



US 20160342021A1

(19) **United States**(12) **Patent Application Publication**
LI(10) **Pub. No.: US 2016/0342021 A1**(43) **Pub. Date: Nov. 24, 2016**(54) **DISPLAY PANEL AND DISPLAY DEVICE**(71) Applicant: **BOE TECHNOLOGY GROUP CO., LTD.**, Beijing (CN)(72) Inventor: **Wenbo LI**, Beijing (CN)(73) Assignee: **BOE TECHNOLOGY GROUP CO., LTD.**, Beijing (CN)(52) **U.S. Cl.**CPC ... **G02F 1/133528** (2013.01); **G02F 1/136286** (2013.01); **G02F 1/133514** (2013.01); **G02F 1/133512** (2013.01); **G02F 1/134363** (2013.01); **G02F 1/13439** (2013.01); **G02F 2001/133548** (2013.01); **G02F 2201/121** (2013.01); **G02F 2201/123** (2013.01); **G02F 2001/133531** (2013.01)(21) Appl. No.: **14/895,099**(22) PCT Filed: **Jun. 24, 2015**(86) PCT No.: **PCT/CN2015/082149**

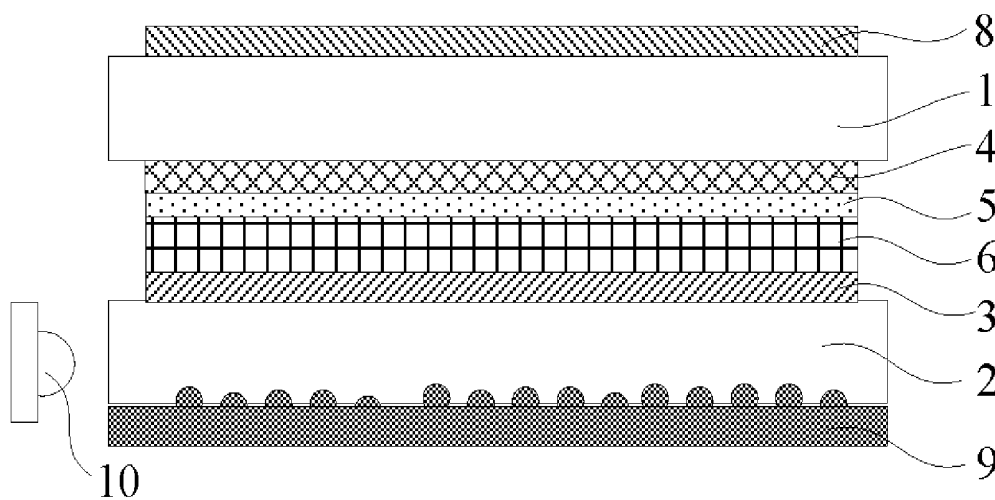
§ 371 (c)(1),

(2) Date: **Dec. 1, 2015**(30) **Foreign Application Priority Data**

Dec. 30, 2014 (CN) 201410850930.6

Publication Classification(51) **Int. Cl.****G02F 1/1335** (2006.01)**G02F 1/1343** (2006.01)**G02F 1/1362** (2006.01)(57) **ABSTRACT**

A display panel and a display device are disclosed. The display panel includes an upper substrate (1) and a lower substrate (2) that are disposed opposite to each other; a liquid crystal layer (5) provided between the upper substrate (1) and the lower substrate (2); and a common electrode (3) provided on a side of the liquid crystal layer (5). The common electrode (3) has a wire gating polarizing structure that forms a polarization analyzer structure or a polarizer structure. Upon the common electrode (3) being applied for polarizing the light or analysis of light polarization, a polarizer or a polarization analyzer can be omitted in the display panel, which can reduce numbers of layered structures in the display panel and hence reduce a thickness of the display device.



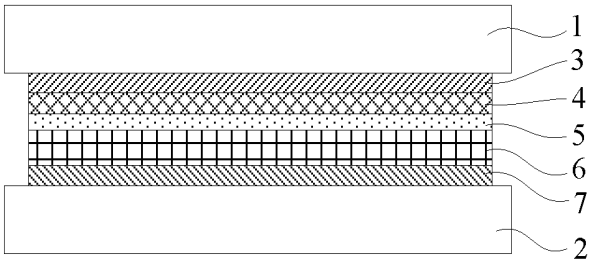


FIG. 1

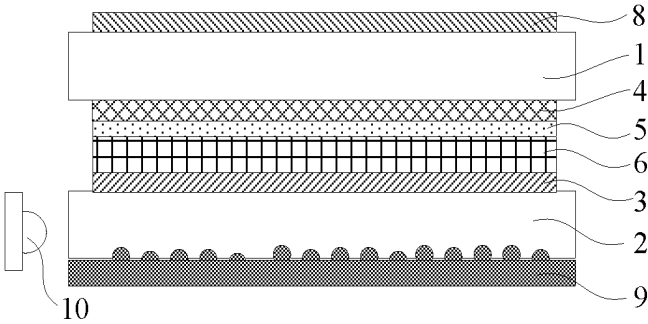


FIG. 2

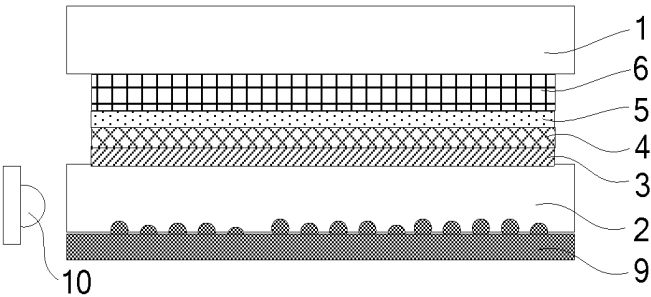


FIG. 3

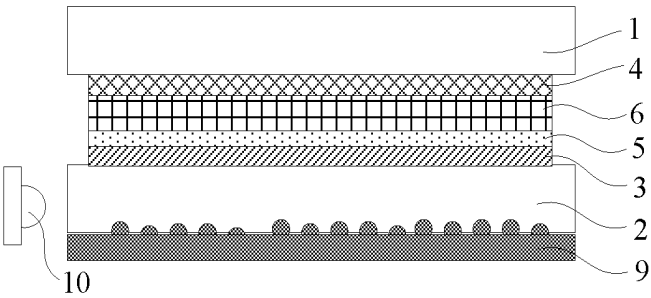


FIG. 4

DISPLAY PANEL AND DISPLAY DEVICE

TECHNICAL FIELD

[0001] Embodiments of the present invention relate to a display panel and a display device.

BACKGROUND

[0002] In the technology of the art, a display device includes a display panel and a backlight module. The display panel includes a plurality of layered structures such as an upper substrate, a lower substrate, a liquid crystal layer provided between the upper substrate and the lower substrate, an array layer, a color film layer, a common electrode, a polarizer disposed on a light-entering side of the liquid crystal layer and a polarization analyzer disposed on a light-emitting side of the liquid crystal layer, which can lead to a relative large thickness of the whole display device. Therefore, designing a thin display device is by far one of the technical problems that are needed to be solved by those skilled in the art.

SUMMARY

[0003] A display panel is provided in one embodiment of the present invention and the display panel includes an upper substrate and a lower substrate that are disposed opposite to each other; a liquid crystal layer provided between the upper substrate and the lower substrate; and a common electrode located on a side of the liquid crystal layer; wherein the common electrode has a wire gating polarizing structure that forms a polarization analyzer structure or a polarizer structure.

[0004] A display device is provided in another embodiment of the present invention and the display device comprises the display panel mentioned above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] In order to clearly illustrate the technical solution of the embodiments of the invention, the drawings of the embodiments will be briefly described in the following; it is obvious that the described drawings are only related to some embodiments of the invention and, it is not limitative to the scope of the present invention.

[0006] FIG. 1 is a schematic view of a structure of a display panel in an embodiment of the present invention;

[0007] FIG. 2 is a schematic view of a structure of a display device in an embodiment of the present invention;

[0008] FIG. 3 is a schematic view of a structure of another display device in an embodiment of the present invention;

[0009] FIG. 4 is a schematic view of a structure of another display device in an embodiment of the present invention.

DETAILED DESCRIPTION

[0010] In order to make objects, technical details and advantages of the embodiments of the invention apparent, the technical solutions of the embodiments will be described in a clearly and fully understandable way in connection with the drawings related to the embodiments of the invention. Apparently, the described embodiments are just a part but not all of the embodiments of the invention. Based on the described embodiments herein, those skilled in the art can obtain other embodiment(s), without any inventive work, which should be within the scope of the invention.

[0011] Please refer to FIGS. 1-4. FIG. 1 is a schematic view of a structure of a display panel in an embodiment of the present invention; FIG. 2 is a schematic view of a structure of a display device in an embodiment of the present invention; FIG. 3 is a schematic view of a structure of another display device in an embodiment of the present invention; FIG. 4 is a schematic view of a structure of another display device in an embodiment of the present invention.

[0012] As illustrated in FIG. 1, a display panel provided in the embodiment of the present invention includes an upper substrate 1 and a lower substrate 2 that are disposed opposite to each other, a liquid crystal layer 5 disposed between the upper substrate 1 and the lower substrate 2, and a common electrode 3 provided on a side of the liquid crystal layer 5. The common electrode 3 has a wire gating polarizing structure that forms a polarization analyzer structure or a polarizer structure.

[0013] The common electrode 3 in the above display panel has a wire gating polarizing structure that forms a polarization analyzer structure or a polarizer structure and hence the common electrode 3 can be used for polarizing or polarization analysis of light. A polarizer structure can be omitted in the display panel upon the common electrode 3 being used for polarizing the light; and a polarization analyzer structure can be omitted in the display panel upon the common electrode 3 being used for polarization analysis of the light. In summary, the display panel mentioned above can omit a polarization analyzer or a polarizer, which can reduce numbers of layers in the structure of a display panel and hence reduce a thickness of a display panel.

[0014] In a specific embodiment as illustrated in FIG. 1, the common electrode 3 in a display panel is disposed on a side of the liquid crystal layer 5 facing the upper substrate and forms a polarization analyzer structure and a polarizer 7 is disposed on a side of the liquid crystal layer 5 facing the lower substrate 2.

[0015] In the display panel mentioned above, the common electrode 3 is provided between the upper substrate 1 and the liquid crystal layer 5 and the common electrode 3 can be used for polarization analysis of light. Therefore, a polarization analyzer can be omitted in the display panel, thus making the thickness of the display panel reduced.

[0016] As illustrated in FIG. 1, in some embodiments, a polarizer 7 can be a wire gating polarizing film.

[0017] As illustrated in FIG. 1, in some embodiments, the display panel mentioned above can also include a color film layer 4 and an array layer 6. The color film layer 4 can be provided between the common electrode 3 and the liquid crystal layer 5 while the array layer 6 can be disposed between the polarizer 7 and the liquid crystal layer 5. In the embodiment of the present invention, the color film layer 4 includes, for example, a color filter and a black matrix. The color filter includes, for example, a red color filter, a green color filter, and a blue color filter. The array layer 6 includes, for example, thin film transistors arranged in an array and the like.

[0018] As illustrated in FIG. 2, FIG. 3 and FIG. 4, in the display panel according to some other embodiments, the common electrode 3 is provided on a side of the liquid crystal layer 5 facing the lower substrate 2 and forms a polarizer structure.

[0019] As illustrated in FIG. 2, FIG. 3 and FIG. 4, in the display panel, the common electrode 3 is provided between

the lower substrate 2 and the liquid crystal layer 5, which can be used for polarizing the light and therefore, a polarizer can be omitted in the display panel, and hence a thickness of the display panel can be reduced. In addition, disposing the common electrode 3 on a position between the lower substrate 2 and the liquid crystal layer 5 can also avoid adverse influence on a display area due to reflection of light by the wire gating polarizing structure in the common electrode 3.

[0020] As illustrated in FIG. 2, in some embodiments, the display panel further includes an antistatic layer 8 disposed on a side of the upper substrate 1 facing away from the lower substrate 2. The antistatic layer 8 can shield static electricity and prevent the static electricity from disturbing liquid crystals in a liquid crystal cell.

[0021] In some embodiments, the antistatic layer 8 can have a wire gating polarizing structure that forms a polarization analyzer structure. The wire gating polarizing structure of the antistatic layer 8 can be applied in polarization analysis of light. Therefore, besides effectively avoiding static electricity disturbances, a polarization analyzer can also be omitted in the display panel mentioned above, and hence making the thickness of the display panel less.

[0022] Upon a common electrode forming a polarizer structure, in some embodiments, the display panel further include an array layer 6 and a color film layer 4, wherein the positional relationships of the array layer 6 and the color film layer 4 can be as follows.

[0023] First mode: as illustrated in FIG. 3, the color film layer 4 is provided between the common electrode 3 and the liquid crystal layer 5 while the array layer 6 is provided between the upper substrate 1 and the liquid crystal layer 5.

[0024] Second mode: as illustrated in FIG. 2, the color film layer 4 is provided between the liquid crystal layer 5 and the upper substrate 1 while the array layer 6 is provided between the common electrode 3 and the liquid crystal layer 5.

[0025] Third mode: as illustrated in FIG. 4, the color film layer 4 is provided between the liquid crystal layer 5 and the upper substrate 1 while the array layer 6 is provided between the color film layer 4 and the liquid crystal layer 5.

[0026] Upon the common electrode being provided between the liquid crystal layer 5 and the lower substrate 2, in some embodiments, the display panel mentioned above further includes a plurality of crossly arranged gate lines and data lines disposed between the liquid crystal layer 5 and the lower substrate 2, so as to form a plurality of pixel units arranged in array and the common electrode 3 forms common electrode units each of which corresponds to one of the pixel units.

[0027] For example, the display panel is a display panel of ADS mode. Each common electrode unit is provided on the same layer with gate lines. A pixel electrode with a strip structure is disposed on a side of the common electrode 3 facing the liquid crystal layer 5.

[0028] The display device can also be a display device of IPS mode.

[0029] As illustrated in FIG. 2, FIG. 3 and FIG. 4, a display device is provided in the embodiment of the present invention. The display device can include the display panel according to any one of the above embodiments.

[0030] As illustrated in FIG. 2, FIG. 3 and FIG. 4, in some embodiments, the lower substrate 2 of the display panel can be a light-guide plate. Under such case, a reflection plate 9 is disposed on a side of the lower substrate 2 facing away

from the upper substrate 1, and a lamp strip 10 is disposed on at least a side face of the lower substrate 2. With the lower substrate 2 being as a light-guide plate, numbers of layers in the structure of a display device can be reduced and the display device can be made thinner.

[0031] What are described above is related to the illustrative embodiments of the disclosure only and not limitative to the scope of the disclosure. The scopes of the disclosure are defined by the accompanying claims.

[0032] This application claims the benefit of Chinese patent application No. 201410850930.6 filled in China on Dec. 30, 2014, which is incorporated by reference herein as a part of this application.

1: A display panel, comprising:

an upper substrate and a lower substrate disposed opposite to each other;

a liquid crystal layer provided between the upper substrate and the lower substrate; and

a common electrode disposed on a side of the liquid crystal layer,

wherein the common electrode has a wire gating polarizing structure that forms a polarization analyzer structure or a polarizer structure.

2: The display panel according to claim 1, wherein the common electrode is disposed on a side of the liquid crystal layer facing the upper substrate and forms the polarization analyzer structure, and a polarizer is disposed on a side of the liquid crystal layer facing the lower substrate.

3: The display panel according to claim 2, wherein the polarizer is a wire gating polarizing film.

4: The display panel according to claim 2, wherein the display panel further comprises a color film layer and an array layer; the color film layer is disposed between the common electrode and the liquid crystal layer; the array layer is disposed between the polarizer and the liquid crystal layer.

5: The display panel according to claim 1, wherein the common electrode is provided on a side of the liquid crystal layer facing the lower substrate and forms the polarizer structure.

6: The display panel according to claim 5, wherein the display panel further comprises an antistatic layer disposed on a side of the upper substrate facing away from the lower substrate.

7: The display panel according to claim 6, wherein the antistatic layer has a wire gating polarizing structure that forms a polarization analyzer structure.

8: The display panel according to claim 5, wherein the display panel further comprises an array layer and a color film layer, wherein:

the color film layer is provided between the common electrode and the liquid crystal layer, the array layer is provided between the upper substrate and the liquid crystal layer; or,

the color film layer is provided between the liquid crystal layer and the upper substrate, the array layer is provided between the common electrode and the liquid crystal layer; or,

the color film layer is provided between the liquid crystal layer and the upper substrate, the array layer is provided between the color film layer and the liquid crystal layer.

9: The display panel according to claim 5, further comprising a plurality of crossly arranged gate lines and data

lines provided between the liquid crystal layer and the lower substrate so as to form a plurality of pixel units arranged in array, and the common electrode forms common electrode units each of which corresponds to one of the pixel units.

10: The display panel according to claim **9**, wherein the display panel is a display panel of ADS mode and each of the common electrode units is disposed on a same layer with the gate lines; a pixel electrode with a strip structure is disposed on a side of the common electrode facing the liquid crystal layer.

11: The display panel according to claim **2**, wherein the common electrode is disposed between the upper substrate and the liquid crystal layer.

12: The display panel according to claim **5**, wherein the common electrode is disposed between the liquid crystal layer and the lower substrate.

13: A display device, comprising the display panel according to claim **1**.

14: The display device according to claim **13**, wherein the lower substrate of the display panel is a light-guide plate; a reflection plate is disposed on a side the lower substrate facing away from the upper substrate and a lamp strip is disposed on at least a side face of the lower substrate.

15: The display device according to claim **13**, wherein the common electrode is disposed on a side of the liquid crystal

layer facing the upper substrate and forms the polarization analyzer structure, and a polarizer is disposed on a side of the liquid crystal layer facing the lower substrate.

16: The display device according to claim **15**, wherein the polarizer is a wire gating polarizing film.

17: The display device according to claim **15**, wherein the display panel further comprises a color film layer and an array layer; the color film layer is disposed between the common electrode and the liquid crystal layer; the array layer is disposed between the polarizer and the liquid crystal layer.

18: The display device according to claim **13**, wherein the common electrode is provided on a side of the liquid crystal layer facing the lower substrate and forms the polarizer structure.

19: The display device according to claim **18**, wherein the display panel further comprises an antistatic layer disposed on a side of the upper substrate facing away from the lower substrate.

20: The display device according to claim **19**, wherein the antistatic layer has a wire gating polarizing structure that forms a polarization analyzer structure.

* * * * *

专利名称(译)	显示面板和显示设备		
公开(公告)号	US20160342021A1	公开(公告)日	2016-11-24
申请号	US14/895099	申请日	2015-06-24
[标]申请(专利权)人(译)	京东方科技集团股份有限公司		
申请(专利权)人(译)	京东方科技集团股份有限公司.		
当前申请(专利权)人(译)	京东方科技集团股份有限公司.		
[标]发明人	LI WENBO		
发明人	LI, WENBO		
IPC分类号	G02F1/1335 G02F1/1343 G02F1/1362		
CPC分类号	G02F1/133528 G02F1/136286 G02F1/133514 G02F1/133512 G02F2001/133531 G02F1/13439 G02F2001/133548 G02F2201/121 G02F2201/123 G02F1/134363 G02F2001/134318 G02F2202/22		
优先权	201410850930.6 2014-12-30 CN		
其他公开文献	US9817265		
外部链接	Espacenet USPTO		

摘要(译)

公开了一种显示面板和显示装置。显示面板包括彼此相对设置的上基板(1)和下基板(2);在上基板(1)和下基板(b)之间设置液晶层(5);公共电极(3)设置在液晶层一侧(5)。公共电极(3)具有形成偏振分析器结构或偏振器结构的线控选通偏振结构。在应用公共电极(3)以使光偏振或分析光偏振时,可以在显示面板中省略偏振器或偏振分析器,这可以减少显示器中的分层结构的数量因此减小了显示装置的厚度。

