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Kim

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(54) **ORGANIC LIGHT EMITTING DISPLAY**

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(30) **Foreign Application Priority Data**

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H01L 51/50 (2006.01)
H01L 51/52 (2006.01)

(52) **U.S. Cl.** **313/503**; 313/292; 313/506

(58) **Field of Classification Search** 313/500–512
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2004/0140759 A1 * 7/2004 Park et al. 313/504

FOREIGN PATENT DOCUMENTS

JP 2000030858 A * 1/2000
JP 2001230073 A * 8/2001

* cited by examiner

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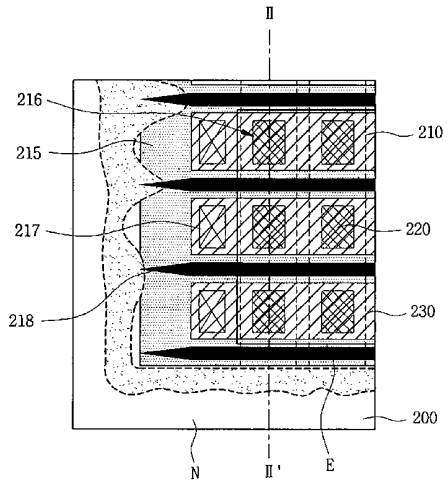
(74) *Attorney, Agent, or Firm*—Ked & Associates LLP

(57) **ABSTRACT**

An organic light emitting device is provided. The device may include a substrate having an emission region and a non-emission region, a sub-pixel formed on the substrate in the emission region of the substrate, and a sealant provided in the non-emission region that seals the emission region of the substrate. The sub-pixel may include a first electrode formed on the substrate in the emission region of the substrate, an emission portion formed on the first electrode, and a second electrode arranged on the emission portion. A barrier rib may be provided to partition the second electrode. A width of an end portion of the barrier rib may be narrower than a width of another portion of the barrier rib.

13 Claims, 8 Drawing Sheets



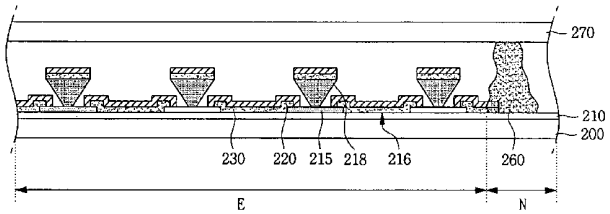


FIG. 1

(Related Art)

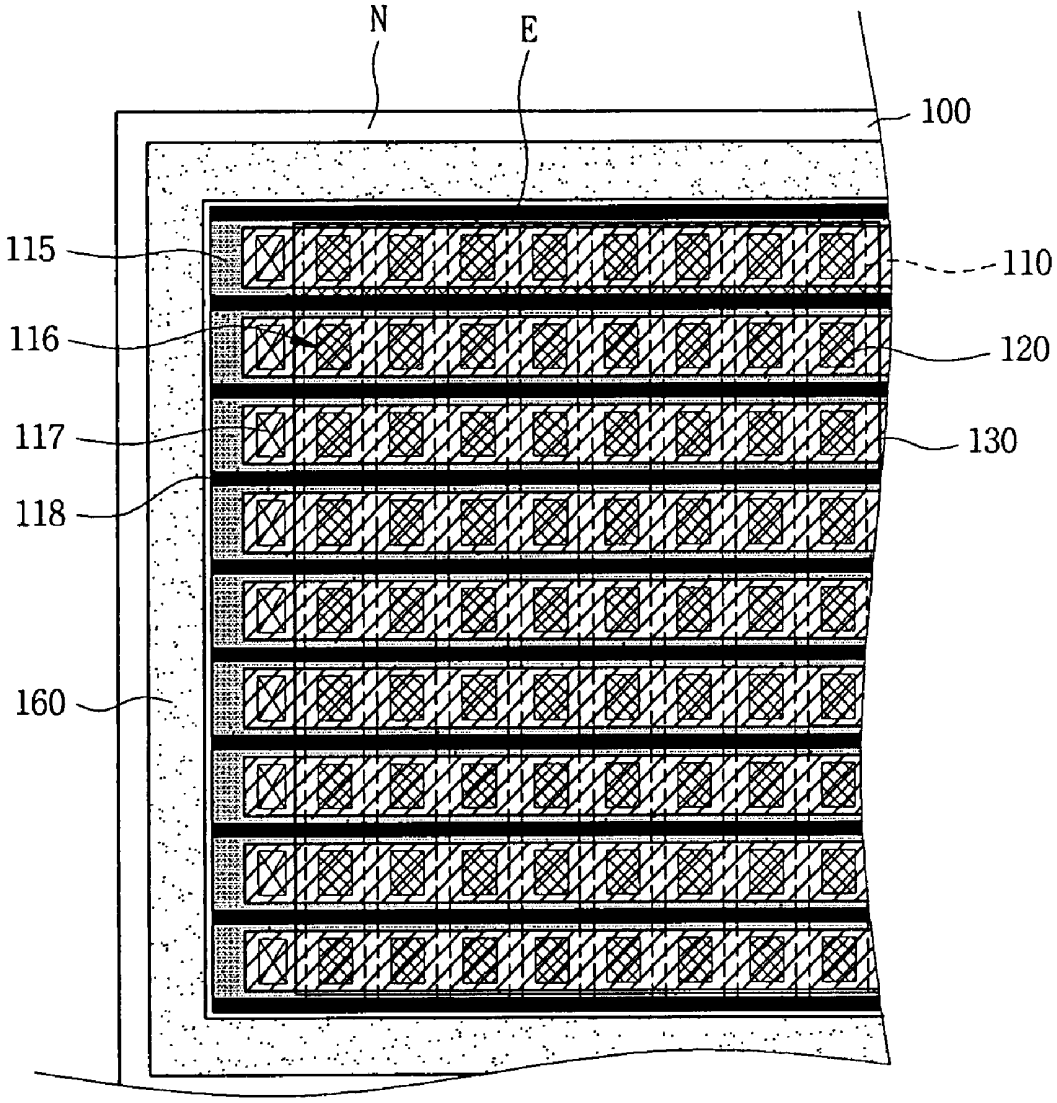


FIG. 2

(Related Art)

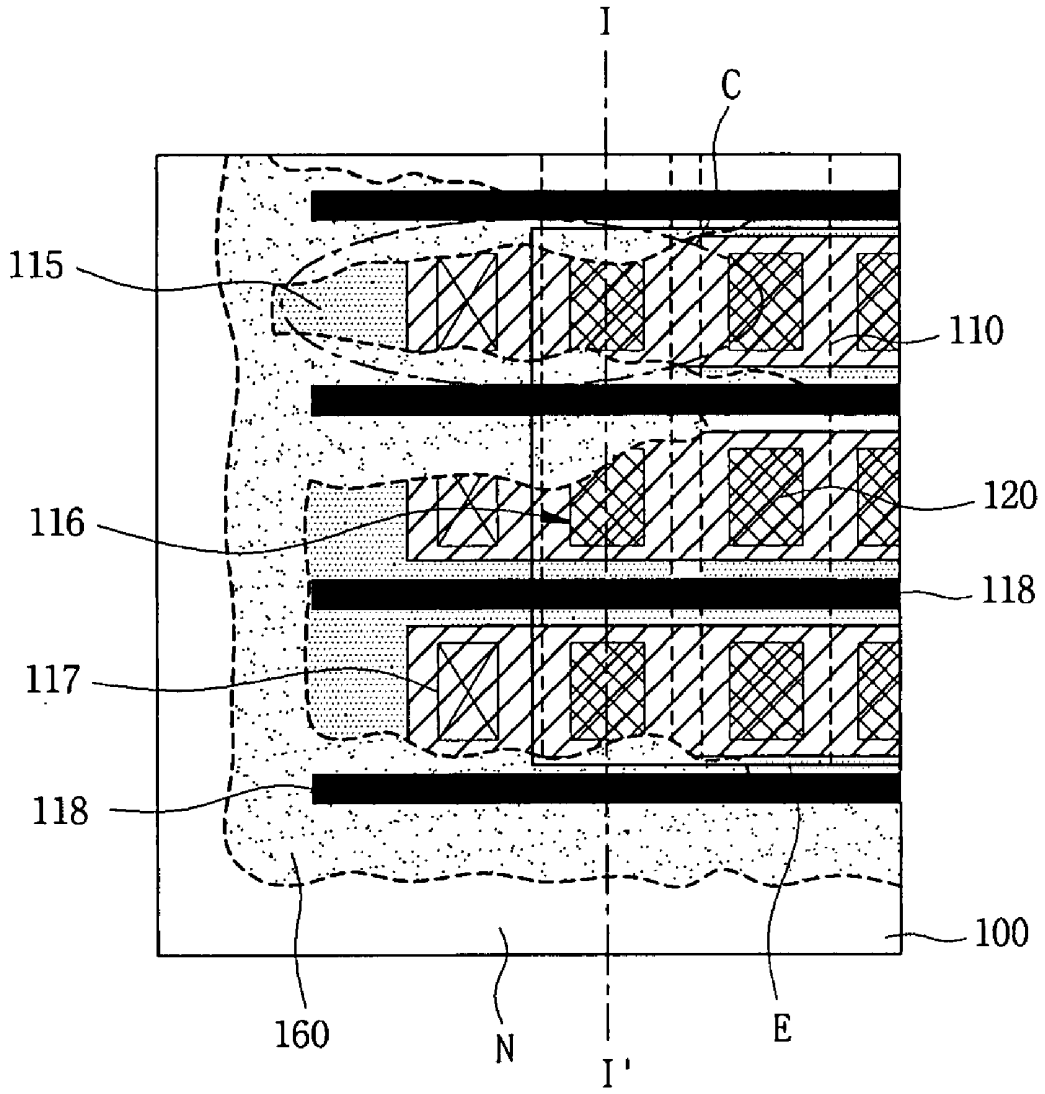


FIG. 3

(Related Art)

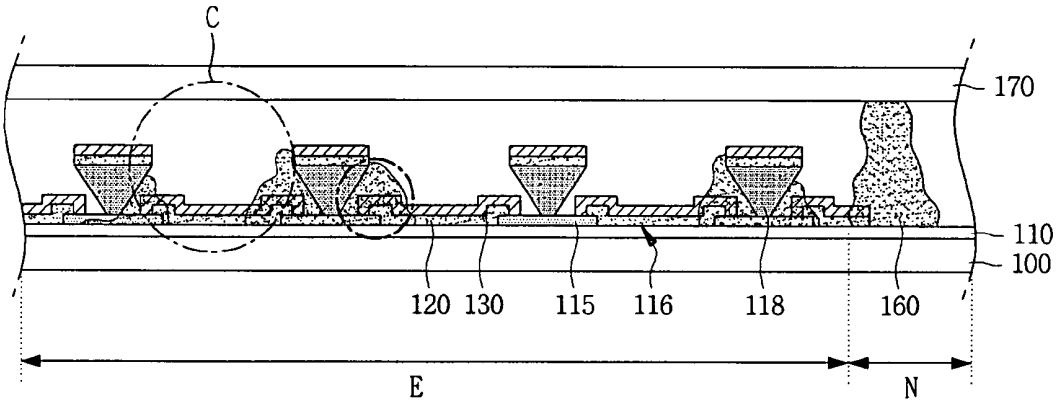


FIG. 4

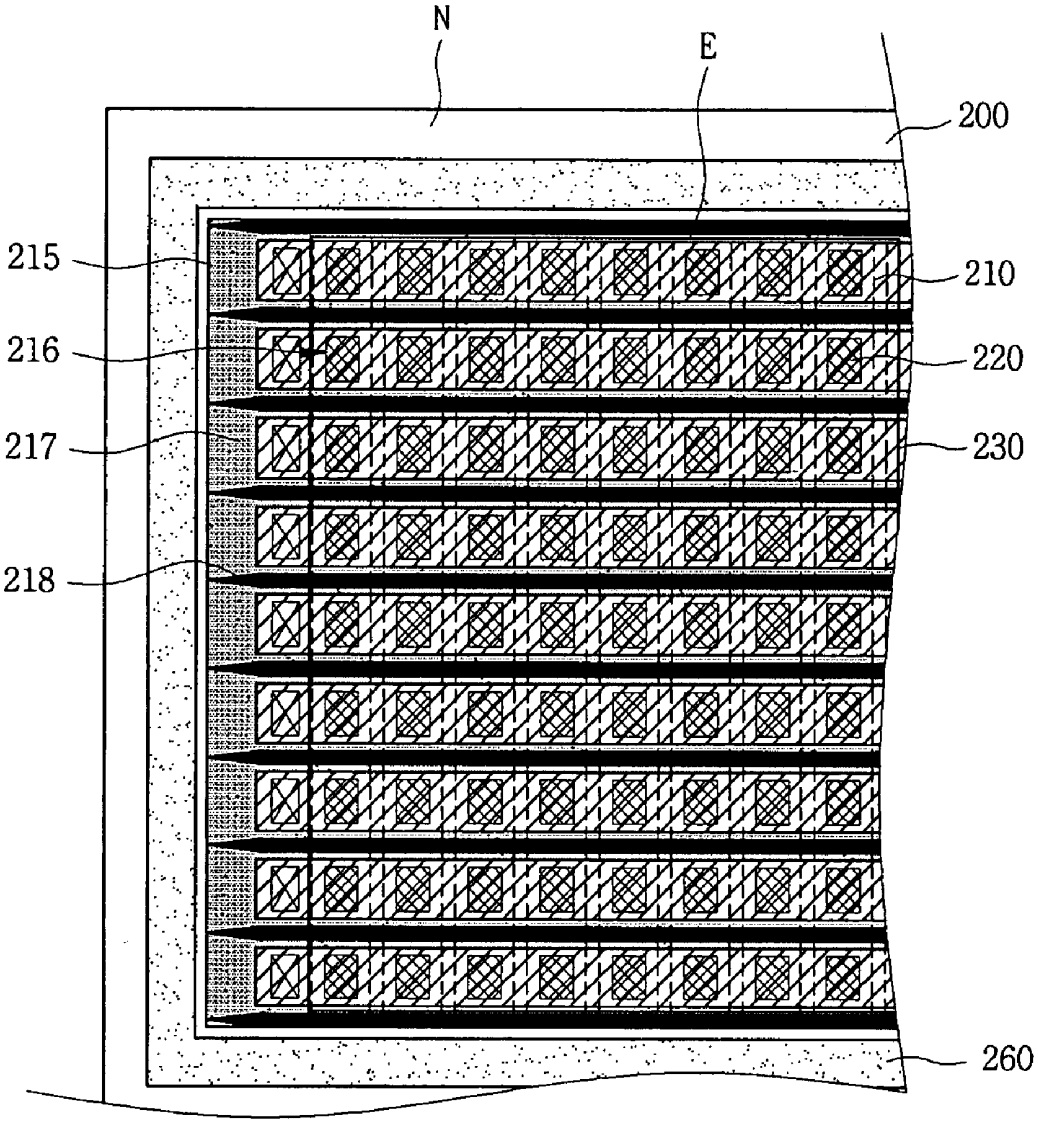


FIG. 5

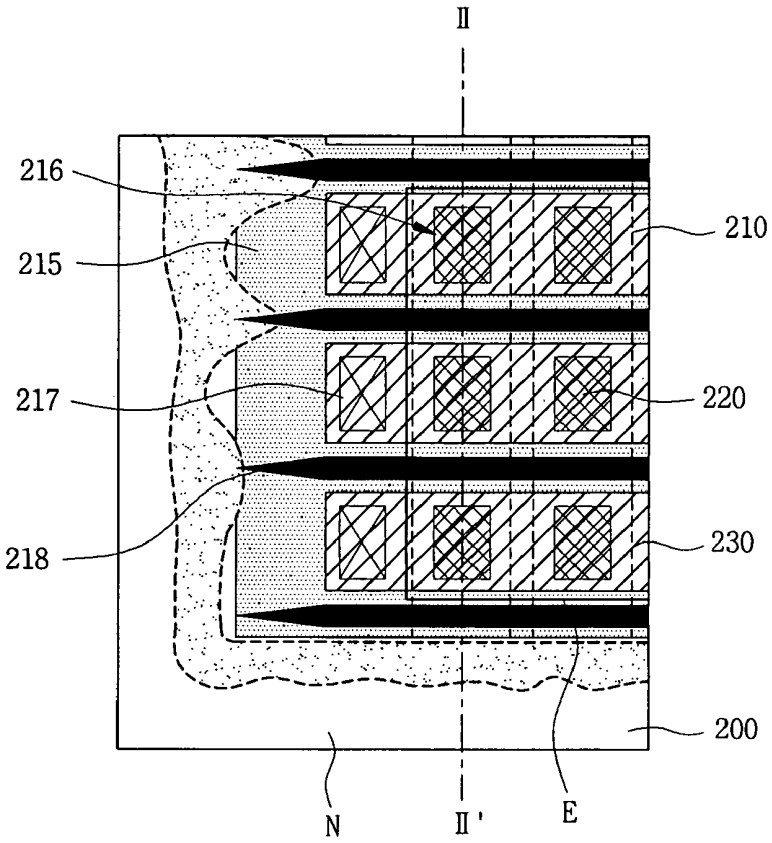

II
216
215
217
218
210
220
230
200
N
II'
E

FIG. 6

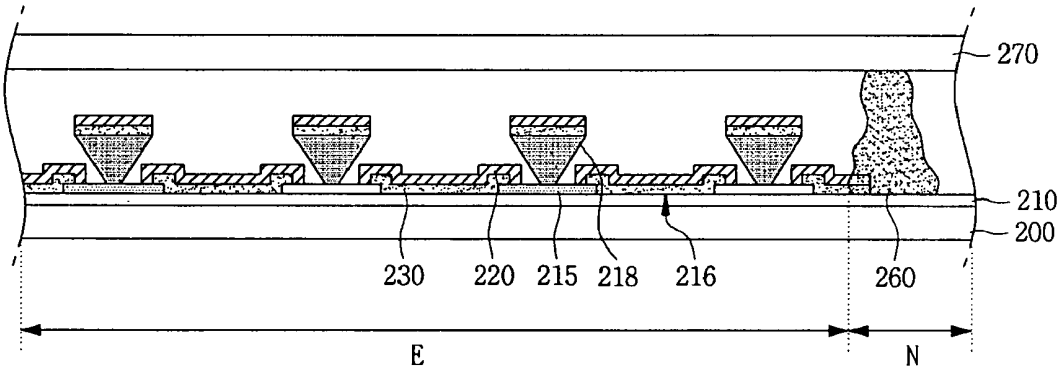

270
210
200
230
220
215
218
216
260
E
N

FIG. 7A

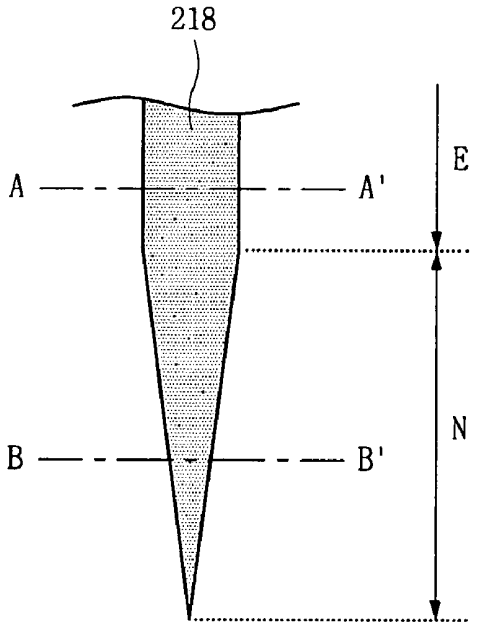


FIG. 7B

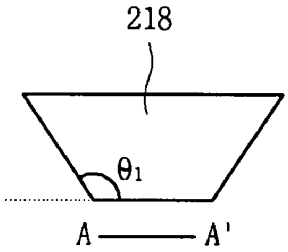


FIG. 7C

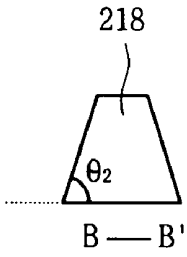


FIG. 8

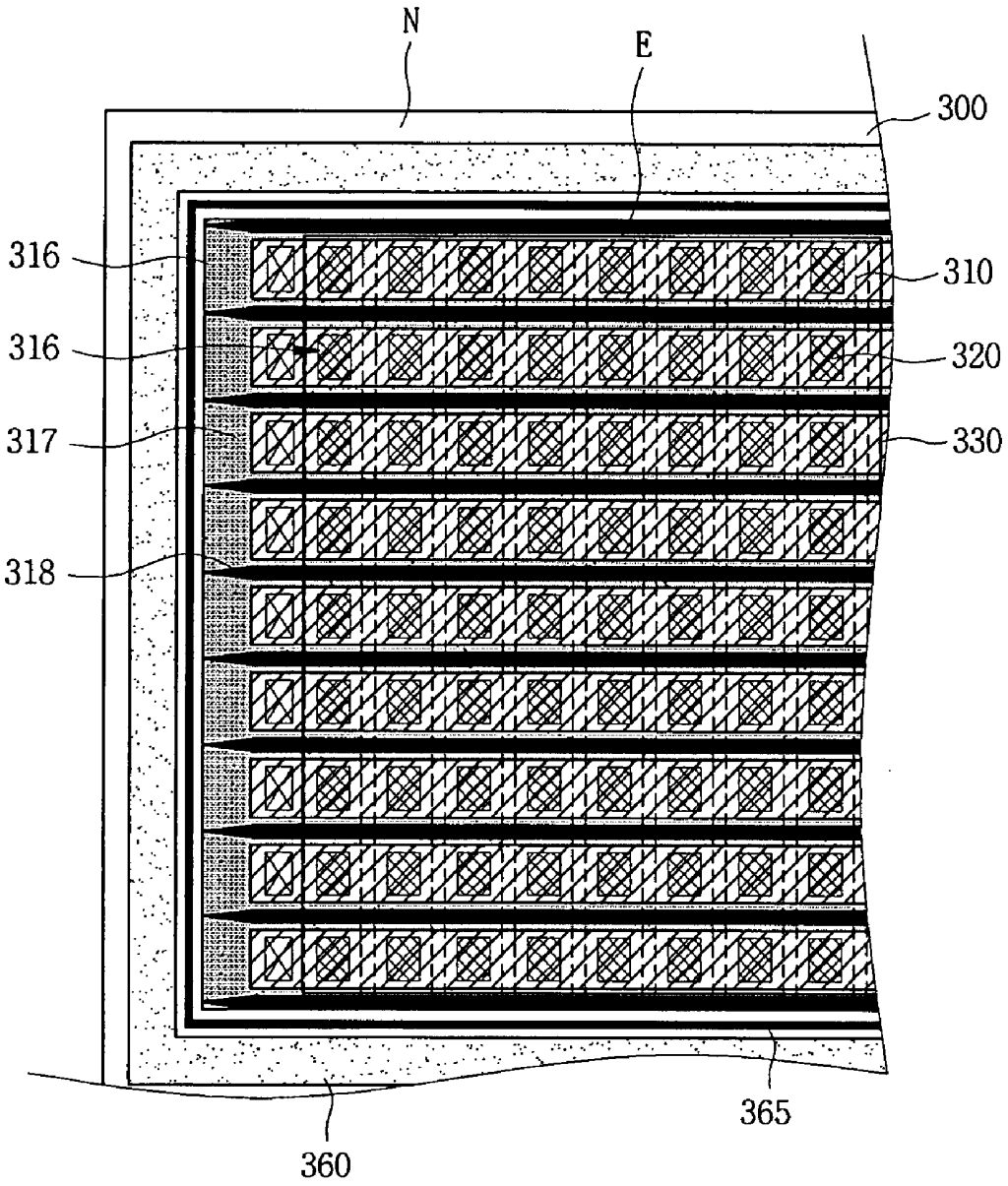
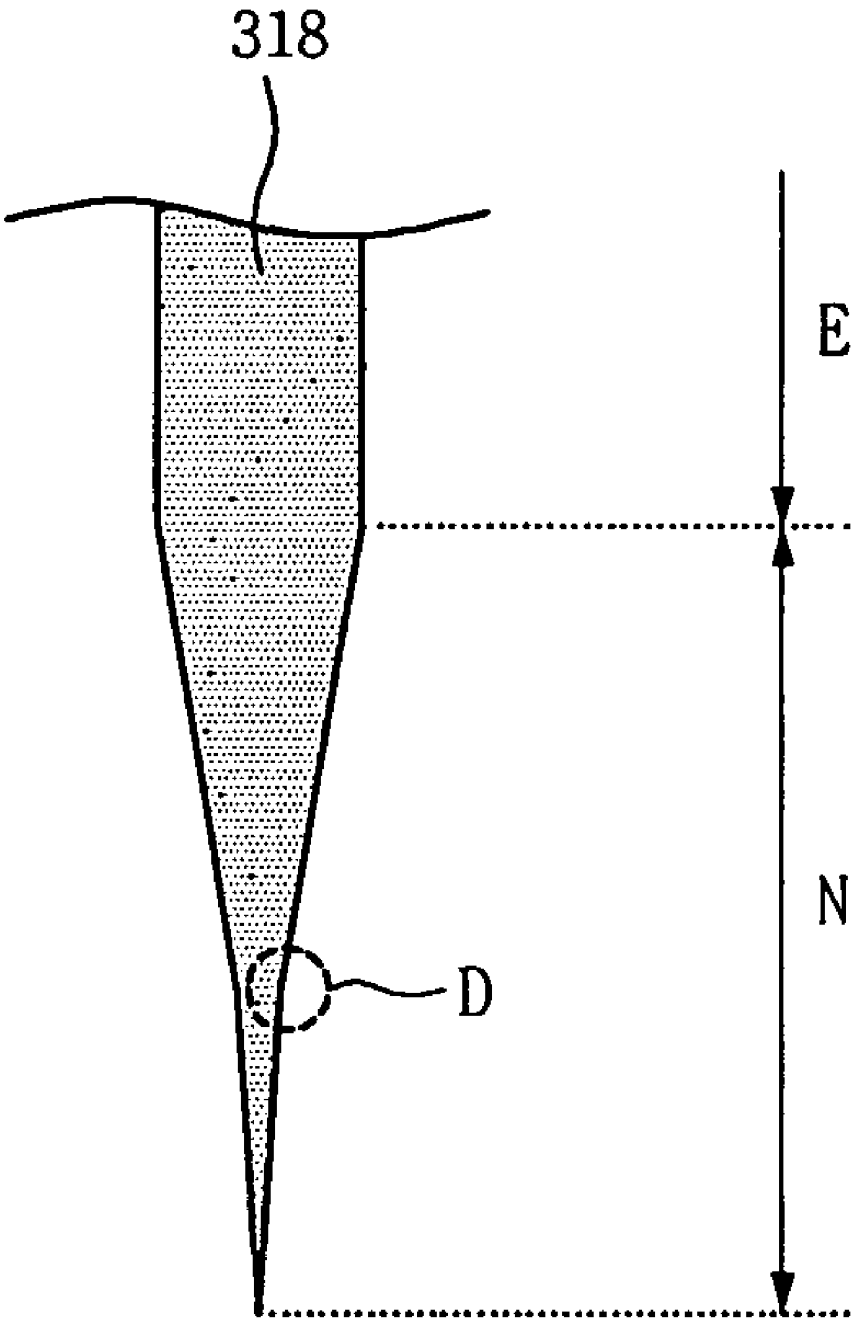


FIG. 9



ORGANIC LIGHT EMITTING DISPLAY

CROSS-REFERENCE

This application claims priority to and the benefit of Korea Patent Application No. 10-2006-0029600, filed on Mar. 31, 2006, the entire content of which is incorporated herein by reference.

BACKGROUND

1. Field

The present invention relates to an organic light emitting display.

2. Related Art

In recent years, a flat panel display (FPD) increasingly becomes important with the development of multimedia. Hence, various flat panel displays such as a plasma display panel (PDP), a field emission display (FED), and an organic light emitting display (OLED) have been put to practical use.

In portionicular, an organic light emitting display has an advantage in that it has a high response speed lower than 1 ms and low consumption power, as well as emits light by itself. In addition, the organic light emitting display is advantageous as a motion image display medium because it does not have a trouble in the view angle without respect to its size. Furthermore, the organic light emitting display has come into the spotlight as a next generation flat panel display because it can be simply manufactured with existing semiconductor manufacturing processes at a low temperature.

FIG. **1** is a plan view illustrating a structure of an organic light emitting display according to the prior art, FIG. **2** is a portionially enlarged view of the organic light emitting display in FIG. **1**, and FIG. **3** is a cross sectional view of the organic light emitting display taken along line I-I' of FIG. **2**.

Referring to FIGS. **1** to **3**, an organic light emitting display according to the prior art comprises a substrate **100** comprising a non-emission region N and an emission region E, on which there are arranged sub-pixels, each comprising a first electrode **110**, an emission layer **120**, and a second electrode **130**. Here, a first region where sub-pixels are arranged is defined as an emission region E, and a second region other than the first region is defined as a non-emission region N.

On the non-emission region N of the substrate **100** there are provided sealant **160** and wires (not shown) to apply electrical signals to the first electrode **110** and the second electrode **130**.

More specifically, the first electrode **110** is patterned on the substrate **100** in a stripe form. And, wires (not shown), which are spaced from the first electrode **110** and have the same material as the first electrode **110**, are provided. On a portion of the first electrode **110** and wires (not shown) there is provided an insulating film **115** comprising an opening **116** for exposing a portion of the first electrode **110** and a contact portion **117** for exposing a portion of the wires (not shown). On the insulating film **115** there are provided barrier ribs **118** formed to be spaced from each other in the direction of intersecting the first electrode **110**, and in the opening **116** there is provided the emission layer **120**. The second electrode **130** is located on the substrate comprising the emission layer **120** and contact portion **117**, and the second electrode **130** is patterned by the barrier ribs **118**. And, the sealant **160** is provided on the non-emission region N of the substrate **100** to surround the emission region E. And, the substrate **100** provided with the sub-pixels is attached to an encapsulation substrate (not-shown) by the sealant **160** to protect the emission portion from external moisture or oxygen.

At this time, however, the sealant **160** can be flowed into the emission region E as shown in FIGS. **2** and **3**(C). That is, a capillary phenomenon created by a pressure applied when the substrate **110** and the encapsulation substrate **170** are attached to each other causes the sealant **160** to flow into the emission region E along the lower space of barrier ribs having overhang structures.

The flowed sealant **160** may cause damage to an outer circumference of the emission layer **120**, thereby to reduce reliability and emission efficiency of elements.

SUMMARY

Accordingly, the present invention is provided to substantially obviate one or more problems due to limitations and disadvantages of the related art.

To achieve the above objects, there is provided an organic light emitting device according to the present invention comprising: a first substrate comprising an emission region and a non-emission region; a sub-pixel located on the first substrate, the sub-pixel comprising a first electrode, an emission layer, and a second electrode; and a barrier rib located on the substrate comprising the first electrode, the barrier rib patterning the second electrode, wherein a volume per unit area of a portion of the barrier rib located on the non-emission region is different from that of the other portion of the barrier rib located on the emission region.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a plan view illustrating an organic light emitting display according to the prior art.

FIG. **2** is a portionially enlarged view of the organic light emitting display in FIG. **1**.

FIG. **3** is a cross sectional view of the organic light emitting display taken along line I-I' of FIG. **2**.

FIG. **4** is a plan view of an organic light emitting display according to a first embodiment of the present invention.

FIG. **5** is a portionially enlarged view of the organic light emitting display in FIG. **4**.

FIG. **6** is a cross sectional view of the organic light emitting display taken along line II-II' of FIG. **4**.

FIG. **4** is a plan view illustrating a portion of a barrier rib of an organic light emitting display according to a first embodiment of the present invention.

FIG. **7**B is a cross sectional view of the barrier rib taken along line A-A' of FIG. **7**A.

FIG. **7**C is a cross sectional view of the barrier rib taken along line B-B' of FIG. **7**A.

FIG. **8** is a plan view illustrating an organic light emitting display according to a second embodiment of the present invention.

FIG. **9** is a cross sectional view of a barrier rib of the organic light emitting display according to the second embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Referring to FIGS. **4** to **6**, an organic light emitting display comprises a substrate **200** comprising a non-emission region N and an emission region E, on which there are arranged sub-pixels, each comprising a first electrode **210**, an emission layer **220**, and a second electrode **230**. On the non-emission region N of the substrate **200** there are provided sealant **260** and wires (not shown) to apply electrical signals to the first electrode **210** and the second electrode **230**.

More specifically, the first electrode **210** is patterned on the substrate **200** in a stripe form. And, wires (not shown), which are spaced from the first electrode **210** and have the same material as the first electrode **210**, are provided.

The first electrode **210** may be an anode and may comprise a transparent conductive layer having a high work function such as ITO (Indium Tin Oxide). And, the wires (not shown) may further comprise a metallic layer disposed on a transparent conductive film other than the transparent conductive layer.

An insulating film **215** is disposed on a portion of the first electrodes **210** and wires (not shown). The insulating film **215** may comprise an opening **216** for exposing a portion of the first electrode **210** and a contact portion **217** for exposing a portion of the wires (not shown). And, on the insulating film **215** there are disposed barrier ribs **218** formed in the direction of intersecting the first electrode **210**. The barrier ribs **218** are formed to be spaced from each other. And, the width of a portion of a barrier rib **218** located on the non-emission region N may be narrower than that of a portion of a barrier rib **218** located on the emission region E.

More specifically, the width of a portion of a barrier rib **218** located on the non-emission region N, i.e. the width of an end portion, may become narrower as it goes to the outer circumference of the substrate as shown in FIGS. **7**A to **7**C. At this time, it is desirable that the end portion of the barrier rib **218** located on the non-emission region N is formed to have a length of more than 0 μm and less than 100 μm.

A cross section of the end portion of the barrier rib **218** located on the emission region E, taken along the line A-A', may have a reverse taper shape so that the second electrode **230** may be patterned. That is, each (θ1) of two base angles at the cross section taken along the line A-A' may be greater than 90 degrees. And, a cross section of the end portion of the barrier rib **218** located on the non-emission region N, taken along the line B-B' may have a taper shape, and each θ2 of two base angles at the cross section taken along the line B-B' may be more than 10 degrees and less than 90 degrees.

The barrier rib **218** having the above-mentioned structure can be formed by selectively etching the end portion of the barrier rib located on the non-emission region N through a well known process such as lithography or sandblasting.

Returning to FIGS. **4** to **6**, the sealant **260** is applied on a portion of the non-emission region, and the substrate **200** having the above-mentioned structure is attached to the encapsulation substrate **270** by the sealant **260**.

At this time, the organic light emitting device according to a first embodiment of the present invention can reduce the phenomenon where the sealant **260** flows into the emission region as shown in FIGS. **5** and **6**, since the width of the end portion of the barrier rib **218** located on the non-emission region N is formed to be narrower than that of the end portion of the barrier rib **218** located on the emission region E. That is, the organic light emitting device according to the embodiment of the present invention can reduce the phenomenon caused by a capillary phenomenon as in the prior art, where the sealant **260** flows into the emission region E, by making the width of the end portion of the barrier rib **218** located on the non-emission region N narrow to secure a space.

FIG. **8** is a plan view illustrating an organic light emitting display according to a second embodiment of the present invention.

Referring to FIG. **8**, the organic light emitting display according to the second embodiment of the present invention, has the same construction as the first embodiment of the present invention except that a barrier **365** is further provided between the barrier rib **318** and sealant **360**.

That is, on a substrate **300** according to the second embodiment of the present invention there are located a first electrode **310** patterned in a stripe form and wires (not shown), and on a portion of the first electrode **310** and wires there is provided an insulating film **315** comprising an opening **316** for exposing a portion of the first electrode **310** and a contact portion **317** for exposing a portion of the wires (not shown). And, on the insulating film **315** there are disposed barrier ribs **318** formed to be spaced from each other in the direction of intersecting the first electrode **310**, where the width of a barrier rib **318** located on the non-emission region N may be narrower than that of a barrier rib **318** located on the emission region E.

And, a barrier **365** may be disposed between the emission region E and sealant **360**. The barrier **365** of the organic light emitting display according to the second embodiment of the present invention can be formed in one or more layers, and prevent the sealant **360** from flowing into the emission region E. The location where the barrier **365** is to be formed may be selected depending on how much sealant **360** is flowed into the emission region E.

That is, the organic light emitting display according to the second embodiment of the present invention can prevent sealant **360** from flowing into the emission region when the substrate **300** and the encapsulation substrate **370** are attached to each other, primarily by the barrier and secondarily by the barrier rib **318**.

Therefore, the organic light emitting display according to the second embodiment of the present invention can prevent more efficiently sealant from flowing into the emission region compared to the organic light emitting display according to the first embodiment of the present invention.

FIG. **9** is a plan view illustrating a structure of a barrier rib according to the second embodiment of the present invention.

Referring to FIG. **9**, a portion of the barrier rib according to the second embodiment, which is located on the non-emission region, has narrower width than the other portion thereof, which is located on the emission region, and the portion of the barrier rib which is located on the emission region becomes narrower in width as going to the outer circumference of the substrate and has a bent where the width decreases sharply.

Accordingly, the organic light emitting display according to the second embodiment of the present invention can reduce dramatically a capillary phenomenon since the width of the end portion of the barrier rib located on the non-emission region decreases prominently compared to the barrier rib according to the first embodiment of the present invention. As a consequence, the barrier rib according to the second embodiment can prevent the inflow of sealant effectively.

While the above-mentioned embodiments illustrate a case where the width of a portion of the barrier rib located on the non-emission region is narrower than that of the other portion of the barrier rib located on the emission region, the structure of the barrier rib is not limited thereto, and therefore the height of a portion of the barrier rib located on the non-emission region may be lower than that of the other portion of the barrier rib located on the emission region. And, both of height and width of the portion of the barrier rib located on the non-emission region may be adjusted at the same time.

In addition, while the barrier ribs according to the embodiments of the present invention have been described to be formed by photolithography or sandblasting, but not limited thereto, various processes can be applicable to form the barrier ribs.

And, while the barrier ribs according to the embodiments of the present invention have been described to be formed in a singe layer, they can also be formed in a double layer.

What is claimed is:

1. An organic light emitting display, comprising:
a first electrode arranged on a substrate;
an emission portion formed on the first electrode;
a second electrode arranged on the emission portion;
a barrier rib partitioning the second electrode, the barrier rib formed so that an end portion of the barrier rib has a narrower width than another portion of the barrier rib; and
a sealant formed to seal the emission portion.

2. The organic light emitting display of claim 1, wherein the end portion of the barrier rib has a lower height than the another portion of the barrier rib.

3. The organic light emitting display of claim 1, further comprising a barrier partitioning the barrier rib from the sealant.

4. The organic light emitting display of claim 1, wherein a length of the end portion of the barrier rib is 100 μm or less.

5. The organic light emitting display of claim 1, wherein the emission portion includes an organic light emitting layer.

6. The organic light emitting display of claim 1, wherein a cross section of the end portion of the barrier rib taken in a height direction thereof has an exterior angle slope of 90 degrees or more.

7. The organic light emitting display of claim 2, further comprising a barrier that partitions the barrier rib from the sealant.

8. The organic light emitting display of claim 2, wherein a length of the end portion of the barrier rib is 100 μm or less.

9. The organic light emitting display of claim 2, wherein the emission portion includes an organic light emitting layer.

10. The organic light emitting display of claim 2, wherein a cross section of the end portion of the barrier rib taken in a height direction thereof has an exterior angle slope of 90 degrees or more.

11. The organic light emitting display of claim 6, further comprising a barrier that partitions the barrier rib from the sealant.

12. The organic light emitting display of claim 6, wherein a length of the end portion of the barrier rib is 100 μm or less.

13. The organic light emitting display of claim 6, wherein the emission portion includes an organic light emitting layer.

* * * * *

专利名称(译)	有机发光显示器		
公开(公告)号	US7808172	公开(公告)日	2010-10-05
申请号	US11/730103	申请日	2007-03-29
申请(专利权)人(译)	LG电子株式会社.		
当前申请(专利权)人(译)	LG电子株式会社.		
[标]发明人	KIM CHANG NAM		
发明人	KIM, CHANG NAM		
IPC分类号	H01L51/50 H01L51/52		
CPC分类号	H01L27/3283 H01L51/5246		
优先权	1020060029600 2006-03-31 KR		
其他公开文献	US20070228936A1		
外部链接	Espacenet USPTO		

摘要(译)

提供一种有机发光器件。该器件可以包括具有发射区域和非发射区域的衬底，在衬底的发射区域中的衬底上形成的子像素，以及设置在密封发射区域的非发射区域中的密封剂。基质。子像素可包括：第一电极，形成在基板的发光区域中的基板上;发光部分，形成在第一电极上;以及第二电极，布置在发光部分上。可以提供障肋以分隔第二电极。障肋的端部的宽度可以窄于障肋的另一部分的宽度。