US 20030123017A1

(19) United States

(12) Patent Application Publication (10) Pub. No.: US 2003/0123017 A1

Kim et al. (43) Pub. Date: Jul. 3, 2003

(54) LIQUID CRYSTAL DISPLAY DEVICE AND METHOD OF FABRICATING THE SAME

(75) Inventors: **Woong-Kwon Kim**, Gyeonggi-do (KR); **Seung-Ryul Park**, Incheon (KR)

Correspondence Address:
MORGAN LEWIS & BOCKIUS LLP
1111 PENNSYLVANIA AVENUE NW
WASHINGTON, DC 20004 (US)

(73) Assignee: **LG.Philips LCD Co., Ltd.**

(21) Appl. No.: **10/323,877**

(22) Filed: **Dec. 20, 2002**

(30) **Foreign Application Priority Data**

Dec. 29, 2001 (KR) 2001-87757

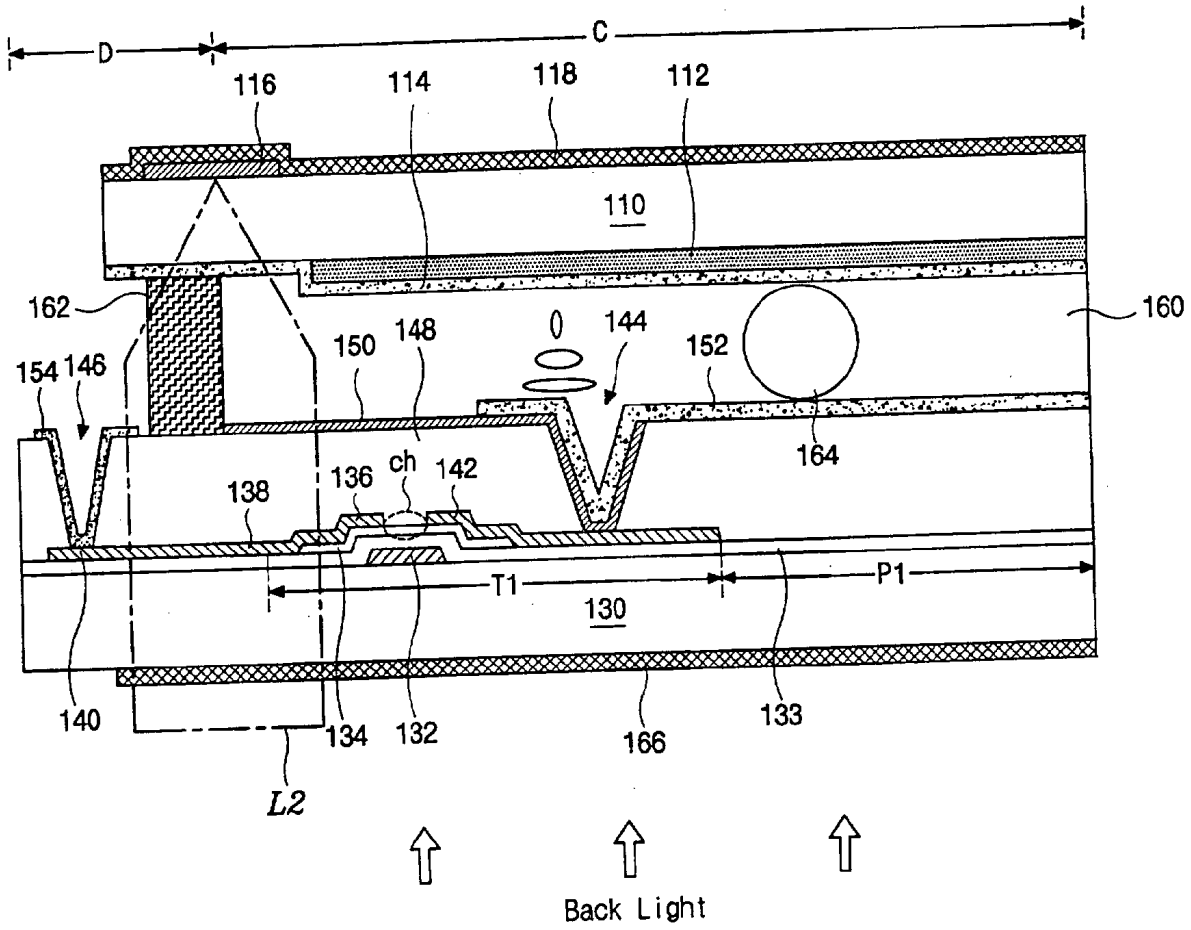
Publication Classification

(51) **Int. Cl.**[7] **G02F 1/1333**

(52) **U.S. Cl.** **349/153**

(57) **ABSTRACT**

A liquid crystal display device includes first and second substrates facing each other with a predetermined space therebetween, a liquid crystal material layer disposed between the first and second substrates, a seal pattern formed between the first and second substrates to surround the liquid crystal material layer, and a blocking layer formed over a first surface of the second substrate to cover the seal pattern.



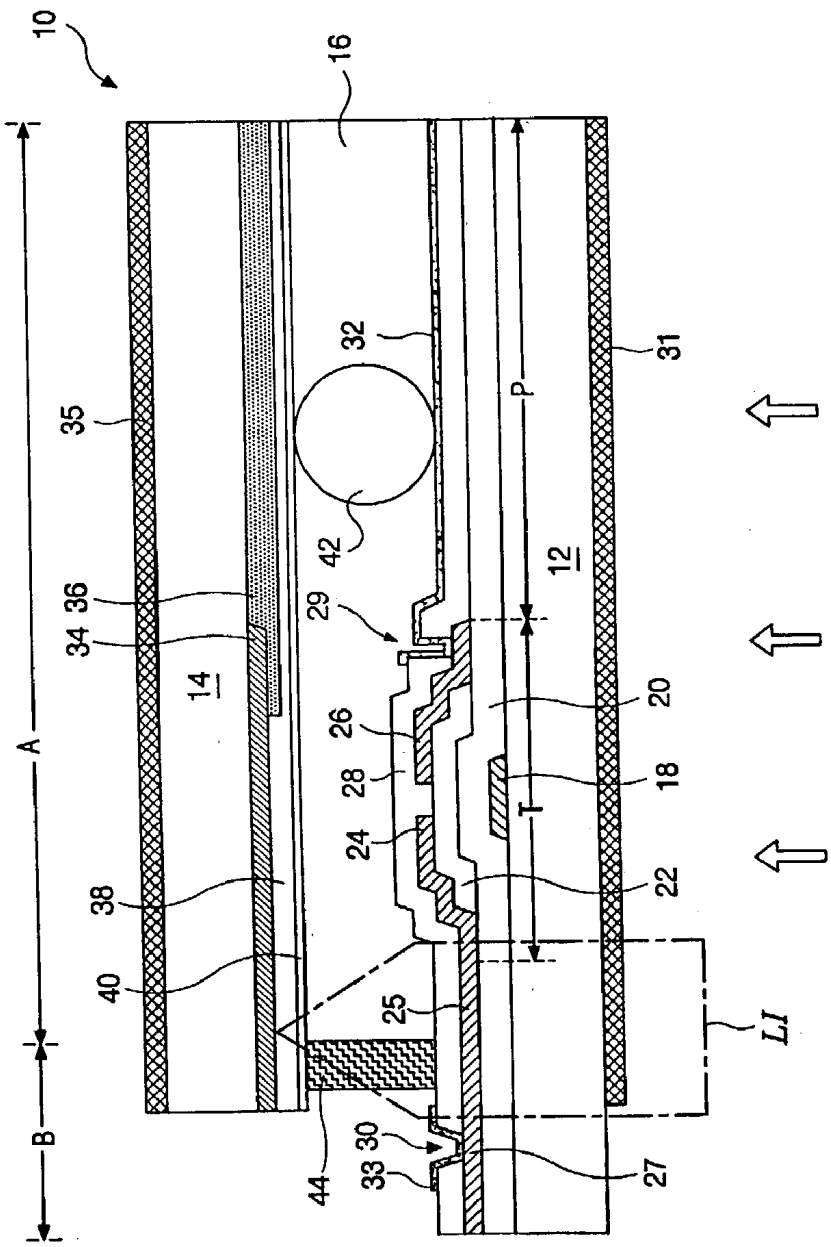


FIG. 1
Related Art

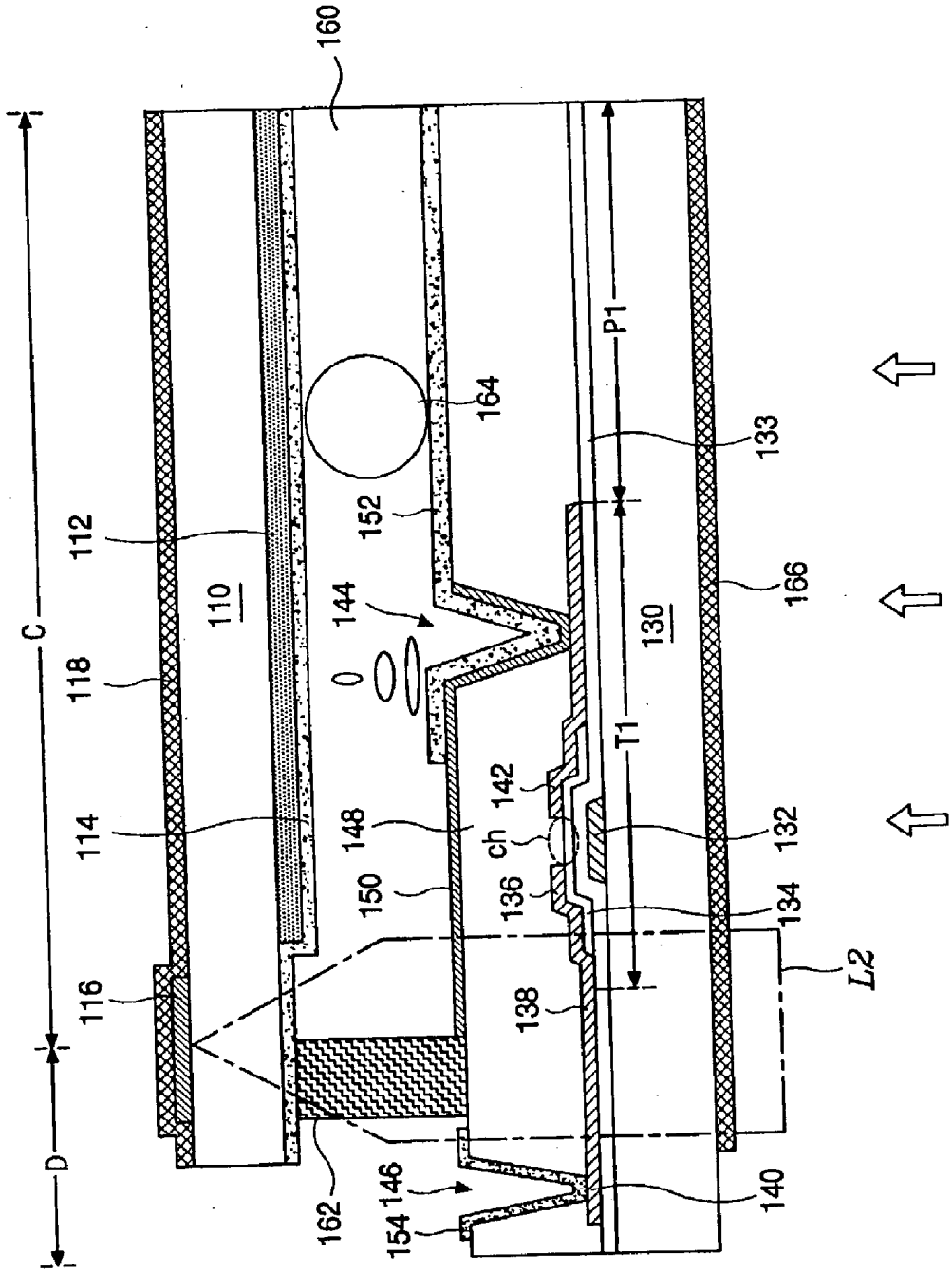

160
C
112
110
118
114
116
D
162
154
146
152
164
144
148
150
142
ch
136
138
146
140
P1
T1
130
133
166
132
134
L2
Back Light

FIG. 2

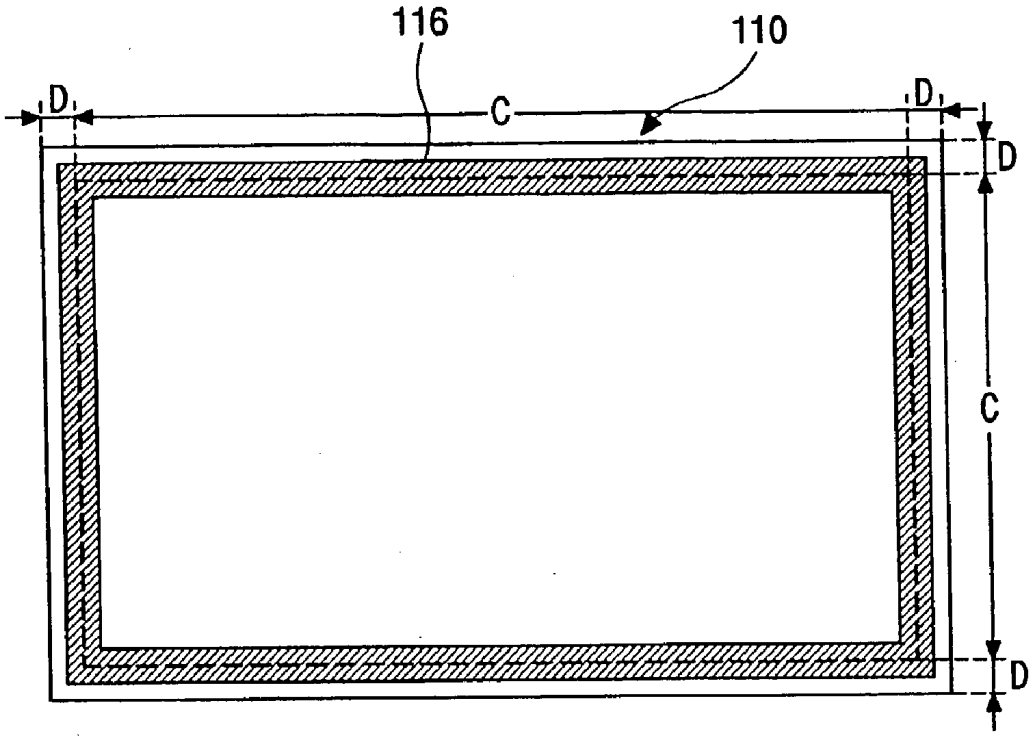


FIG. 3

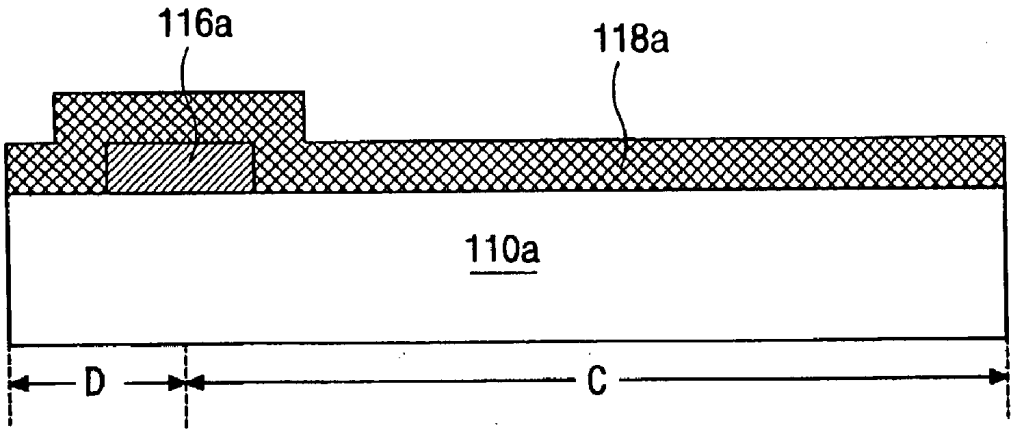


FIG. 4A

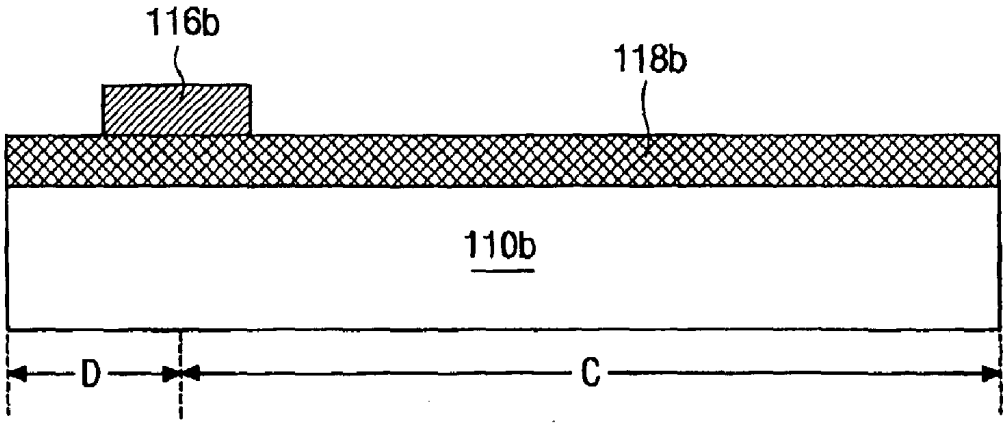


FIG. 4B

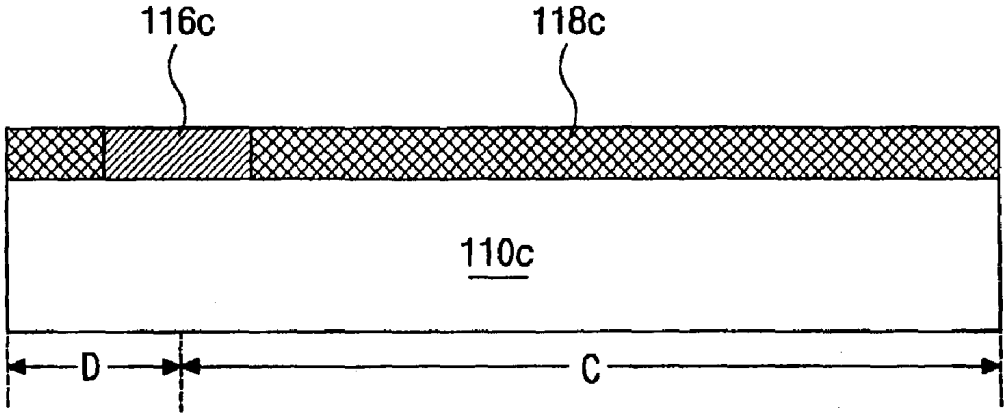


FIG. 4C

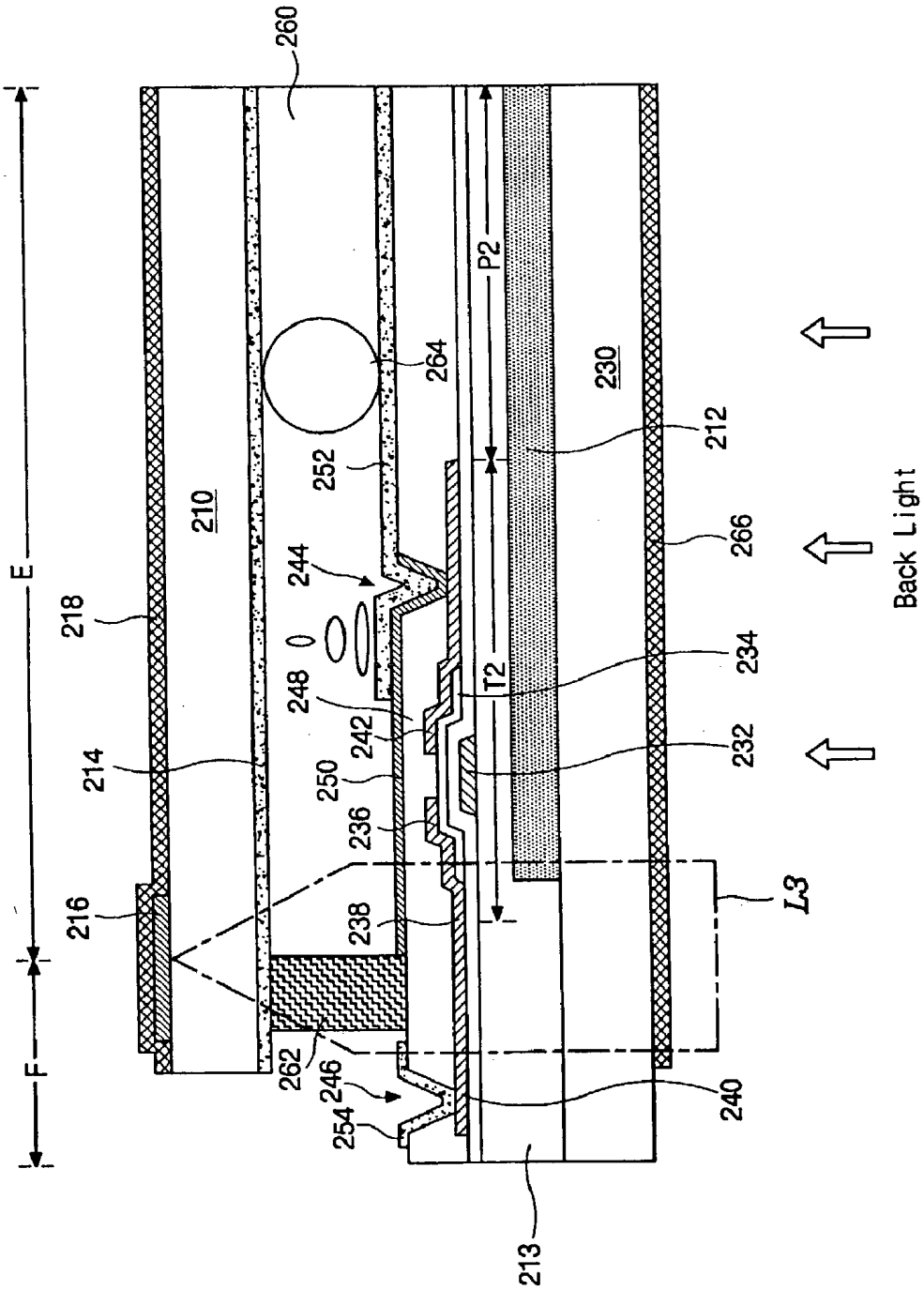

260
E
F
210
218
216
214
244
248
242
250
236
238
262
246
254
264
252
P2
T2
230
212
266
234
232
L3
240
213
Back Light

FIG. 5

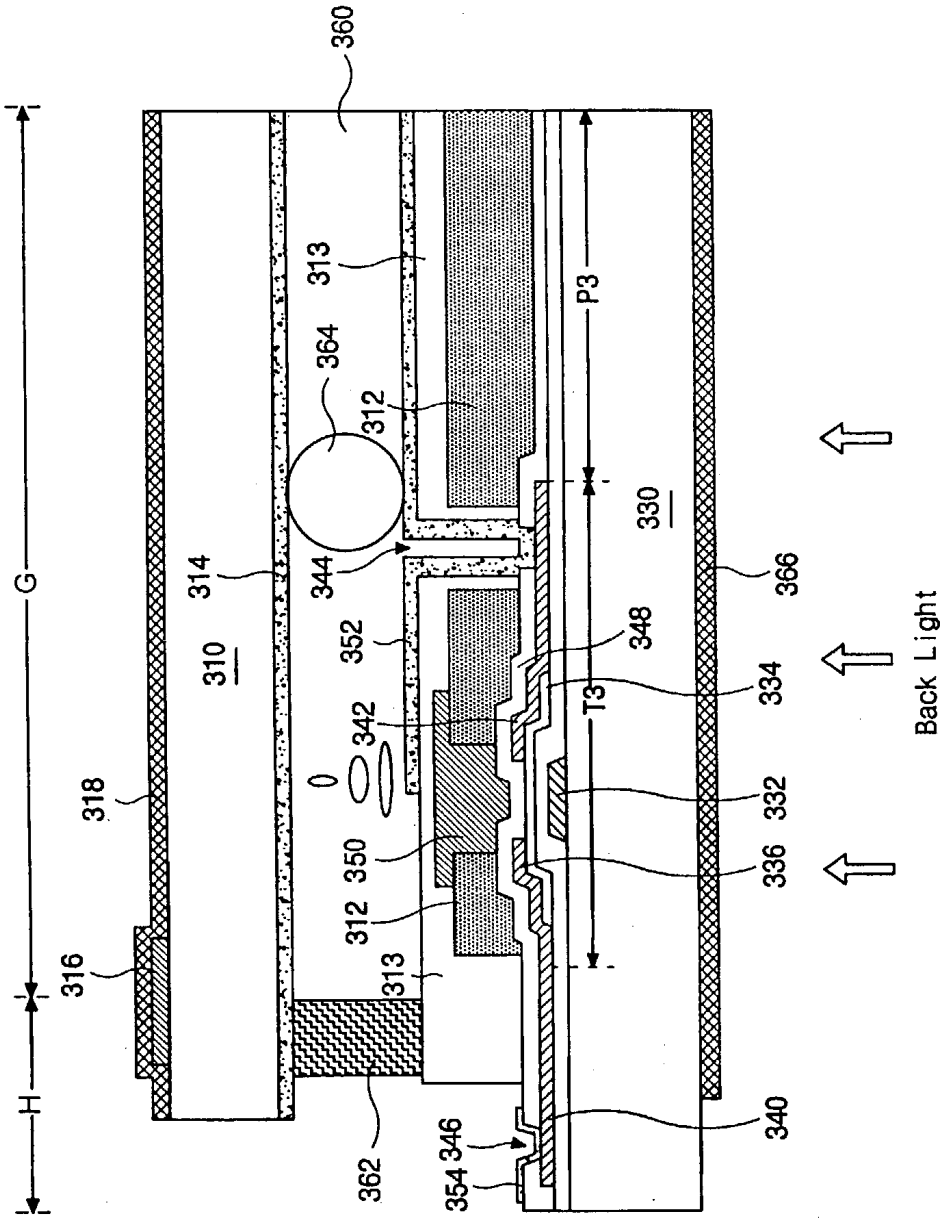

360
313
364
312
P3
330
314
344
366
310
352
348
334
342
T3
318
332
350
336
312
316
313
340
362
346
354
G
H
Back Light

FIG. 6

LIQUID CRYSTAL DISPLAY DEVICE AND METHOD OF FABRICATING THE SAME

[0001] The present invention claims the benefit of Korean Patent Application No. 2001-87757 filed in Korea on Dec. 29, 2001, which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to a liquid crystal display device and a method of fabricating the same, and more particularly, to a liquid crystal display device having a high aperture ratio and a method of fabricating the same.

[0004] 2. Discussion of the Related Art

[0005] Many efforts are being made to study and develop liquid crystal display (LCD) devices because of their high resolution images, light weight, small thickness, compact size, low power supply requirements, and lesser power consumption.

[0006] In general, a LCD device uses an optical anisotropy of liquid crystal materials, and controls light transmissivity through the device by applying an electric field, thereby varying an arrangement of liquid crystal molecules within a liquid crystal material layer to produce an image. A LCD device generally includes upper and lower substrates, which are spaced apart and face each other, and a liquid crystal material layer interposed between the upper and lower substrates. Each of the substrates includes an electrode, where the electrodes face each other. In addition, the LCD device includes thin film transistors and pixel electrodes arranged in a matrix and such a LCD device is generally referred to as an active matrix liquid crystal display (AMLCD) device.

[0007] **FIG. 1** is a cross-sectional view of a liquid crystal display device according to the related art. In **FIG. 1, a** LCD device **10** includes first and second substrates **12** and **14** facing each other with a predetermined space therebetween. A liquid crystal material layer **16** is interposed between the first and second substrates **12** and **14**. The LCD device **10** has an image area A and a non-image area B surrounding the image area A, where images are displayed within the image area A.

[0008] In the image area A, a gate electrode **18** is formed on an inner surface of the first substrate **12**. A gate insulating layer **20** is formed on the gate electrode **18**, and the gate insulating layer **20** extends to the non-image area B. An active layer **22** is formed on the gate insulating layer **20** and is disposed over the gate electrode **18**. In addition, a data line **25** and source and drain electrodes **24** and **26** are formed on the active layer **22**. The gate electrode **18**, the active layer **22**, and the source and drain electrodes **24** and **26** form a thin film transistor T. A data pad **27** is formed on the gate insulating layer **20** in the non-image area B to connect the data line **25** to outer circuits (not shown).

[0009] Furthermore, a passivation layer **28** is formed on the data line **25**, the source and drain electrodes **24** and **26**, and the data pad **27**. The passivation layer **28** has a drain contact hole **29** and a data pad contact hole **30** exposing the drain electrode **26** and the data pad **27**, respectively. Moreover, a pixel electrode **32** and a data pad terminal **33** are formed on the passivation layer **28**. The pixel electrode **32** is located in a pixel region P of the image area A and connected to the drain electrode **26** through the drain contact hole **29**. The data pad terminal **33** is situated in the non-image area B and is connected to the data pad **27** through the data pad contact hole **30**.

[0010] In addition, a black matrix **34** is formed on an inner surface of the second substrate **14**, which is smaller than the first substrate **12**. The black matrix **34** corresponds to the thin film transistor T in the image area A, and is disposed in the non-image area B. Furthermore, a color filter layer **36** is formed on the black matrix **34**, and has three sub-filters of red (R), green (G), and blue (B) disposed in the pixel region P. An overcoat layer **38** is formed on the color filter layer **36**, and a common electrode **40** is formed on the overcoat layer **38**.

[0011] Moreover, first and second alignment layers (not shown) are formed on the pixel electrode **32** and the common electrode **40**, respectively, to arrange liquid crystal molecules of the liquid crystal material layer **16**. Then, a spacer **42** is formed in the liquid crystal material layer **16** to maintain a uniform cell gap forming a uniform thickness of the liquid crystal material layer **16**.

[0012] A seal pattern **44** is formed in the non-image area B between the first and second substrates **12** and **14** to prevent the liquid crystal material of the -liquid crystal material layer **16** from leaking. In addition, first and second polarizers **31** and **35** are arranged over outer surfaces of the first and second substrates **12** and **14**, respectively. Further, a back light unit (not shown) is located over the first polarizer **31** as a light source. Accordingly, the black matrix **34** covers the seal pattern **44**, such that the black matrix **34** blocks light L1 around the seal pattern **44** from the back light unit, and prevents light leakage in the non-image area B. However, the black matrix **34** decreases an aperture ratio of the LCD device, thereby reducing the image area A. Moreover, since the black matrix **34** should have a margin in order to prevent misalign of the first and second substrates **12** and **14**, thereby increasing the non-image area B.

[0013] Recently, a high aperture ratio LCD device has been proposed. In the high aperture ratio LCD device, gate and data lines are used as a black matrix by forming a passivation layer with a low dielectric material and overlapping a pixel electrode with the gate and data lines.

[0014] In addition, a LCD device having a thin film transistor on color filter (TOC) or color filter on thin film transistor (COT) structure, which includes a color filter layer and a thin film transistor on one substrate, has also been proposed. In the LCD device having the TOC or COT structure, a black matrix is formed on the substrate that includes the color filter layer and the thin film transistor, such that the black matrix corresponds to the thin film transistor and does not require a black matrix margin.

[0015] However, in the aforementioned high aperture ratio LCD device and the LCD device having the TOC or COT structure, the black matrix does not cover a seal pattern in the non-image area. Thus, in these LCD devices, light leakage occurs in the non-image area, thereby reducing light usage efficiency of the devices.

SUMMARY OF THE INVENTION

[0016] Accordingly, the present invention is directed to a liquid crystal display device and a method of fabricating the

same that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0017] An object of the present invention is to provide a liquid crystal display device that has a high aperture ratio and prevents light leakage along an edge of an image area.

[0018] Another object of the present invention is to provide a method of fabricating a liquid crystal display device that has a high aperture ratio and prevents light leakage along an edge of an image area.

[0019] Additional features and advantages of the invention will be set forth in the description which follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the structure particularly pointed out in the written description and claims hereof as well as the appended drawings.

[0020] To achieve these and other advantages and in accordance with the purpose of the present invention, as embodied and broadly described, a liquid crystal display device includes first and second substrates facing each other with a predetermined space therebetween, a liquid crystal material layer disposed between the first and second substrates, a seal pattern formed between the first and second substrates to surround the liquid crystal material layer, and a blocking layer formed over a first surface of the second substrate to cover the seal pattern.

[0021] In another aspect, a liquid crystal display device includes a first substrate having a pixel region, a thin film transistor formed on a first surface of the first substrate, a passivation layer formed on the thin film transistor, a black matrix formed on the passivation layer covering the thin film transistor, a pixel electrode formed within in the pixel region over the passivation layer and electrically connected to the thin film transistor, a second substrate facing the first surface of the first substrate with a predetermined space therebetween, a color filter layer formed on a first surface of the second substrate, a common electrode formed on the color filter layer, a liquid crystal material layer disposed between the first and second substrates, a seal pattern between the first and second substrates to surround the liquid crystal material layer, and a blocking layer formed on a second surface of the second substrate to cover the seal pattern.

[0022] In another aspect, a liquid crystal display device includes a first substrate, a color filter layer formed on a first surface of the first substrate, a planarization layer formed on the color filter layer, a thin film transistor formed on the planarization layer, a black matrix covering the thin film transistor, a pixel electrode connected to the thin film transistor, a second substrate facing the first surface of the first substrate with a predetermined space therebetween, a common electrode formed on a first surface of the second substrate, a liquid crystal material layer disposed between the first and second substrates, a seal pattern formed between the first and second substrates to surround the liquid crystal material layer, and a blocking layer on a second surface of the second substrate to cover the seal pattern.

[0023] In another aspect, a liquid crystal display device includes a first substrate having a pixel region, a thin film transistor formed on a first surface of the first substrate, a color filter layer formed over the thin film transistor within the pixel region, a black matrix covering the thin film transistor, a planarization layer formed over the color filter layer and the black matrix, a pixel electrode formed on the planarization layer, the pixel electrode corresponding ,to the color filter layer and connected to the thin film transistor, a second substrate facing the first surface of the first substrate with a predetermined space therebetween, a common electrode formed on a first surface of the second substrate, a liquid crystal material layer disposed between the first and second substrates, a seal pattern formed between the first and second substrates to surround the liquid crystal material layer, and a blocking layer formed on a second surface of the second substrate to cover the seal pattern.

[0024] In another aspect, a method of fabricating a liquid crystal display device includes forming a thin film transistor on a first substrate, forming a pixel electrode connected to the thin film transistor on the first substrate, forming a seal pattern over the first substrate to surround the thin film transistor and the pixel electrode, forming a common electrode on a first surface of a second substrate, attaching the first and second substrates such that the common electrode faces the pixel electrode, injecting a liquid crystal material into a space within the seal pattern between the pixel electrode and the common electrode, and forming a blocking layer on a second surface of the second substrate to cover the seal pattern.

[0025] It is to be understood that both the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate embodiments of the invention and together with the description serve to explain the principle of the invention. In the drawings:

[0027] **FIG. 1** is a cross-sectional view of a liquid crystal display device according to the related art;

[0028] **FIG. 2** is a cross-sectional view of an exemplary liquid crystal display device according to the present invention;

[0029] **FIG. 3** is a plan view of the substrate including an exemplary blocking layer of the liquid crystal display device of **FIG. 2**;

[0030] **FIGS. 4A** to **4**C are cross-sectional views of an exemplary fabrication process for forming blocking layer according to the present invention;

[0031] **FIG. 5** is a cross-sectional view of another exemplary liquid crystal display device according to the present invention; and

[0032] **FIG. 6** is a cross-sectional view of another exemplary liquid crystal display device according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

[0034] **FIG. 2** is a cross-sectional view of an exemplary liquid crystal display device according to the present invention. In **FIG. 2, a** LCD device may include first and second substrates **130** and **110** facing each other with a predetermined space therebetween. A liquid crystal material layer **160** may be interposed between the first and second substrates **130** and **110**. The LCD device may have an image area C in which images are to be displayed, and a non-image area D around the image area C.

[0035] A gate electrode **132** may be formed within the image area C on an inner surface of the first substrate **130**. In addition, a gate insulating layer **133** may be formed on the gate electrode **132**, and the gate insulating layer **133** may extend into the non-image area D. An active layer **134** may be formed on the gate insulating layer **133** over the gate electrode **132**. In addition, a data line **138** and source and drain electrodes **136** and **142** may be formed on the active layer **134**. An ohmic contact layer (not shown) may be formed between the active layer **134** and the source and drain electrodes **136** and **142** to lower a contact resistance between the active layer **134** and the source and drain electrodes **136** and **142**. Furthermore, a data pad **140** may be formed on the gate insulating layer **133** within the non-image area D to connect the data line **138** to outer circuits (not shown). The gate electrode **132**, the active layer **134**, and the source and drain electrodes **136** and **142** may form a thin film transistor T1. Moreover, the active layer **134** may become a channel "ch" of the thin film transistor T1. Although not shown in **FIG. 2, a** gate line and a gate pad may be formed on the first substrate **130**, such that the gate line may be formed within the image area C and connected to the gate electrode **132**. The gate pad may be formed within in the non-image area D, and may connect the gate line to outer circuits (not shown). The gate line and the gate pad may be formed of the same material as the gate electrode **132**.

[0036] In addition, a passivation layer **148** may be formed on the data line **138**, the source and drain electrodes **136** and **142**, and the data pad **140**. The passivation layer **148** may include a drain contact hole **144** and a data pad contact hole **146** exposing the drain electrode **142** and the data pad **140**, respectively. The passivation layer **148** may have a relatively low dielectric constant about less than four, for example, and may be made of benzocyclobutene (BCB).

[0037] Furthermore, a black matrix **150** may be formed on the passivation layer **148** over the thin film transistor T1. The black matrix **150** may be made of an opaque conductive material, such as chromium (Cr). The black matrix **150** may also be connected to the drain electrode **142** through the drain contact hole **144**.

[0038] A pixel electrode **152** may be formed on the black matrix **150** within the image area C to be electrically connected to the drain electrode **142**. Further, the pixel electrode **152** may be formed to overlap the gate line and the data line **138**, such that the gate line and the data line **138** also function as a black matrix. In addition, a data pad terminal **154** may be formed on the passivation layer **148** within the non-image area D, and the data pad terminal **154** may connect to the data pad **140** through the data pad contact hole **146**. The data pad terminal **154** may be made of the same material as the pixel electrode **152**.

[0039] Moreover, a color filter layer **112** may be formed on an inner surface of the second substrate **110**, which has a smaller size than the first substrate **130**. The color filter layer **112** may have three sub-filters of red (R), green (G), and blue (B) corresponding to a pixel region P1. A common electrode **114** may be formed on the color filter layer **112**, and may extend into the non-image area D to form a electrical connection over the first substrate **130** using silver (Ag) dots.

[0040] First and second alignment layers (not shown) may be additionally formed on the pixel electrode **152** and the common electrode **114**, respectively, to arrange liquid crystal molecules of the liquid crystal material layer **160**. Also, a spacer **164** may be formed in the liquid crystal material layer **160** to maintain a uniform cell gap and form a uniform thickness of the liquid crystal material layer **160**. In addition, a seal pattern **162** may be formed within the non-image area D between the first and second substrates **130** and **110** to prevent the liquid crystal material of the liquid crystal material layer **160** from leaking.

[0041] A first polarizer **166** may be arranged on an outer surface of the first substrate **130**, and a second polarizer **118** may be arranged on an outer surface of the second substrates **110**. The second polarizer **118** may have a light transmissive axis perpendicular to that of the first polarizer **166**. In addition, a blocking layer **116** may be formed between the second substrate **110** and the second polarizer **118**. The blocking layer **116** may be disposed within a border region between the image area C and the non-image area D covering the seal pattern **162**. Furthermore, a back light unit (not shown) may be located over the first polarizer **166** to function as a light source. Accordingly, the LCD device may have a high aperture ratio since the black matrix **150** may be formed only within the region corresponding to the thin film transistor T1. In addition, light leakage may be prevented along an edge of the image area C since the blocking layer **116** may cover the seal pattern **162**, thereby blocking L2 around the seal pattern **162**.

[0042] **FIG. 3** is a plan view of the substrate including an exemplary blocking layer of the liquid crystal display device of **FIG. 2**. As shown in **FIG. 3**, the blocking layer **116** may be formed covering a border area between the image area C and the non-image area D covering the seal pattern **162**. The blocking layer **116** may be formed by a printing method or by an attaching method using an adhesive material. For example, the blocking layer **116** may be made of the same material as the black matrix **15** or a material having an optical density over about three. In addition, the blocking layer **116** may be formed after attaching the first and second substrates **130** and **110** including the thin film transistor T1, the pixel electrode **152**, and the common electrode **114** on the inner surfaces thereof. Furthermore, the spacer **164** may be formed over the inner surface of the first substrate **130** before the attaching the first and second substrates **130** and **110**. The blocking layer **116** may be formed on the second polarizer **118**, and may be formed in the same layer with the second polarizer **118**.

[0043] **FIGS. 4A** to **4C** are cross-sectional views of an exemplary fabrication process for forming blocking layer according to the present invention. In **FIG. 4A, a** blocking layer **116*a*** may be disposed on a substrate **110*a***, and a polarizer **118*a*** may be arranged on the blocking layer **116*a***. The blocking layer **116*a*** may be formed by a printing method or by an attaching method. In addition, the blocking layer **116*a*** may be formed either on the substrate **110*a*** or on

an inner surface of the polarizer **118***a*. Accordingly, the blocking layer **116***a* may be disposed within a border area between the image area C and the non-image area D covering the seal pattern **162**, as shown in **FIG. 2**.

[**0044**] In **FIG. 4B, a** polarizer **118***b* may be arranged on a substrate **110***b*, and a blocking layer **116***b* may be formed on the polarizer **118***b* by a printing method or an attaching method. Accordingly, the blocking layer **116***b* may be disposed within a border area between the image area C and the non-image area D covering the seal pattern **162**, as shown in **FIG. 2**.

[**0045**] In **FIG. 4C, a** polarizer **118***c* arranged on a substrate **110***c* may have a blocking layer **116***c* covering a spacer (not shown) therein. The blocking layer **116***c* may be formed by arranging the polarizer **118***c* on the substrate **110***c* and changing optical properties of a portion of the polarizer **118***c*, or by inserting a blocking pattern in the portion of the polarizer **118***c*. Accordingly, the blocking layer **116***c* may be disposed within a border area between the image area C and the non-image area D covering the seal pattern **162**, as shown in **FIG. 2**.

[**0046**] **FIG. 5** is a cross-sectional view of another exemplary liquid crystal display device according to the present invention. In **FIG. 5, a** LCD device may include first and second substrates **230** and **210** facing each other with a predetermined space therebetween. A liquid crystal material layer **260** may be interposed between the first and second substrates **230** and **210**. The LCD device may have an image area E in which images are to be displayed and a non-image area F around the image area E.

[**0047**] A color filter layer **212** may be formed on an inner surface of the first substrate **230** in the image area E. A planarization layer **213** may also be formed on the color filer layer **212**, and may flatten the inner surface of the first substrate **230** including the color filter layer **212**. A thin film transistor T2, which may include a gate electrode **232**, an active layer **234**, and source and drain electrodes **236** and **242**, may be formed on the planarization layer **213** within the image area E. A data line **238** and a data pad **240**, which may be made of the source and drain electrodes **236** and **242**, may formed over the planarization layer **213**. In addition, the data line **238** may be connected to the source electrode **236** and the data pad **240**, and the data pad **240** may be disposed within the non-image area F. The data pad **240** may connect the data line **238** to outer circuits (not shown). Furthermore, a gate line (not shown) and a gate pad (not shown) made of the same material as the gate electrode **232** may additionally be formed on the planarization layer **213**.

[**0048**] A passivation layer **248** may be formed on the thin film transistor T2, the data line **238**, and the data pad **240**. The passivation layer **248** may have a drain contact hole **244** and a data pad contact hole **246** exposing the drain electrode **242** and the data pad **240**, respectively. The passivation layer **248** may be made of benzocyclobutene (BCB) having a relatively low dielectric constant of about less than four.

[**0049**] A black matrix **250** may be formed on the passivation layer **248**. The black matrix **250** may cover the thin film transistor T2, and may be connected to the drain electrode **242** through the drain contact hole **244**. The black matrix **150** may be made of an opaque conductive material, such as chromium (Cr).

[**0050**] A pixel electrode **252** may be formed on the black matrix **250** within a pixel region P2 of the image area E. The pixel electrode **252** may be connected to the black matrix **250**, such that the pixel electrode **252** may be electrically connected to the drain electrode **242**. A data pad terminal **254** made of the same material as the pixel electrode **252** may be formed on the passivation layer **248** within the non-image area F. The data pad terminal **254** may be connected to the data pad **240** through the data pad contact hole **246**.

[**0051**] In addition, a common electrode **214** may be formed on an inner surface of the second substrate **210**, and may extend into the non-image area F to form an electrical connection over the first substrate **230** using silver (Ag) dots. First and second alignment layers (not shown) may be formed on the pixel electrode **252** and the common electrode **214**, respectively, to arrange liquid crystal molecules of the liquid crystal material layer **260**. A spacer **264** may be formed in the liquid crystal material layer **260** to maintain a uniform cell gap and form a uniform thickness of the liquid crystal material layer **260**. A seal pattern **262** may also be formed within the non-image area F between the first and second substrates **230** and **210** to prevent the liquid crystal material of the liquid crystal material layer **260** from leaking.

[**0052**] Furthermore, a first polarizer **266** may be arranged on an outer surface of the first substrate **230**, and a second polarizer **218** may be arranged on an outer surface of the second substrates **210**. The second polarizer **218** may have a light transmissive axis perpendicular to that of the first polarizer **266**.

[**0053**] Moreover, a blocking layer **216** may be formed between the second substrate **210** and the second polarizer **218**, and may be disposed within a border region between the image area E and the non-image area F, such that the blocking layer **216** covers the seal pattern **262**. The blocking layer **216** may be formed by a printing method or by an attaching method using an adhesive material. A back light unit (not shown) may be located over the first polarizer **266** to function as a light source. Accordingly, the LCD device may have a high aperture ratio. Further, the black matrix **250** may be formed on the first substrate **230** and may have no margin, since the color filter layer **212** may be formed on the inner surface of the first substrate **230**. In addition, light leakage does not occur along an edge of the image area E, since the blocking layer **216** may cover the seal pattern **262**, thereby blocking light L3 around the seal pattern **262**.

[**0054**] **FIG. 6** is a cross-sectional view of another exemplary liquid crystal display device according to the present invention. In **FIG. 6, a** LCD device may include first and second substrates **330** and **310** facing each other with a predetermined space therebetween. A liquid crystal material layer **360** may be interposed between the first and second substrates **330** and **310**. The LCD device may have an image area G in which images are to be displayed and a non-image area H around the image area G.

[**0055**] A thin film transistor T3, which may include a gate electrode **332**, an active layer **334**, and source and drain electrodes **336** and **342**, may be formed on an inner surface of the first substrate **330** within the image area G. A data pad **340** may also be formed over the inner surface of the first substrate **330** within the non-image area H, and may connect

to the source electrode **336**. In addition, a passivation layer **348** may be formed on the thin film transistor T3 and the data pad **340**. The passivation layer **348** may have a data pad contact hole **346** exposing the data pad **340**.

[**0056**] A color filter layer **312** may be formed on the passivation layer **348** within a pixel region P3 of the image area G. A black matrix **350** may be formed on the passivation layer **348** to cover the thin film transistor T3. A planarization layer **313** may be formed on the color filer layer **312** and the black matrix **350**. The planarization layer **313** may flatten the inner surface of the first substrate **330** including the color filter layer **312**. The planarization layer **313** may have a drain contact hole **344** exposing the drain electrode **342** through the color filter layer **312** and passivation layer **348**.

[**0057**] In addition, a pixel electrode **352** may be formed on the planarization layer **313** within the pixel region P3. The pixel electrode **352** may be connected to the drain electrode **342** through the drain electrode **342**. A data pad terminal **354** made of the same material as the pixel electrode **352** may be formed on the passivation layer **348** within the non-image area H. The data pad terminal **352** may be connected to the data pad **340** through the data pad contact hole **346**.

[**0058**] Furthermore, a common electrode **314** may be formed on an inner surface of the second substrate **310**, and may extend into the non-image area H to form an electrical connection over the first substrate **330** using silver (Ag) dots. First and second alignment layers (not shown) may additionally be formed on the pixel electrode **352** and the common electrode **314**, respectively, to arrange liquid crystal molecules of the liquid crystal material layer **360**.

[**0059**] A spacer **364** may be formed in the liquid crystal material layer **360** to maintain a uniform cell gap to form a uniform thickness of the liquid crystal material layer **360**. Also, a seal pattern **362** may be formed within the non-image area H between the first and second substrates **330** and **310** to prevent the liquid crystal material of the liquid crystal material layer **360** from leaking.

[**0060**] A first polarizer **366** may be arranged on an outer surface of the first substrate **330**, and a second polarizer **318** may be arranged on an outer surface of the second substrates **310**. The second polarizer **318** may have a light transmissive axis perpendicular to that of the first polarizer **366**.

[**0061**] A blocking layer **316** may be formed between the second substrate **310** and the second polarizer **318**, and disposed along a border region between the image area G and the non-image area H covering the seal pattern **362**. The blocking layer **316** may be formed by a printing method or by an attaching method using an adhesive material. A back light unit (not shown) may be located over the first polarizer **366** to function as a light source. Accordingly, the LCD device may have a high aperture ratio. Further, the black matrix **350** may be formed on the first substrate **330** and may have no margin, since the color filter layer **312** may be formed on the inner surface of the first substrate **330**. In addition, light leakage does not occur along an edge of the image area G, since the blocking layer **316** may cover the seal pattern **362**, thereby blocking light around the seal pattern **362**.

[**0062**] It will be apparent to those skilled in the art that various modifications and variations can be made in the liquid crystal display device and the method of fabricating the same of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.

What is claimed is:

1. A liquid crystal display device, comprising:

first and second substrates facing each other with a predetermined space therebetween;

a liquid crystal material layer disposed between the first and second substrates;

a seal pattern formed between the first and second substrates to surround the liquid crystal material layer; and

a blocking layer formed over a first surface of the second substrate to cover the seal pattern.

2. The device according to claim 1, further comprising a first polarizer formed over the first surface of the second substrate.

3. The device according to claim 2, wherein the first polarizer is disposed on the blocking layer.

4. The device according to claim 3, wherein the blocking layer is formed on the first surface of the second substrate using a printing method.

5. The device according to claim 3, wherein the blocking layer is formed on the first surface of the second substrate by an attaching method using an adhesive material.

6. The device according to claim 3, wherein the blocking layer is formed on an inner surface of the first polarizer using a printing method.

7. The device according to claim 3, wherein the blocking layer is formed on an inner surface of the first polarizer by an attaching method using an adhesive material.

8. The device according to claim 2, wherein the blocking layer is disposed directly on the first polarizer.

9. The device according to claim 2, wherein the blocking layer and the first polarizer are formed in the same layer.

10. The device according to claim 2, further comprising a second polarizer over an outer surface of the first substrate.

11. A liquid crystal display device, comprising:

a first substrate having a pixel region;

a thin film transistor formed on a first surface of the first substrate;

a passivation layer formed on the thin film transistor;

a black matrix formed on the passivation layer covering the thin film transistor;

a pixel electrode formed within in the pixel region over the passivation layer and electrically connected to the thin film transistor;

a second substrate facing the first surface of the first substrate with a predetermined space therebetween;

a color filter layer formed on a first surface of the second substrate;

a common electrode formed on the color filter layer;

a liquid crystal material layer disposed between the first and second substrates;

a seal pattern between the first and second substrates to surround the liquid crystal material layer; and

a blocking layer formed on a second surface of the second substrate to cover the seal pattern.

12. The device according to claim 11, wherein the passivation layer has a dielectric constant less than about four.

13. The device according to claim 12, wherein the passivation layer is made of benzocyclobutene (BCB).

14. The device according to claim 11, wherein the black matrix is connected to the thin film transistor.

15. The device according to claim 14, wherein the black matrix includes chromium (Cr).

16. The device according to claim 15, wherein the black matrix is connected to the pixel electrode.

17. A liquid crystal display device, comprising:

a first substrate;

a color filter layer formed on a first surface of the first substrate;

a planarization layer formed on the color filter layer;

a thin film transistor formed on the planarization layer;

a black matrix covering the thin film transistor;

a pixel electrode connected to the thin film transistor;

a second substrate facing the first surface of the first substrate with a predetermined space therebetween;

a common electrode formed on a first surface of the second substrate;

a liquid crystal material layer disposed between the first and second substrates;

a seal pattern formed between the first and second substrates to surround the liquid crystal material layer; and

a blocking layer on a second surface of the second substrate to cover the seal pattern.

18. The device according to claim 17, wherein the black matrix is connected to the thin film transistor.

19. The device according to claim 18, wherein the black matrix includes chromium (Cr).

20. The device according to claim 19, wherein the black matrix is connected to the pixel electrode.

21. A liquid crystal display device, comprising:

a first substrate having a pixel region;

a thin film transistor formed on a first surface of the first substrate;

a color filter layer formed over the thin film transistor within the pixel region;

a black matrix covering the thin film transistor;

a planarization layer formed over the color filter layer and the black matrix;

a pixel electrode formed on the planarization layer, the pixel electrode corresponding to the color filter layer and connected to the thin film transistor;

a second substrate facing the first surface of the first substrate with a predetermined space therebetween;

a common electrode formed on a first surface of the second substrate;

a liquid crystal material layer disposed between the first and second substrates;

a seal pattern formed between the first and second substrates to surround the liquid crystal material layer; and

a blocking layer formed on a second surface of the second substrate to cover the seal pattern.

22. A method of fabricating a liquid crystal display device, comprising the steps of:

forming a thin film transistor on a first substrate;

forming a pixel electrode connected to the thin film transistor on the first substrate;

forming a seal pattern over the first substrate to surround the thin film transistor and the pixel electrode;

forming a common electrode on a first surface of a second substrate;

attaching the first and second substrates such that the common electrode faces the pixel electrode;

injecting a liquid crystal material into a space within the seal pattern between the pixel electrode and the common electrode; and

forming a blocking layer on a second surface of the second substrate to cover the seal pattern.

23. The method according to claim 22, further comprising a step of attaching a polarizer on the blocking layer.

24. The method according to claim 22, further comprising a step of attaching a polarizer on the second surface of the second substrate.

25. The method according to claim 22, wherein the step of forming a blocking layer includes a printing method.

26. The method according to claim 22, wherein the step of forming a blocking layer includes an attaching method using an adhesive material.

27. The method according to claim 22, wherein the step of forming a blocking layer includes attaching a polarizer on the second surface of the second substrate to change optical properties of a portion of the polarizer.

28. The method according to claim 22, further comprising a step of attaching a polarizer on the second surface of the second substrate, wherein the polarizer and the blocking layer are formed of the same layer.

* * * * *

专利名称(译)	液晶显示装置及其制造方法		
公开(公告)号	US20030123017A1	公开(公告)日	2003-07-03
申请号	US10/323877	申请日	2002-12-20
[标]申请(专利权)人(译)	乐金显示有限公司		
申请(专利权)人(译)	LG.PHILIPS LCD CO.，LTD.		
当前申请(专利权)人(译)	LG DISPLAY CO.，LTD.		
[标]发明人	KIM WOONG KWON PARK SEUNG RYUL		
发明人	KIM, WOONG-KWON PARK, SEUNG-RYUL		
IPC分类号	G02F1/1333 G02F1/1335 G02F1/1339		
CPC分类号	G02F1/133512 G02F2001/133388 G02F1/1339		
优先权	1020010087757 2001-12-29 KR		
其他公开文献	US7667784		
外部链接	Espacenet USPTO		

摘要(译)

液晶显示装置包括彼此面对的第一和第二基板，其间具有预定间隔，设置在第一和第二基板之间的液晶材料层，形成在第一和第二基板之间以围绕液晶材料层的密封图案，以及在第二基板的第一表面上形成的阻挡层，以覆盖密封图案。