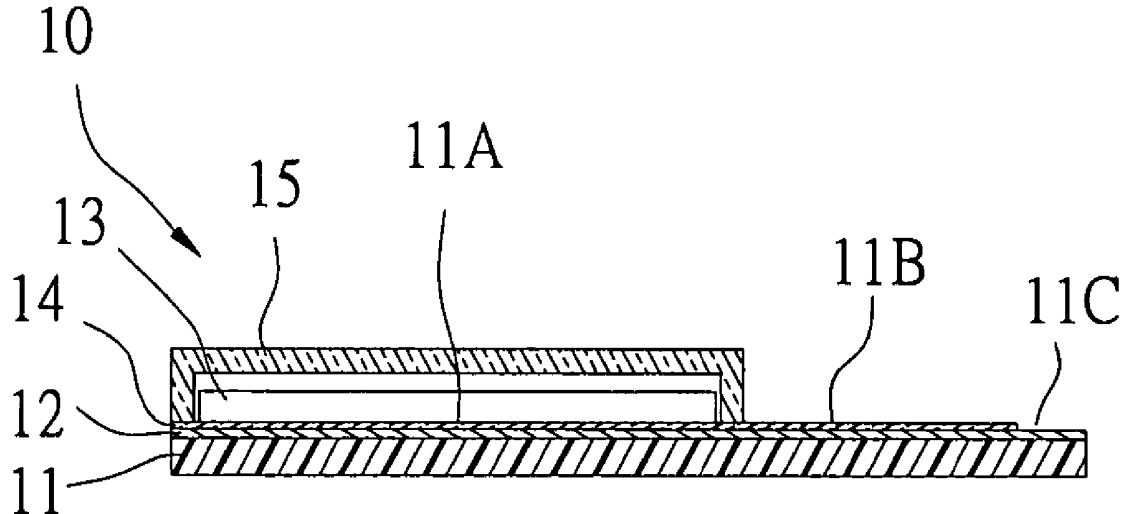
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(57) **ABSTRACT**

An organic light emitting diode display panel element and a method for manufacturing the same are provided. The element comprises a substrate, a conductive wire layer, a protective layer, an organic light emitting diode structure, and a package body. It first makes the conductive wire layer on the substrate, then coats protective glue on a display area and a non-display area on the substrate, evaporates the organic light emitting diode structure on the display area on the substrate and connects it to the conductive wire layer (connection with electricity conductive ability), and packages the organic light emitting diode structure on the substrate. Therefore, twice protective glue coating process is not needed, it is easy to process the coating process, and the protective glue is more adhesive to the substrate, thus reducing process steps and processing time, meanwhile reducing process expenses.



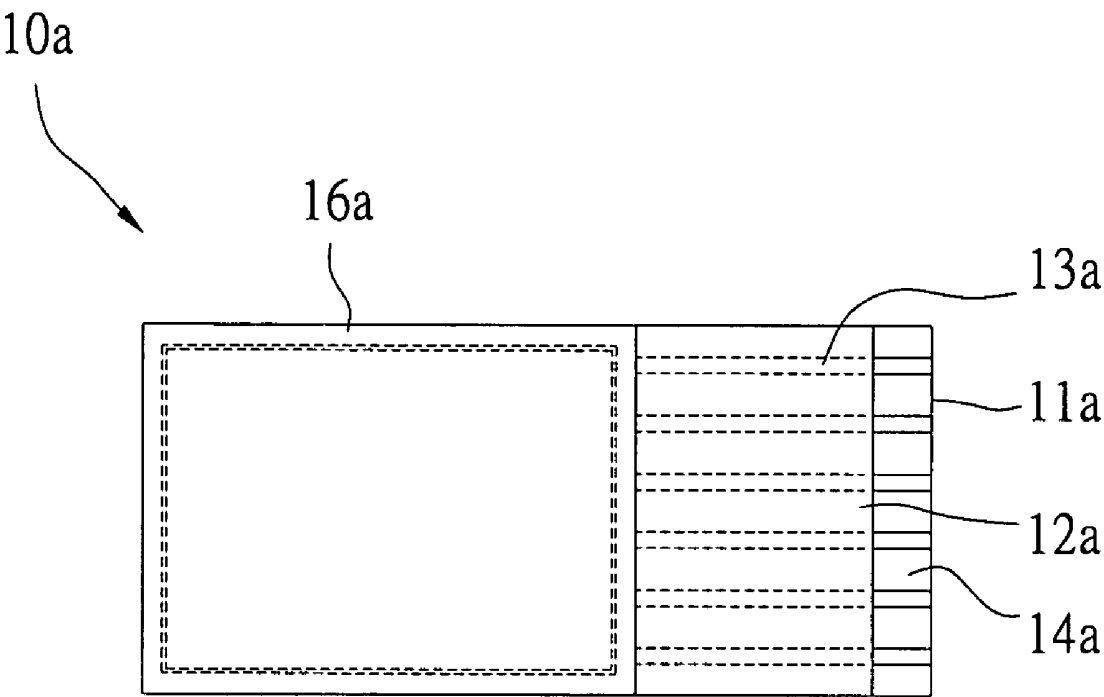


FIG 1
(PRIOR ART)

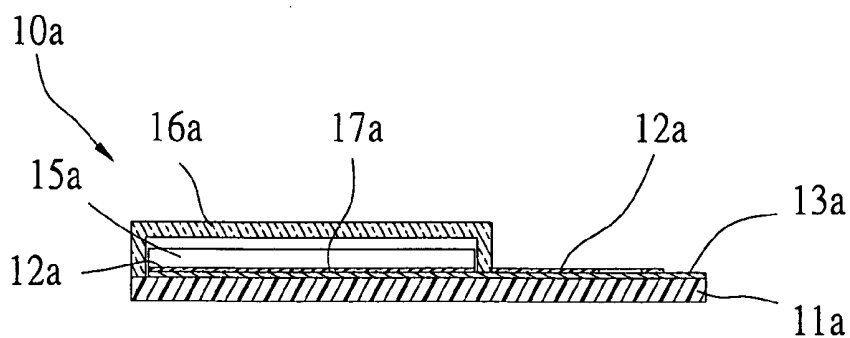


FIG 2
(PRIOR ART)

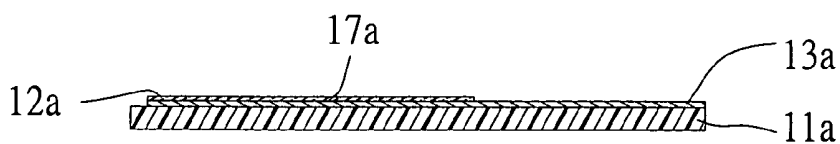


FIG 2A
(PRIOR ART)

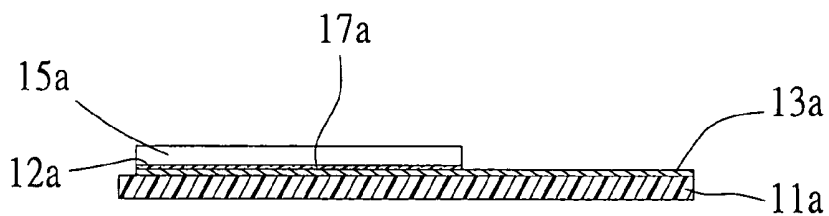


FIG 2B
(PRIOR ART)

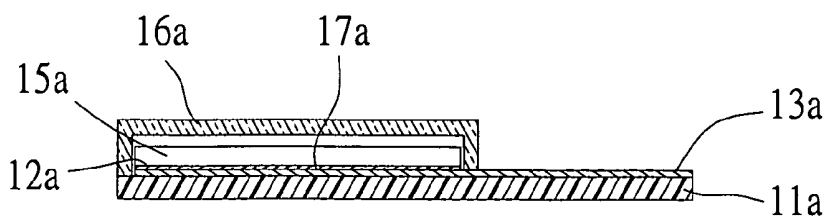


FIG 2C
(PRIOR ART)

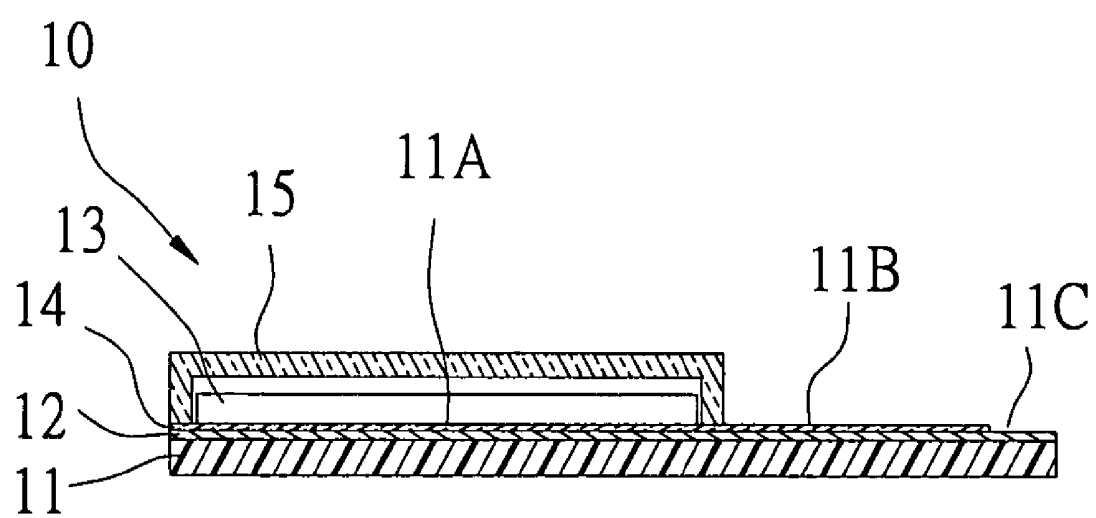


FIG 3

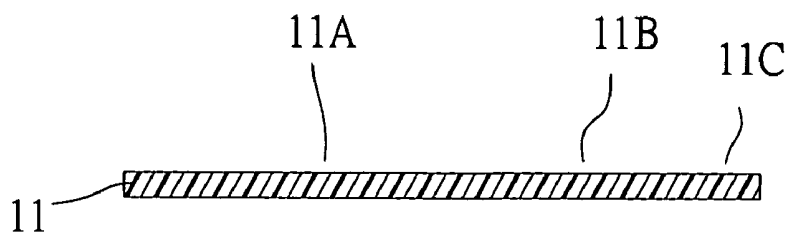


FIG 3A

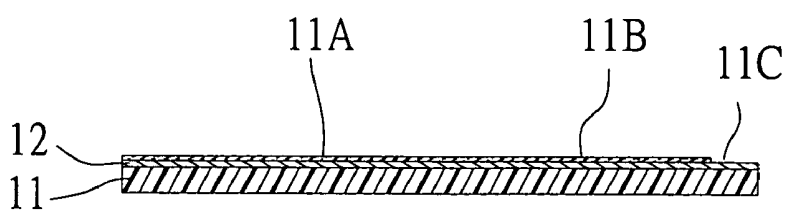


FIG.3B

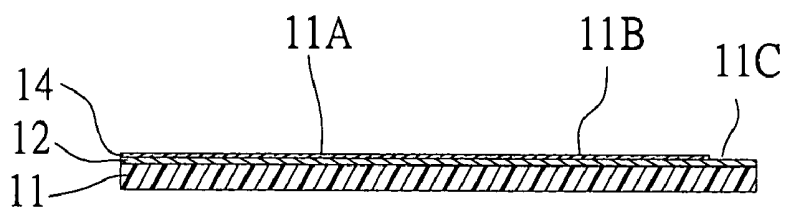


FIG.3C

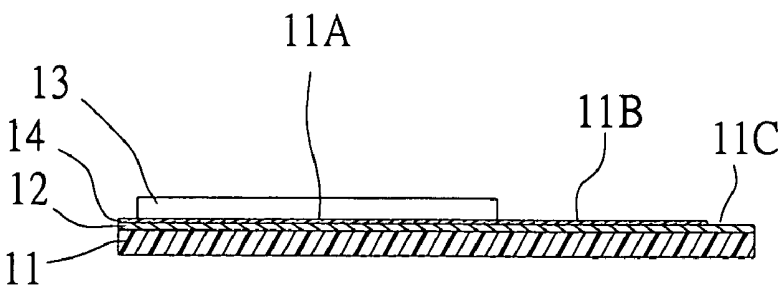


FIG.3D

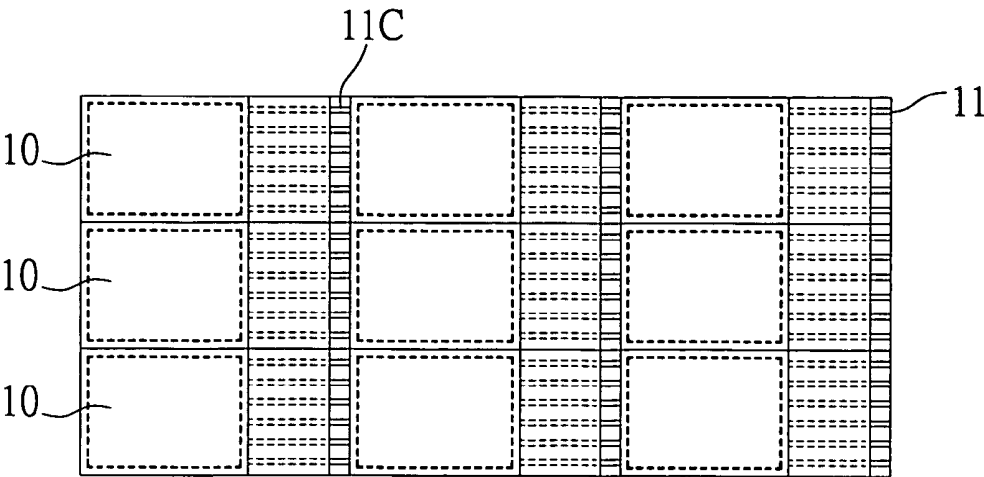


FIG. 4

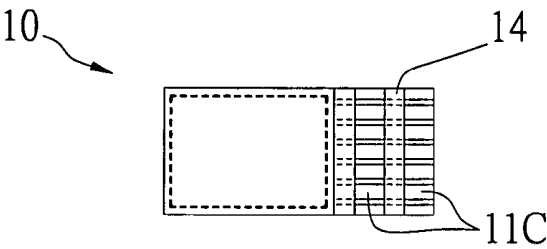


FIG. 5

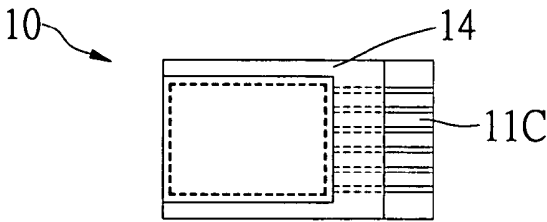


FIG. 6

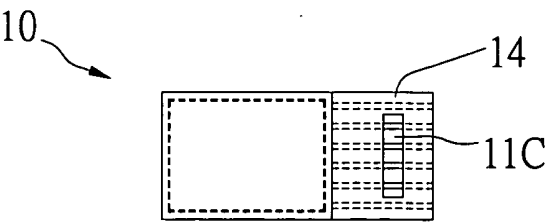


FIG. 7

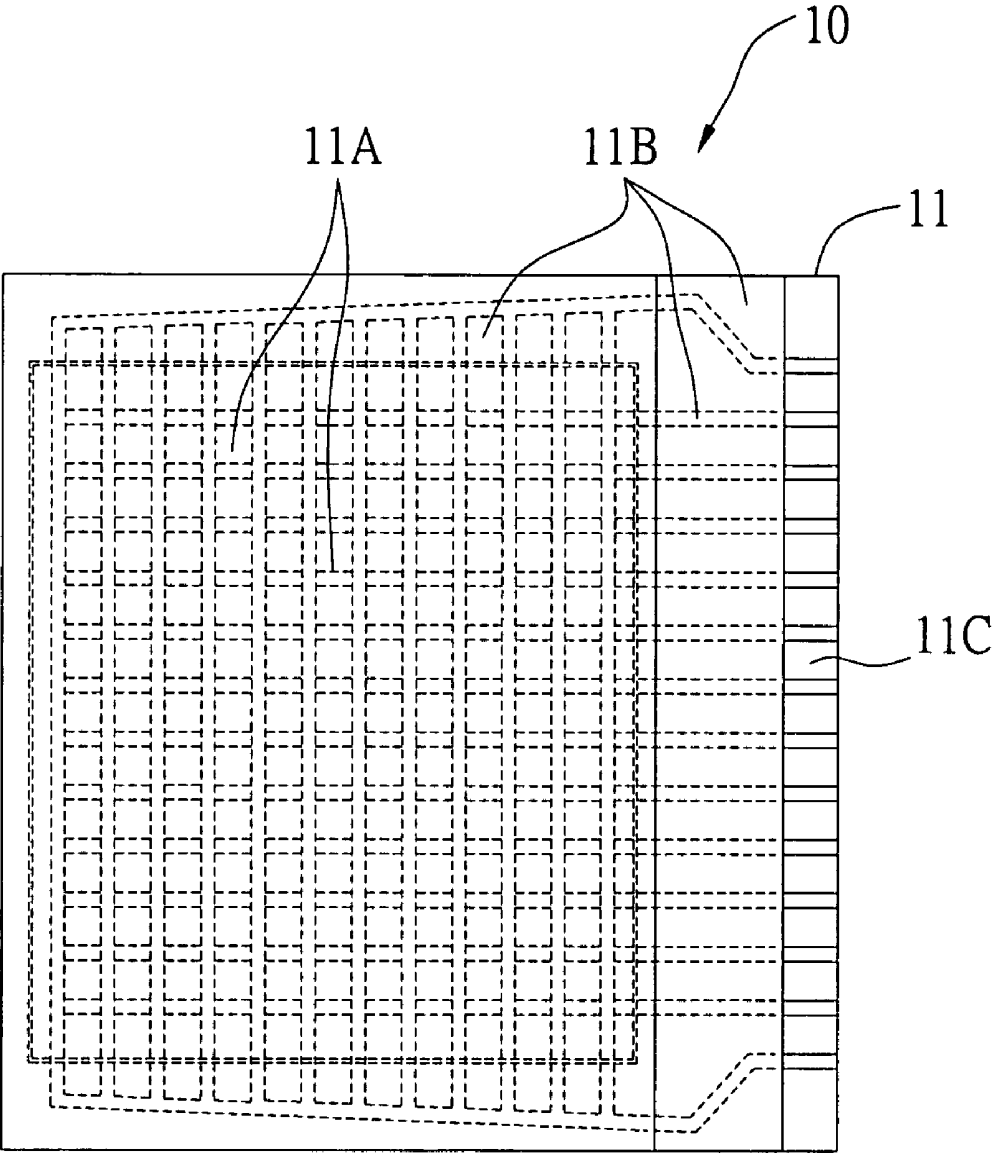


FIG.8

ORGANIC LIGHT EMITTING DIODE DISPLAY PANEL ELEMENT AND METHOD FOR MANUFACTURING THE SAME

FIELD OF THE INVENTION

[0001] The present invention is related to an organic light emitting diode display panel element and a method for manufacturing the same, and more particularly to an organic light emitting diode display panel element for reducing process steps.

BACKGROUND

[0002] General display panels (LCD or OLED) have electrode leading wires exposed on a substrate, and the electrode leading wires exposed in an environment are very easily to be affected by moist and temperature in the environment and corroded to cause a short circuit or an broken circuit. Therefore, lifetime of the display is quickly shortened.

[0003] Therefore, please refer to **FIG. 1**. To resolve such a problem of corroding the exposed electrode leading wires, a prior art organic light emitting diode display element **10a** further coats a layer of protective layer **12a** on an exposed substrate **11a** of the packaged organic light emitting diode display element **10a** to protect electrode leading wires **13a** on the substrate **11a** and exposes uncoated area **14a** to be connected to external electrical connection element (not shown) to be such that the external electrical connection element is electrically connected to the electrode leading wires **13a** on the substrate **11a**. Therefore, the electrode leading wires **13a** are avoided from corroding by the protective layer **12a** protecting the electrode leading wires **13a** on the substrate **11a** to prevent moist in the environment from contacting with the electrode leading wires **13a**.

[0004] However, the prior art display element still has defects of resolving the problem of corroding the exposed electrode leading wires. Among them, the steps of the process of the organic light emitting diode display element **10a** are sequentially as:

[0005] A. Please refer to **FIG. 2A**, providing a substrate **11a**;

[0006] B. Making the electrode leading wires **13a** on the substrate **11a**;

[0007] C. Coating the protective layer **12a** on the display area **17a** of the substrate **11a** first, and exposing partial electrode leading wires **13a** of the display area **17a**;

[0008] D. Please refer to **FIG. 2B**, evaporating the organic light emitting diode structure **15a** on the electrode leading wires **13a** of the protective layer **12a** and the display area **17a**;

[0009] E. Please refer to **FIG. 2C**, using a package process to seal package the organic light emitting diode structure **15a** on the display area **17a** of the substrate **11a** by a package body **16a**;

[0010] F. Please refer to **FIG. 2**, proceeding a coating process of the protective layer **12a** on the exposed substrate **11a** out of the package body **16a**, and the coating process uses a dispenser to coat protective glue on the substrate **11a** and the electrode leading wires **13a**. However, usually because of the shape of the package body **16a** and other

limitations, the protective glue is not easy to be evenly coated on the substrate **11a** out of the package body **16a** to cause the solidified degree of the protective glue **12a** bad and easily generate many defects, and thus affecting good or coarse of the coating quality. Therefore, the moisture cannot be effectively obstructed from permeating between the substrate **11a** and the protective layer **12a** such that the electrode leading wires **13a** covered by the protective layer **12a** are still corroded. Besides, the substrate **11a** has twice protective glue coating process, and thus increasing process steps and extending processing working hours. Meanwhile, the process cost raises, losing the compatibility of products.

SUMMARY OF THE INVENTION

[0011] The present invention is related to an organic light emitting diode display panel element and a method for manufacturing the same which coats a protective layer on a display area and a non-display area of a substrate prior to evaporating the organic light emitting diode structure on the glass structure. Therefore, the protective layer and the glass substrate are easily to be tightly connected to reduce process steps and processing time and lower the cost. Meanwhile, the solidified protective layer protects leading wires on the substrate to prevent the leading wires corroding which is affected by moisture and temperature attacking.

[0012] According to the previous mentioned objects, the present invention provides an organic light emitting diode display panel element which comprises a substrate, at least one conductive wire layer, at least one protective layer, at least one organic light emitting diode structure, and a package body. Among them, a surface of the substrate has a display area and a non-display area, and the display area and the non-display area adjacent to each other. The at least one conductive wire layer is spread on the surface of the substrate and extended to the display area and the non-display area. The at least one protective layer is spread on the display area and the non-display area of the substrate, covering the at least one conductive wire layer thereon, and exposing partial conductive layer of the display area and the non-display area. The at least one organic light emitting diode structure is spread on the protective layer of the display area and on the at least one conductive layer of the exposed display area. The package body covers the at least one organic light emitting diode structure in the display area of the substrate and adheres to the at least one protective layer.

[0013] Besides, a process of an organic light emitting diode display element comprises the steps of:

[0014] providing a substrate whose surface has a display area and a non-display area, and the display area and the non-display area adjacent to each other;

[0015] making at least one conductive wire layer on the substrate and extending them to the display area and the non-display area;

[0016] spreading at least one protective layer on the substrate, covering the display area and the non-display area on the substrate, and exposing partial conductive layer of the display area and the non-display area;

[0017] spreading at least one organic light emitting diode structure on the display area on the substrate and the partial conductive layer of the exposed display area; and

[0018] packaging the at least one organic light emitting diode structure on the display area of the substrate. This way, the process steps and processing time is reduced, and the cost is lowered. Meanwhile the solidified protective layer protects the electricity conducting wires on the substrate to prevent the electricity conducting wires from corroding by moist and temperatures.

BRIEF DESCRIPTION OF DRAWINGS

[0019] **FIG. 1** is a vertical view of a prior art organic light emitting diode display element;

[0020] **FIG. 2** is a cross section diagram of the prior art organic light emitting diode display module;

[0021] **FIG. 2A** to **FIG. 2C** are manufacturing flow charts of the prior art organic light emitting diode display element;

[0022] **FIG. 3** is a cross section diagram of an organic light emitting diode display element module of the present invention;

[0023] **FIG. 3A** to **FIG. 3D** are manufacturing flow charts of the organic light emitting diode display module of the present invention;

[0024] **FIG. 4** is a vertical view of simultaneously making a plurality of organic light emitting diode display elements on a big substrate in accordance with the present invention;

[0025] **FIG. 5** to **FIG. 7** are vertical views of an embodiment of the organic light emitting diode display element of the present invention; and

[0026] **FIG. 8** is a top view of the organic light emitting diode display element.

DETAILED DESCRIPTION

[0027] Please refer to **FIG. 3**, an organic light emitting diode display element **10** and a method of manufacturing the same of the present invention. The element comprises a substrate **11**, a conductive wire layer **12**, an organic light emitting diode structure **13**, a protective layer **14**, and a package body **15**. Among them, the conductive wire layer **12** is made on the substrate **11** first, then the protective layer **14** covers on the substrate **11**, partial area on the substrate **11** is exposed, the organic light emitting diode structure **13** is evaporated on the partial area on the substrate **11** and electrically connected to the electricity conductive wire **12**, and the organic light emitting diode structure **13** is packaged on the substrate **11**. This way, the protective layer **14** is easily and firmly attached to the substrate **11** and the conductive wire layer **12** by changing the process to protect the conductive wire layer **12** on the substrate **11** to avoid moisture and temperature factor from oxidizing or corroding the electricity conductive wire **12**.

[0028] Among them, the process of the organic light emitting diode display element **10** has the steps of:

[0029] Please refer to **FIG. 3A**, providing a substrate **11**. A surface of the substrate **11** has a display area **11A**, a non-display area **11B**, and an external electrical connection area **11C**, and the substrate **11** can be a glass substrate.

[0030] Please refer to **FIG. 3B**, making at least one conductive wire layer **12** on the substrate **11** to extend to the

display area **11A**, the non-display area **11B**, and the external electrical connection area **11C**. The conductive wire layers **12** can use a lithographically etching technology to make metallic leading wires or Indium-Tin Oxide (ITO) wires on the substrate **11**.

[0031] Please refer to **FIG. 3C**, spreading a protective layer **14** on the substrate **11**, covering the conductive wire layer **12** of the display area **11A** and the non-display area **11B** on the substrate **11**, and exposing partial area of the conductive wire layer **12** of the display area **11A** and the non-display area **11B**. The protective layer **14** can be a macromolecule photoresist material with high dielectricity and low permeability. The photoresist material can be polyimide (PI) material and can use spin coating to be coated on the substrate **11**. Then a way of lithographically etching is used to remove the area on the substrate **11** which does not need to cover photoresist, such as the external electrical connection area **11C** and part of the display area **11A**.

[0032] Please refer to **FIG. 3D**, spreading at least one organic light emitting diode structure **13** on the protective layer **14** and conductive wire layer **12** of the display area **11A**. Among them, the organic light emitting diode structure **13** can use an evaporation process to be provided on the display area **11A** such that the organic light emitting diode structure **13** is electrically connected to the conductive wire layer **12**, and the protective layer **14** is used to isolate from partial conductive wire layer **12**.

[0033] Please refer to **FIG. 3**, packaging at least one organic light emitting diode structure **13** on the display area **11A** of the substrate **11**. Among them, the package body **15** can be used to cover and seal the organic light emitting diode structure **13** on the substrate **11**, and the protective layer **14** of the display area **11A** can be sealed by the package body **15**.

[0034] Besides, please refer to **FIG. 4**. When simultaneously making a plurality of organic light emitting diode display elements **10** on a large-area substrate **11** with the above mentioned process, a scribing & breaking process is used on the substrate **11** to separate individual organic light emitting diode display element **10** after completing the package process. Thereafter, an fabrication process is used to make the external electrical connection area **11C** of the organic light emitting diode display element **10** electrically connect to the electrical connection element (not shown) to be fabricated and electrically connected to other devices. Further, please refer to **FIG. 5** to **FIG. 7**; the protective layer **14** further has other types of covering on the substrate, which all exposes the external electrical connection area **11C**.

[0035] Hereafter, **FIG. 8** is used to briefly describe a structure of the organic light emitting diode display element. Among them, the display area **11A** is made of an organic light emitting diode, and the external electrical connection area **11C** of external non-display area **11B** is used to connect to cathode and anode to enter the display area **11A** (including a cathode conductive wire layer of both sides of the display area **11A** and anode conductive wire layer below the display area **11A**). The light emitting principle is using the cathode and anode to guide the organic light emitting diode to emit light.

[0036] In summary, the "organic light emitting diode display element" of the present invention coats photoresist

on the display area and non-display area on the substrate prior to the organic light emitting diode structure spread on the substrate by changing the process. Therefore, the coating process is not limited by the shape of the package body such that the protective glue is easily and evenly spread and attached on the substrate. In addition, it is no need to re-coat the protective glue after completing packaging, and thus the process steps and processing time is reduced. This way, the cost is lowered. Meanwhile, the solidified protective layer protects the conductive wires on the substrate to prevent the conductive wires from corroding by moist and temperature.

[0037] The foregoing description is merely one embodiment of present invention and not considered as restrictive. All equivalent variations and modifications in process, method, feature, and spirit in accordance with the appended claims may be made without in any way from the scope of the invention.

1. An organic light emitting diode display element, comprising:

a substrate having a display area and a non-display area on the surface of said substrate, and said display area and said non-display area adjacent to each other;

at least one conductive wire layer spread on said surface of said substrate and extended to said display area and said non-display area;

at least one protective layer spread on said display area and said non-display area of said substrate, covering said at least one conductive wire layer thereon, and exposing partial conductive layer of said display area and said non-display area; and

at least one organic light emitting diode structure spread on said protective layer of said display area and on said partial conductive layer of said exposed display area; and

a package body covering said at least one organic light emitting diode structure in said display area of said substrate and adhered to said at least one protective layer.

2. The organic light emitting diode display element according to claim 1, wherein said at least one conductive wire layer comprises metallic conductive wires and ITO conductive wires.

3. The organic light emitting diode display element according to claim 1, wherein said at least one protective layer is a photoresist material layer.

4. The organic light emitting diode display element according to claim 1, wherein said at least one protective layer is a polyimide (PI) material.

5. The organic light emitting diode display element according to claim 1, wherein the surface of said substrate further comprises an external electrical connection area, and said at least one conductive wire layer is extended to said external electrical connection area.

6. A process of an organic light emitting diode display element, comprising the steps of:

providing a substrate having a display area and a non-display area on the surface of said substrate, and said display area and said non-display area adjacent to each other;

making at least one conductive wire layer on said substrate and extending them to said display area and said non-display area;

spreading at least one protective layer on said substrate, covering said display area and said non-display area on said substrate, and exposing partial conductive layer of said display area and said non-display area;

spreading at least one organic light emitting diode structure on said display area on said substrate and said partial conductive layer of said exposed display area; and

packaging said at least one organic light emitting diode structure on said display area of said substrate.

7. The process of an organic light emitting diode display element according to claim 6, wherein said spreading a protective layer on said substrate coat said protective layer on said substrate by a coating process.

8. The process of an organic light emitting diode display element according to claim 6, wherein said spreading a protective layer on said substrate coat said protective by a dispenser.

9. The process of an organic light emitting diode display element according to claim 6, wherein said packaging said at least one organic light emitting diode structure on said display area of said substrate seal said at least one organic light emitting diode structure on said display area of said substrate by a cover.

10. The process of an organic light emitting diode display element according to claim 6, wherein said surface of said substrate further comprises an external electrical connection area adjacent to said non-display area, and said at least one conductive wire layer is extended to said non-display area to electrically connect to an electrical connection element.

* * * * *

专利名称(译)	有机发光二极管显示面板元件及其制造方法		
公开(公告)号	US20060022579A1	公开(公告)日	2006-02-02
申请号	US11/192214	申请日	2005-07-29
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IPC分类号	H05B33/14 H05B33/22 H05B33/10 G09F9/30 H01L27/32 H01L51/52 H05B33/00		
CPC分类号	H01L51/5237 H01L27/3288 H01L51/524 H01L51/5253		
优先权	093122986 2004-07-30 TW		
外部链接	Espacenet USPTO		

摘要(译)

提供一种有机发光二极管显示面板元件及其制造方法。该元件包括基板，导线层，保护层，有机发光二极管结构和封装体。首先在基板上制作导线层，然后在基板上的显示区域和非显示区域涂覆保护胶，蒸发基板上显示区域上的有机发光二极管结构，并将其连接到导线上层（与导电能力连接），并将有机发光二极管结构封装在基板上。因此，不需要两次保护胶涂工艺，易于加工涂装工艺，保护胶对基材的附着力更强，从而减少了工艺步骤和加工时间，同时降低了工艺费用。

