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(72) Inventors:
• **LI, Guosheng**
Beijing, 100085 (CN)
• **ZHONG, Guilin**
Beijing, 100085 (CN)
• **FENG, Wei**
Beijing, 100085 (CN)

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(71) Applicant: **Xiaomi Inc.**
Beijing 100085 (CN)

(74) Representative: **Hughes, Andrea Michelle**
Dehns Germany LLP
Singlspielerhaus
Sendlinger Straße 29
80331 München (DE)

(54) **OLED PANEL, TERMINAL AND METHOD FOR CONTROLLING PHOTOSENSITIVITY**

(57) The present disclosure provides an OLED panel, a terminal and a method for controlling photosensitivity, and belongs to the field of display technology. The OLED panel includes: an array substrate 110; an OLED layer 120 disposed on the array substrate; a photosen-

sitive device array 330 disposed in the array substrate, or a photosensitive device array disposed between the array substrate and the OLED layer; and a control circuit connected to the photosensitive device array.

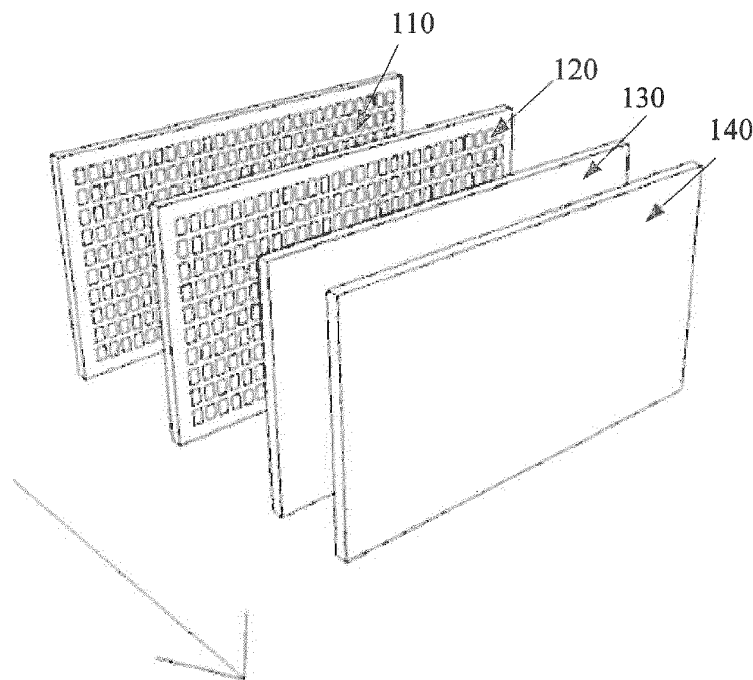


Fig. 1

Description

TECHNICAL FIELD

[0001] The present disclosure relates to the field of display technology, and more particularly to an organic light emitting display (OLED) panel, a terminal and a method for controlling photosensitivity.

BACKGROUND

[0002] A camera is a common component in a mobile terminal. The camera is used for collecting an image. The camera may be classified as a front-facing camera or a rear-facing camera in accordance with a determined position of the mobile terminal.

[0003] Taking the front-facing camera as an example, a front panel of the mobile terminal includes an OLED panel region and a frame region. In the related art, the frame region is provided with an aperture in which the front-facing camera is installed.

SUMMARY

[0004] In order to resolve a problem that a terminal needs to be provided with a separate aperture for a camera, the present disclosure provides in embodiments an organic light emitting display (OLED) panel, a terminal and a method for controlling photosensitivity. The technical solutions are shown as below.

[0005] According to a first aspect of embodiments of the present disclosure, there is provided an organic light emitting display (OLED) panel, including:

an array substrate;
an OLED layer disposed on the array substrate;
a photosensitive device array disposed in the array substrate, or a photosensitive device array disposed between the array substrate and the OLED layer;
and
a control circuit connected to the photosensitive device array.

[0006] The array substrate may include $m \times n$ pixel units, each pixel unit including K pixel sub-units; and the photosensitive device array may include $a \times b$ photosensitive devices, each photosensitive device corresponding to one pixel sub-unit, wherein $a \leq K \times m$ and $b \leq n$.

[0007] Optionally, the photosensitive devices in the photosensitive device array correspond to the pixel sub-units in the array substrate in a one-to-one manner, wherein $a = K \times m$ and $b = n$; or the photosensitive device array is located at a partial region of the array substrate, the photosensitive devices in the photosensitive device array correspond to the pixel sub-units in the partial region in a one-to-one manner, wherein $a < K \times m$ and $b < n$; or $a < K \times m$ and $b = n$; or $a = K \times m$

and $b < n$.

[0008] Optionally, the photosensitive device array is disposed in the array substrate; the pixel sub-unit includes a thin film transistor (TFT) region and a non-TFT region; and

a position in which at least one photosensitive device is present is located at the non-TFT region of a corresponding pixel sub-unit.

[0009] Optionally, the photosensitive device array is disposed between the array substrate and the OLED layer; and

a position in which the photosensitive device is present is located above a region of a corresponding sub-pixel unit.

[0010] Optionally, the control circuit includes a plurality of data lines in a columns and a plurality of control lines in b rows;

each row of the plurality of control lines is connected to the plurality of data lines in a columns via a number a switches respectively; and

a control terminal of each switch is connected to the control line, a first connecting terminal of each switch is connected to a corresponding photosensitive device, and a second connecting terminal of each switch is connected to a corresponding data line.

[0011] Optionally, each photosensitive device is provided with a lens at a photosensitive side.

[0012] Optionally, the OLED panel further includes:

a glass substrate disposed on the OLED layer;
a polarizer disposed on the glass substrate; and
a lens disposed on the polarizer.

[0013] According to a second aspect of embodiments of the present disclosure, there is provided a terminal, including the organic light emitting display (OLED) panel according to the first aspect of embodiments of the present disclosure.

[0014] Optionally, the terminal further includes a photosensitive control unit connected to each data line and each control line.

[0015] According to a third aspect of embodiments of the present disclosure, there is provided a method for controlling photosensitivity, for use in a photosensitive control unit connected to the organic light emitting display (OLED) panel according to the first aspect of embodiments of the present disclosure. The method includes:

sending an enabling signal to a control line in the i^{th} row, for controlling a photosensitive device in the i^{th} row to communicate with a data line;
obtaining a photosensitive signal collected by the photosensitive devices in the i^{th} row via the data line;
setting $i = i + 1$ and resending the enabling signal to the control line in the i^{th} row in the case that i is less than b ; and
setting $i = 1$ and resending the enabling signal to the control line in the i^{th} row in the case that i equals to b .

[0016] According to embodiments of the present disclosure, the technical solution may have the following advantageous effects. The photosensitive device array is disposed in the array substrate of the OLED panel or between the array substrate and the OLED layer, so as to solve a problem that a front panel is generally divided into a plurality of regions, so that a camera function is integrated into the OLED panel, such that a front panel of the terminal may have the displaying function and the camera function at the same time even if merely provided with the OLED panel, thereby enhancing integral consistency and aesthetics of the terminal.

[0017] It is to be understood that both the foregoing general description and the following detailed description are illustrative only and are not restrictive of the disclosure, as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrated embodiments consistent with the present disclosure and, together with the description, serve to explain the principles of the present disclosure.

Fig. 1 is a schematic diagram showing an OLED panel in the related art;

Fig. 2 is a schematic diagram showing an arrangement of pixel units of an array substrate;

Fig. 3A is a schematic diagram showing an OLED panel according to an illustrative embodiment of the present disclosure;

Fig. 3B is a schematic diagram showing an OLED panel according to another illustrative embodiment of the present disclosure;

Fig. 4A is a schematic diagram showing a position at which a photosensitive device is located according to an illustrative embodiment of the present disclosure;

Fig. 4B is a schematic diagram showing a position at which a photosensitive device is located according to an illustrative embodiment of the present disclosure;

Fig. 4C is a schematic diagram showing a position at which a photosensitive device is located according to an illustrative embodiment of the present disclosure;

Fig. 4D is a schematic diagram showing a position at which a photosensitive device is located according to another illustrative embodiment of the present disclosure;

Fig. 5 is a schematic diagram showing a control circuit according to an illustrative embodiment of the present disclosure;

Fig. 6A is a schematic diagram showing a Liquid Crystal Display (LCD) panel according to an illustrative embodiment of the present disclosure;

Fig. 6B is a schematic diagram showing an LCD panel

according to an illustrative embodiment of the present disclosure;

Fig. 7 is a block diagram showing a terminal according to an illustrative embodiment of the present disclosure; and

Fig. 8 is a flow chart showing a method for controlling photosensitivity according to an illustrative embodiment of the present disclosure.

DETAILED DESCRIPTION

[0019] Reference will now be made in detail to illustrative embodiments, examples of which are illustrated in the accompanying drawings. The following description refers to the accompanying drawings in which the same numbers in different drawings represent the same or similar elements unless otherwise represented. The implementations set forth in the following description of illustrative embodiments do not represent all implementations consistent with the invention. Instead, they are merely examples of apparatuses and methods consistent with aspects related to the invention as recited in the appended claims.

[0020] Before introducing and describing embodiments of the present disclosure, an organic light emitting display (OLED) panel is described briefly at first. Fig. 1 is a schematic diagram showing an OLED panel in the related art.

[0021] As shown in Fig. 1, the OLED panel includes: an array substrate 110, an OLED layer 120, a glass substrate 130 and a polarizer 140.

[0022] The OLED layer 120 is disposed on the array substrate 110, the glass substrate 130 is disposed on the OLED layer 120 and the polarizer 140 is disposed on the glass substrate 130.

[0023] The OLED layer 120 includes $m \times n$ pixel units. Each pixel unit includes K pixel sub-units. In general, each pixel unit in the OLED layer 120 includes three pixel sub-units, which are a red (R) pixel sub-unit, a green (G) pixel sub-unit and a blue (B) pixel sub-unit. In some embodiments, each pixel unit includes four pixel sub-units, which are a red (R) pixel sub-unit, a green (G) pixel sub-unit, a blue (B) pixel sub-unit and a white (W) pixel sub-unit. That is the number of K may be three or four.

[0024] Correspondingly, the array substrate 110 may also include $m \times n$ pixel units, corresponding to the $m \times n$ pixel units in the OLED layer 120. Each pixel units in the array substrate 110 includes K pixel sub-units, such as three or four.

[0025] Fig. 2 is a schematic diagram showing an arrangement of pixel units in the array substrate 110. As shown in Fig. 2, the array substrate 110 includes 4×4 pixel units, i.e., 16 pixel units, and each pixel unit includes three pixel sub-units 20. Each pixel sub-unit 20 includes a thin film transistor (TFT) region 22 and a non-TFT region 24.

[0026] It should be noted that, Fig. 2 merely shows a partial region of the array substrate 110, i.e., the array

substrate 110 may consist of a plurality of regions as shown in Fig. 2. The arrangement as shown in Fig. 2 is merely illustrative and explanatory, and other arrangements are not defined in embodiments of the present disclosure.

[0027] The polarizer 140 is attached on the glass substrate 130.

[0028] The array substrate 110 provides the OLED layer 120 electric field, under which an organic semiconductor material and a light emitting material are driven to emit light, such that the light emitted passes through the glass substrate 130 and the polarizer 140 successively from bottom to top, thereby displaying an image.

[0029] Fig. 3A is a schematic diagram showing an OLED panel according to an illustrative embodiment of the present disclosure. The OLED panel may be used for an electric device such as a mobile phone, a tablet computer and a laptop computer. As shown in Fig. 3A, the OLED panel includes:

- an array substrate 310A;
- an OLED layer 320A disposed on the array substrate 310A;
- a photosensitive device array 330A disposed in the array substrate 310A; and a control circuit (not shown) connected to the photosensitive device array 330A.

[0030] The glass substrate and the polarizer (not shown) may be disposed on the OLED layer 320A, as shown in Fig. 1.

[0031] Above all, with the OLED panel according to embodiments of the present disclosure, the photosensitive device array 330A is disposed in the array substrate 310A of the OLED panel, so as to solve a problem that a front panel is generally divided into a plurality of regions, so that a camera function is integrated into the OLED panel, such that a front panel of the terminal may have the displaying function and the camera function at the same time even if merely provided with the OLED panel, thereby enhancing integral consistency and aesthetics of the terminal.

[0032] Fig. 3B is a schematic diagram showing an OLED panel according to another illustrative embodiment of the present disclosure. The OLED panel may be used for an electric device such as a mobile phone, a tablet computer and a laptop computer. As shown in Fig. 3B, the OLED panel includes:

- an array substrate 310B;
- an OLED layer 320B disposed on the array substrate 310B;
- a photosensitive device array 330B disposed between the array substrate 310B and the OLED layer 320B; and
- a control circuit (not shown) connected to the photosensitive device array 330B.

[0033] A glass substrate 340B and a polarizer 350B may be disposed on the OLED layer 320B.

[0034] Above all, with the OLED panel according to embodiments of the present disclosure, the photosensitive device array 330B is disposed between the array substrate 310B and the OLED layer 320B, so as to solve a problem that a front panel usually is divided into a plurality of regions, so that a camera function is integrated into the OLED panel, such that a front panel of the terminal may have the displaying function and the camera function at the same time even if merely provided with the OLED panel, thereby enhancing integral consistency and aesthetics of the terminal.

[0035] In an alternative embodiment provided by the embodiment as shown in Fig. 3A, the photosensitive device array 330A includes $a \times b$ photosensitive devices. Each photosensitive device corresponds to one pixel sub-unit in the array substrate 310A, in which $a \leq K \times m$ and $b \leq n$. In a front view of the OLED panel, each photosensitive device is of a cross-section area less than an area occupied by one pixel sub-unit. During collecting the image, each photosensitive device is used to collect a photosensitive signal for one pixel sub-unit.

[0036] The number of photosensitive devices may be the following two cases.

1. The number of the photosensitive devices equals to the number of the pixel sub-units in the array substrate, i.e., $a = K \times m$ and $b = n$.
2. The number of the photosensitive devices is less than the number of the pixel sub-units in the array substrate, i.e., $a < K \times m$ and $b < n$; or $a < K \times m$ and $b = n$; or $a = K \times m$ and $b < n$.

[0037] In accordance with different numbers of the photosensitive devices, the illustratively shown position where the photosensitive device is located may be the following cases.

[0038] 1. The photosensitive devices in the photosensitive device array correspond to the pixel sub-units in the array substrate in a one-to-one manner, in which $a = K \times m$ and $b = n$, i.e., each pixel sub-unit corresponds to one photosensitive device.

[0039] Optionally, a position in which at least one photosensitive device is present is located at the non-TFT region of a corresponding pixel sub-unit.

[0040] In general, in view of sizes of the photosensitive device and a circuit connected thereto, the position in which the photosensitive device is present is located at the non-TFT region of the corresponding pixel sub-unit; while in some embodiments, the position in which the photosensitive device is present is located at the TFT region of the corresponding pixel sub-unit.

[0041] Taking the photosensitive device array disposed in the array substrate as an example, as shown in Fig. 4A, the array substrate includes 2×4 pixel units 31, i.e., includes 24 (8×3) pixel sub-units. The array substrate further includes 6×4 photosensitive devices 33, i.e.,

24 photosensitive devices 33. The non-TFT region of each pixel sub-unit 31 is provided with one corresponding photosensitive device 33.

[0042] 2. The photosensitive device array is located at a partial region of the array substrate, the photosensitive devices in the photosensitive device array correspond to the pixel sub-units in the partial region in a one-to-one manner, in which $a < K \times m$ and $b < n$; or $a < K \times m$ and $b = n$; or $a = K \times m$ and $b < n$, i.e., each pixel sub-unit in the partial region of the array substrate corresponds to one photosensitive device.

[0043] Optionally, a position in which at least one photosensitive device is present is located at the non-TFT region of the corresponding pixel sub-unit.

[0044] Taking the photosensitive device array disposed in the array substrate as an example, as shown in Fig. 4B, the array substrate includes 2×4 pixel units, i.e., includes 24 (8×3) pixel sub-units. The array substrate further includes 9 (3×3) photosensitive devices. For 9 pixel sub-units located at the partial region, each pixel sub-unit is provided with one corresponding photosensitive device 33.

[0045] 3. The entire region of the array substrate is provided with the photosensitive devices corresponding to some pixel sub-units in the array substrate, which are arranged separately, in which $a < K \times m$ and $b < n$; or $a < K \times m$, $b = n$; or $a = K \times m$ and $b < n$.

[0046] Optionally, a position in which at least one photosensitive device is present is located at the non-TFT region of the corresponding pixel sub-unit.

[0047] The photosensitive devices correspond to some pixel sub-units in the array substrate, i.e., the photosensitive devices are distributed in the entire region of the array substrate evenly. However, some pixel sub-units are provided with one photosensitive device, while other sub-pixel units are not provided with the photosensitive device.

[0048] Taking the photosensitive device array disposed in the array substrate as an example, as shown in Fig. 4C, the array substrate includes 12 (3×4) pixel units 31, i.e., includes 36 (12×3) pixel sub-units. The array substrate further includes 3×4 photosensitive devices 33, i.e., 12 photosensitive devices 33. Taking the first row of the array substrate as an example, the first pixel sub-unit 35 in the first pixel unit from left to right side is provided with one photosensitive device 33, the second pixel sub-unit 36 in the second pixel unit is provided with one photosensitive device 33, and the third pixel sub-unit 37 in the third pixel unit is provided with one photosensitive device 33.

[0049] The photosensitive device array may be further disposed between the array substrate and the OLED layer: the position in which the photosensitive device is present is located above the corresponding pixel sub-unit.

[0050] In the case that the photosensitive device array is disposed between the array substrate and the OLED layer, the position in which the photosensitive device is

present is located above the corresponding pixel sub-unit, i.e., the position in which the photosensitive device is present is located above the TFT region of the corresponding pixel sub-unit, or above the non-TFT region of the corresponding pixel sub-unit.

[0051] Taking the photosensitive device array disposed between the array substrate and the OLED layer as an example, as shown in Fig. 4D, some photosensitive devices 33 are located above the TFT region 32 of the corresponding pixel sub-unit, and other photosensitive devices 33 are located above the non-TFT region 34 of the corresponding pixel sub-unit.

[0052] It should be noted that Figs. 4A-4D are merely some examples showing some positions in which the photosensitive device may be located, it is apparent for those skilled in the art to acquire other positions in which the photosensitive device is located based on combinations of the above described cases, and other possible arrangements of positions are not limited herein by embodiments of the present disclosure.

[0053] Fig. 5 is a schematic diagram showing a control circuit connected to a photosensitive device array. The control circuit includes: a plurality of data lines 41 in a columns and a plurality of control lines 42 in b rows.

[0054] Each row of the plurality of the control lines 42 is connected to the plurality of the data lines 41 in a columns via a number a switches 45 respectively. Each switch 45 includes: a control terminal 46 connected to the control line 42; a first connecting terminal 43 connected to the corresponding photosensitive device 33; and a second connecting terminal 44 connected to the corresponding data line 41.

[0055] As shown in Fig. 5, it is assumed that the control circuit includes three rows of the control lines 42, four columns of the data lines 41, 3×4 photosensitive devices, i.e., 12 photosensitive devices. Data in Fig. 5 is merely for illustration, the specific number of a or b is not limited herein.

[0056] As known to those skilled in the art, the array substrate may also include: $K \times m$ columns of the pixel data lines and n rows of the pixel control lines. The pixel data line and the pixel control line are connected to the pixel sub-unit via a TFT device. A control circuit consisting of the pixel data line and the pixel control line for connecting the TFT in the array substrate is similar to that shown in Fig. 4, which is not elaborated in detail herein.

[0057] Alternative embodiments are provided in accordance with the embodiments of Figs. 3A and 3B. A lens is disposed at a photosensitive side of each photosensitive device, i.e., the number of the lens equals to the number of the photosensitive devices. As shown in Fig. 6A, a lens 54 is disposed on each photosensitive device 52. Optionally, the lens 54 is a semi-lens with a convex surface.

[0058] The lens may be disposed at the photosensitive side of the photosensitive device array, i.e., one lens is disposed on the photosensitive device array and the lens can cover all photosensitive devices. As shown in Fig.

6B, one lens 58 is disposed at the photosensitive side of the photosensitive device array 56. Optionally, the lens 58 is a semi-lens with a convex surface. Optionally, the lens 58 is disposed on an upper polarizer as shown in Fig. 1.

[0059] In the present embodiment, the lens is disposed at the photosensitive side of the photosensitive device or the photosensitive side of the photosensitive device array, so that the photosensitive device may be of a wider photosensitive range, thereby achieving better effect of acquired image.

[0060] Fig. 7 is a block diagram showing a terminal according to an illustrative embodiment of the present disclosure. As shown in Fig. 7, the terminal 700 includes an OLED panel 710, a photosensitive control unit 720, a memory 730, a processing component 740, a power component 750, an audio component 760, an input/output (I/O) interface 770.

[0061] The OLED panel 710 may be any one of the OLED panels as shown in Figs. 3A, 3B, 6A and 6B provided by the above embodiments.

[0062] The photosensitive control unit 720 is connected to a control circuit in the OLED panel 710. The photosensitive control unit 720 is connected to each data line in the control circuit, and further connected to each control line in the control circuit. The control circuit is connected to the photosensitive device array in the OLED panel 710.

[0063] The memory 730 is configured to store various types of data for supporting operations to the device 700. Examples of such data include instructions for any applications or methods operated on the device 700, contact data, phonebook data, messages, pictures, video, etc. The memory 730 may be implemented using any type of volatile or non-volatile memory devices, or a combination thereof, such as a static random access memory (SRAM), an electrically erasable programmable read-only memory (EEPROM), an erasable programmable read-only memory (EPROM), a programmable read-only memory (PROM), a read-only memory (ROM), a magnetic memory, a flash memory, a magnetic or optical disk.

[0064] The processing component 740 typically controls overall operations of the device 700, such as the operations associated with display, telephone calls, data communications, camera operations, and recording operations. The processing component 740 may include one or more processors to execute instructions to perform all or part of the steps in the above described methods. Moreover, the processing component 740 may include one or more modules which facilitate the interaction between the processing component 740 and other components.

[0065] The power component 750 provides power to various components of the device 700. The power component 750 may include a power management system, one or more power sources, and any other components associated with the generation, management, and distribution of power in the device 700.

[0066] The audio component 760 is configured to output and/or input audio signals. For example, the audio component 760 includes a microphone (MIC) configured to receive an external audio signal when the device 700 is in an operation mode, such as a call mode, a recording mode, and a voice recognition mode. The received audio signal may be further stored in the memory 730. In some embodiments, the audio component 760 further includes a speaker to output audio signals.

[0067] The I/O interface 770 provides an interface for the processing component 740 and peripheral interface modules, such as a keyboard, a click wheel, buttons, and the like. The buttons may include, but are not limited to, a home button, a volume button, a starting button, and a locking button.

[0068] Fig. 8 is a flow chart showing a method for controlling photosensitivity according to an illustrative embodiment of the present disclosure. In the present embodiment, as shown in Fig. 7, the method for controlling the photosensitivity being used in the photosensitive control unit inside a terminal is taken as an example. The method includes the following steps.

[0069] In step 801, an enabling signal is sent to the control line in the i^{th} row, for controlling the photosensitive devices in the i^{th} row to communicate with the data line.

[0070] The enable signal is configured to control the photosensitive device in the i^{th} row to communicate with the data line. The photosensitive control unit sends the enabling signal to the control line in the i^{th} row of the control circuit. With the enabling signal, the photosensitive devices in the i^{th} row are communicated with the data line of the control circuit.

[0071] For example, as shown in Fig. 5, it is assumed that the control circuit includes four columns of the data lines 41, three rows of the control lines 42, and four photosensitive devices 33 in each row (i.e., 12 photosensitive devices 33 in total). When the photosensitive control unit sends the enabling signal to the control line 42 in the first row, four switches 45 in the first row are all in an ON state and four photosensitive devices 33 in the first row are communicated with the corresponding data line 41, respectively.

[0072] In step 802, a photosensitive signal collected by the photosensitive devices in the i^{th} row is obtained via the data line.

[0073] The photosensitive control unit obtains the photosensitive signal collected by the photosensitive devices in the i^{th} row via the data line. After being collected by the photosensitive devices, the photosensitive signal is transmitted to the photosensitive control unit in the case of communicating with the data line.

[0074] For example, as shown in Fig. 5, it is assumed that the control circuit includes four columns of the data lines 41, three rows of the control lines 42, and four photosensitive devices 33 in each row (i.e., 12 photosensitive devices 33 in total). After four photosensitive devices 33 in the first row are communicated with the data line 41, the photosensitive control unit may obtain the photosen-

sitive signals collected by four photosensitive devices 33 via four columns of the data lines 41.

[0075] The photosensitive signal obtained by the photosensitive control unit is an analog signal. The analog signal is converted to a digital signal by an analog-digital converter, and the digital signal is stored in a memory.

[0076] In step 803, in the case that i is less than b , i is set as $i+1$ and the enabling signal is resent to the control line in the i^{th} row.

[0077] i represents the row number of the control line; and b represents the total number of rows. In the case that i is less than b , i is set as $i+1$ and the photosensitive control unit sends the enabling signal to the control line in the $i+1^{\text{th}}$ row; and in the case that $i=b$, step 804 is performed.

[0078] For example, as shown in Fig. 4, it is assumed that the control circuit includes eight rows of the control lines. In the case that the photosensitive control unit sends the enabling signal to the control line in the third row for a predetermined time period, i.e., $i=3<8$, i is set as 4 and the enabling signal is sent to the control line in the fourth row and then row-by-row until the enabling signal is sent to the control line in the eighth row. That is, the photosensitive control unit sends the enabling signal to the control line row-by-row at intervals of the predetermined time period.

[0079] In step 804, in the case that i equals to b , i is set as 1 and the enabling signal is resent to the control line in the i^{th} row.

[0080] In the case that i equals to b , i is set as 1 and the photosensitive control unit sends the enabling signal to the control line in the first row. That is the enabling signal is sent to the control line again from the first row after the photosensitive control unit has sent the enabling signal to all rows of the control lines.

[0081] Step 801 is performed again after completing step 804, i.e., steps 801 to 804 are performed circularly. In the case that i is of an initial value of 1, the enabling signal is sent to the control lines row-by-row from the first row until the last row, so as to collect the photosensitive signal corresponding to a current frame. Subsequently, it is repeated that the enabling signal is sent to the control lines row-by-row from the first row to the last row, so as to collect the photosensitive signal corresponding to a next frame.

[0082] Above all, with the method for controlling the photosensitivity provided by embodiments of the present disclosure, the photosensitive control unit sends the enabling signal to the control lines in the control circuit row-by-row continuously, so that the photosensitive device in the control circuit communicates with the data line; obtains the photosensitive signal via the control line in the ON state; and processes the photosensitive signal, so as to integrate the camera function into the OLED panel, such that a front panel of the terminal may have the displaying function and the camera function at the same time even if merely provided with the OLED panel, thereby enhancing integral consistency and aesthetics of the

terminal.

[0083] Other embodiments of the invention will be apparent to those skilled in the art from consideration of the specification and practice of the invention disclosed here.

5 This application is intended to cover any variations, uses, or adaptations of the invention following the general principles thereof and including such departures from the present disclosure as come within known or customary practice in the art. The scope of protection is defined by the claims.

Claims

- 15 1. An organic light emitting display (OLED) panel, comprising:
 - an array substrate (110);
 - an OLED layer (120) disposed on the array substrate;
 - 20 a photosensitive device array (330) disposed in the array substrate, or a photosensitive device array disposed between the array substrate and the OLED layer; and
 - 25 a control circuit connected to the photosensitive device array.
2. The OLED panel according to claim 1, wherein the array substrate comprises $m \times n$ pixel units, each pixel unit comprises K pixel sub-units; and the photosensitive device array comprises $a \times b$ photosensitive devices, each photosensitive device corresponds to one pixel sub-unit, wherein $a \leq K \times m$ and $b \leq n$.
- 35 3. The OLED panel according to claim 2, wherein the photosensitive devices in the photosensitive device array correspond to the pixel sub-units in the array substrate in a one-to-one manner, wherein $a = K \times m$ and $b = n$; or the photosensitive device array is located at a partial region of the array substrate, the photosensitive devices in the photosensitive device array correspond to the pixel sub-units in the partial region in a one-to-one manner, wherein $a < K \times m$ and $b < n$; or $a < K \times m$ and $b = n$; or $a = K \times m$ and $b < n$.
- 40 4. The OLED panel according to claim 2 or 3, wherein the photosensitive device array is disposed in the array substrate; the pixel sub-unit comprises a thin film transistor (TFT) region and a non-TFT region; and a position in which at least one photosensitive device is present is located at the non-TFT region of a corresponding pixel sub-unit.
- 45 5. The OLED panel according to claim 2 or 3, wherein the photosensitive device array is disposed between

the array substrate and the OLED layer; and
a position in which the photosensitive device is present is located above a region of a corresponding sub-pixel unit.

6. The OLED panel according to any one of claims 2 to 5, wherein
the control circuit comprises a plurality of data lines in a columns and a plurality of control lines in b rows; each row of the plurality of control lines is connected to the plurality of data lines in a columns via switches 45 in the number of a , respectively; and
a control terminal of each switch is connected to the control line, a first connecting terminal of each switch is connected to a corresponding photosensitive device, and a second connecting terminal of each switch is connected to a corresponding data line.
7. The OLED panel according to any one of claims 1 to 6, wherein each photosensitive device is provided with a lens (58) at a photosensitive side.
8. The OLED panel according to any one of claims 1 to 7, further comprising:
a glass substrate (130) disposed on the OLED layer;
a polarizer (140) disposed on the glass substrate; and
a lens (58) disposed on the polarizer.
9. A terminal, comprising an organic light emitting display (OLED) panel (710) according to any one of claims 1 to 8.
10. The terminal according to claim 9, wherein
the OLED panel is the OLED panel according to claim 6; and
the terminal further comprises a photosensitive control unit (720) connected to each data line and each control line.
11. A method for controlling photosensitivity, for use in a photosensitive control unit connected to an organic light emitting display (OLED) panel according to claim 6, comprising:
sending an enabling signal to a control line in the i^{th} row, for controlling a photosensitive device in the i^{th} row to communicate with a data line;
obtaining a photosensitive signal collected by the photosensitive devices in the i^{th} row via the data line;
setting $i = i + 1$ and resending the enabling signal to the control line in the i^{th} row in the case that i is less than b ; and
setting $i = 1$ and resending the enabling signal to

the control line in the i^{th} row in the case that i equals to b .

12. A program product having stored therein instructions that, when executed by one or more processors of a terminal comprising an organic light emitting display (OLED) panel according to any one of claims 1 to 8, causes the terminal to perform a method for controlling photosensitivity, for use in a photosensitive control unit connected to the OLED panel, the method comprising:

sending an enabling signal to a control line in the i^{th} row, for controlling a photosensitive device in the i^{th} row to communicate with a data line;
obtaining a photosensitive signal collected by the photosensitive devices in the i^{th} row via the data line;
setting $i = i + 1$ and resending the enabling signal to the control line in the i^{th} row in the case that i is less than b ; and
setting $i = 1$ and resending the enabling signal to the control line in the i^{th} row in the case that i equals to b .

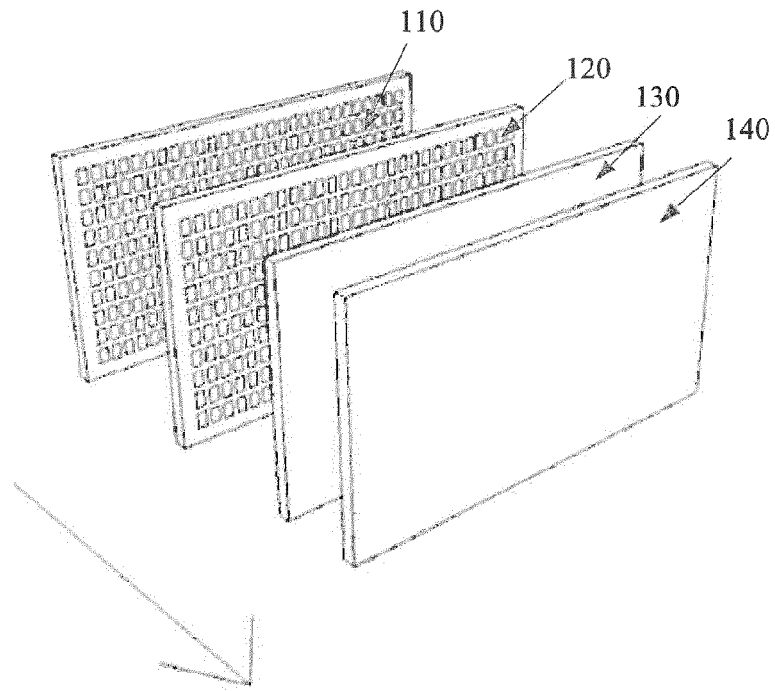


Fig. 1

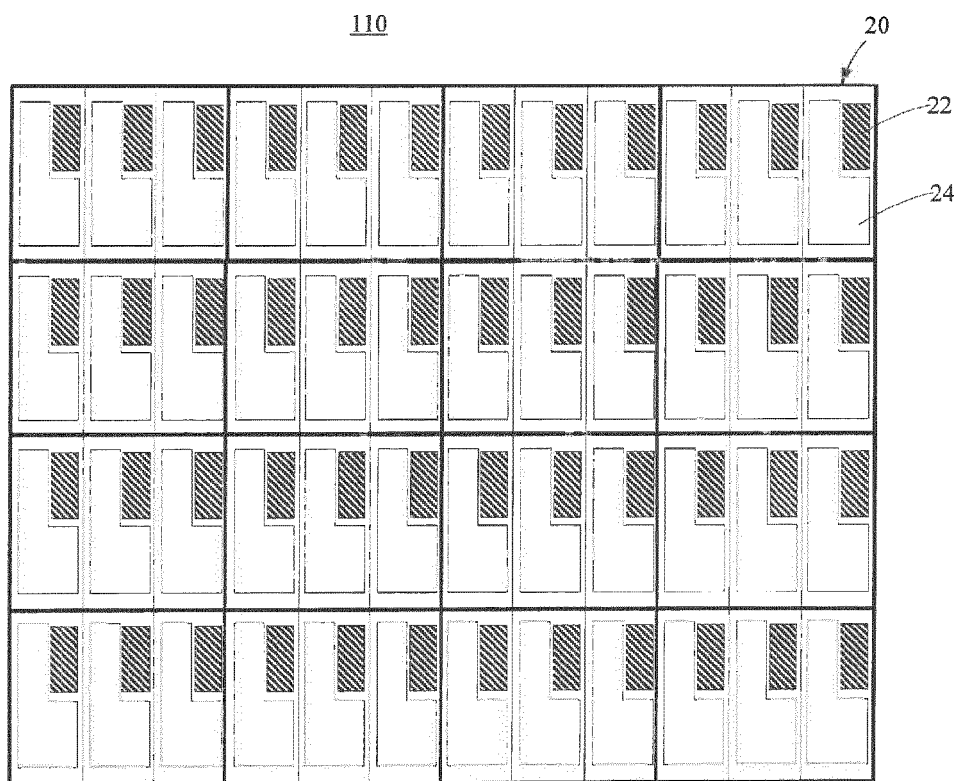


Fig. 2

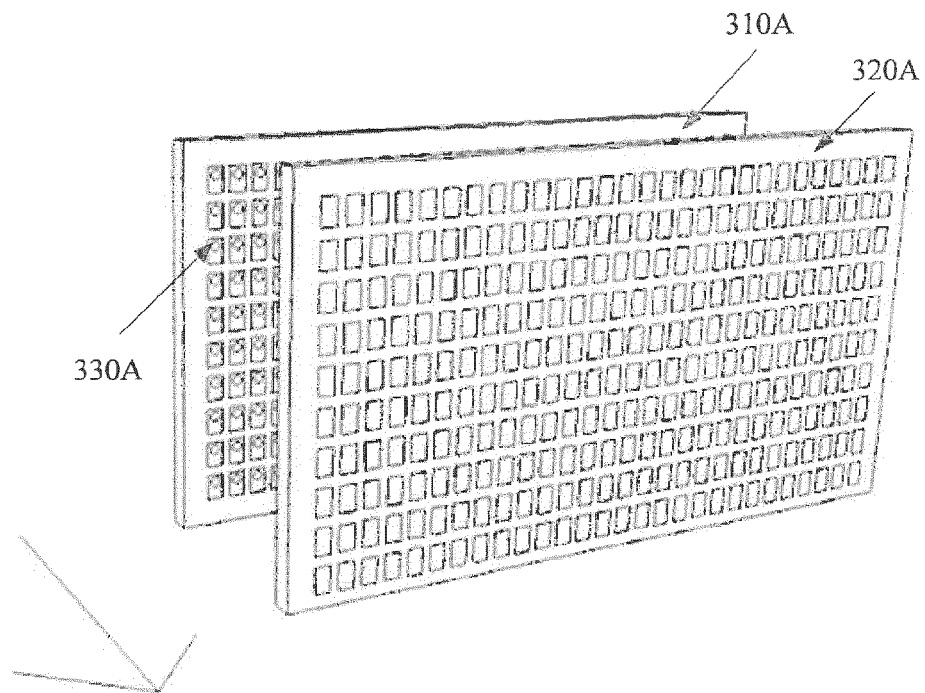


Fig. 3A

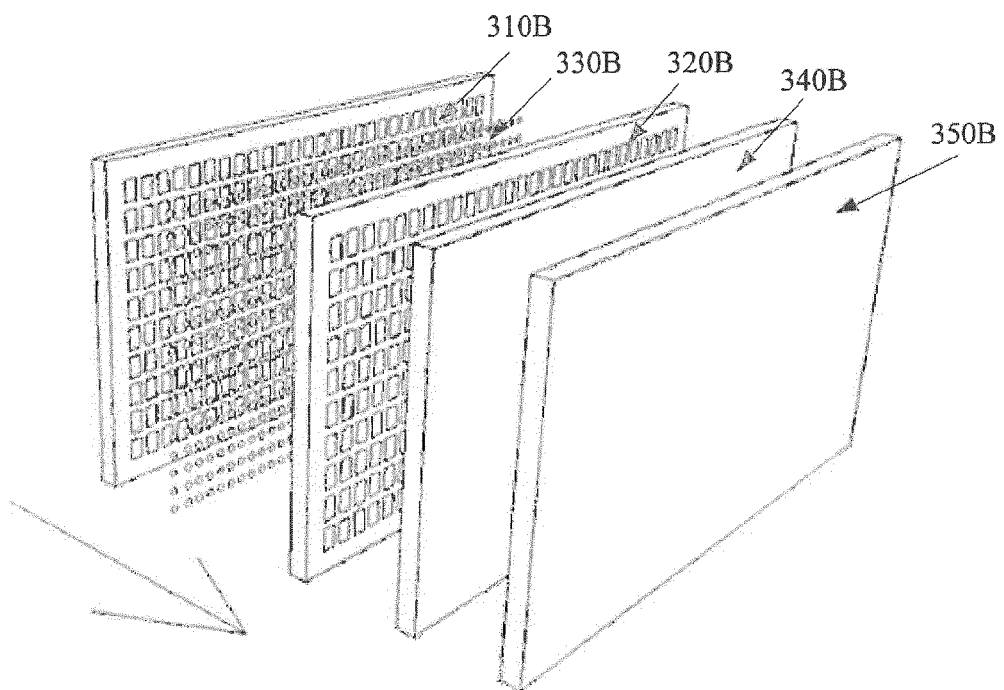


Fig. 3B

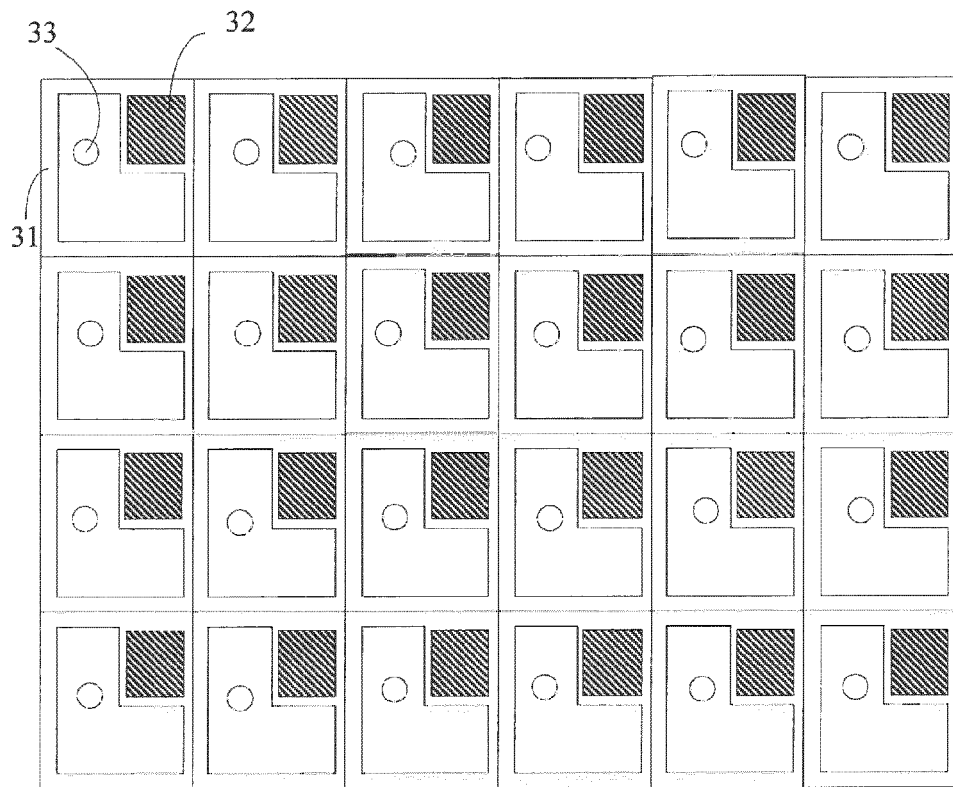


Fig. 4A

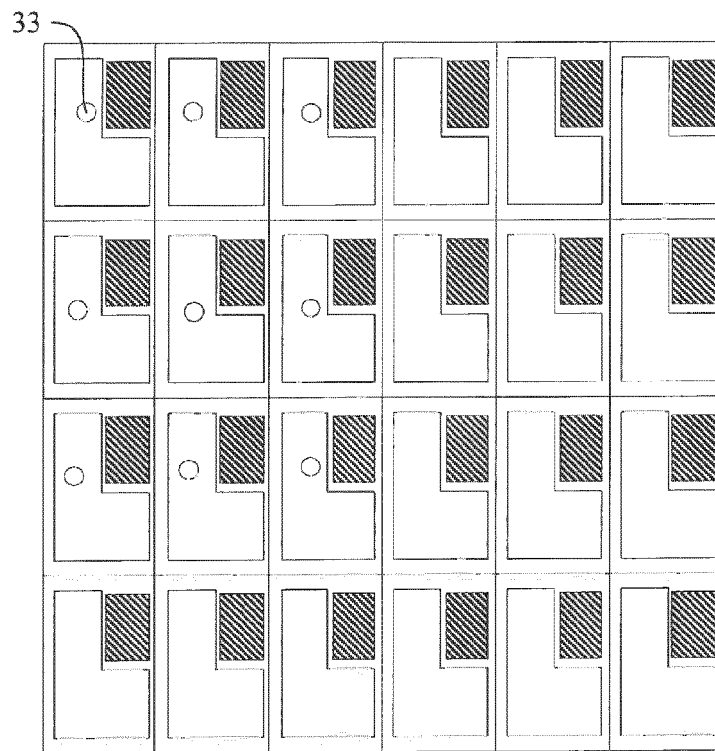


Fig. 4B

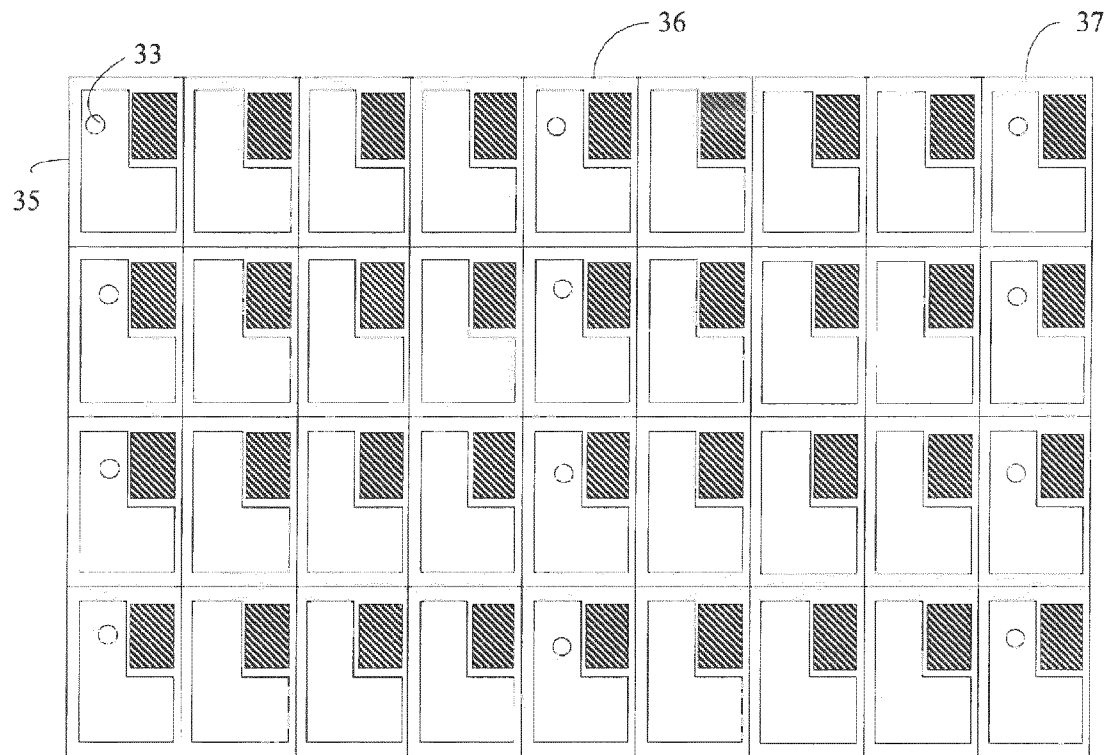


Fig. 4C

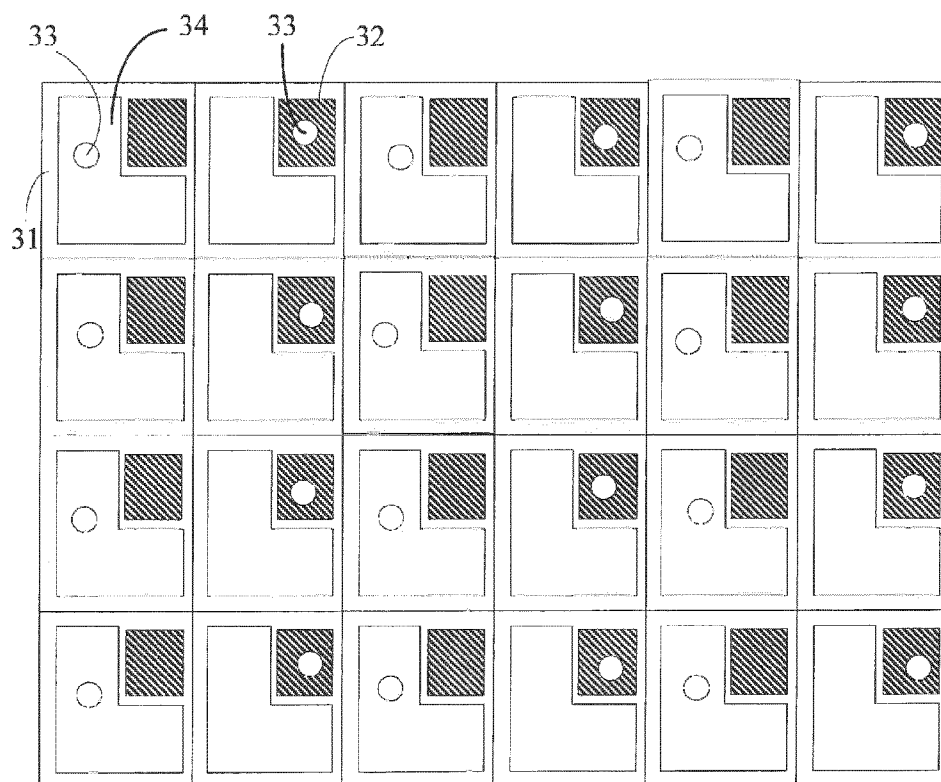


Fig. 4D

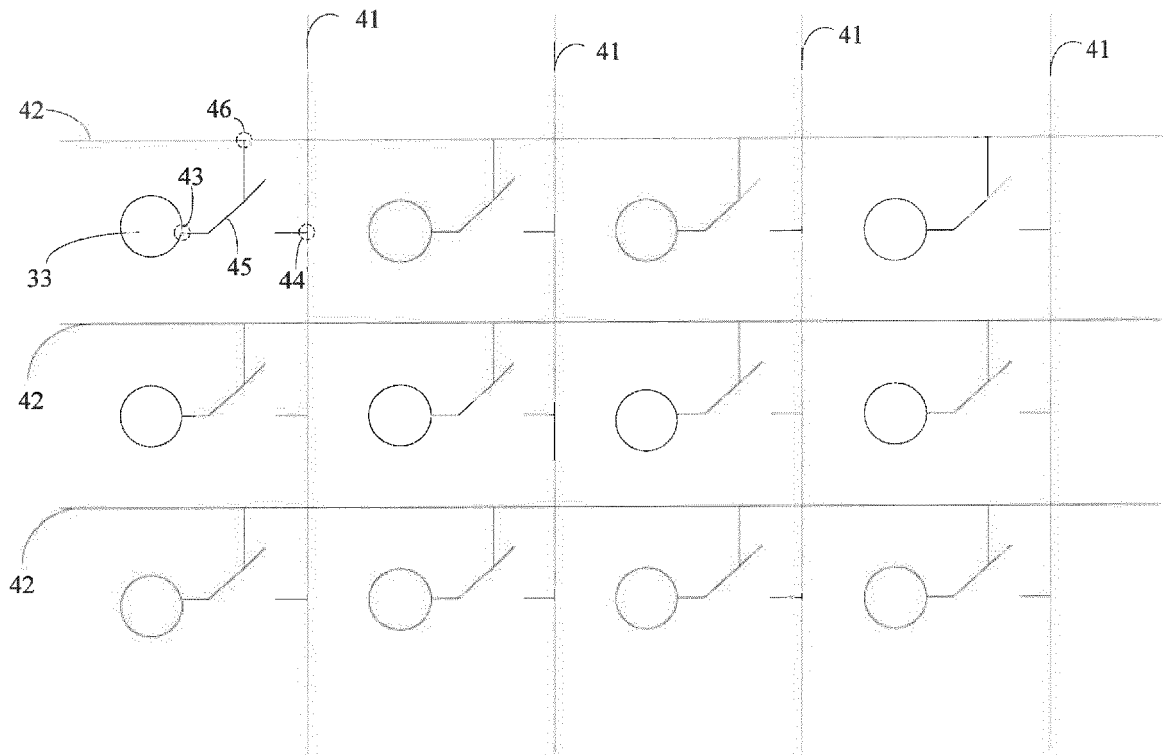


Fig. 5

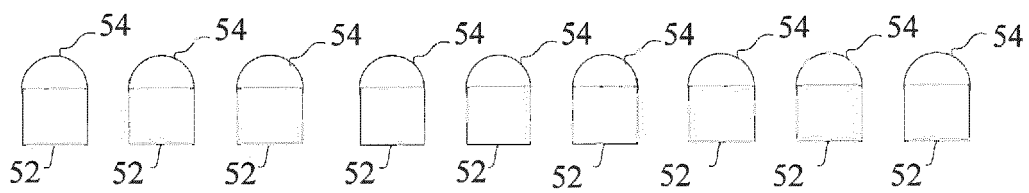


Fig. 6A

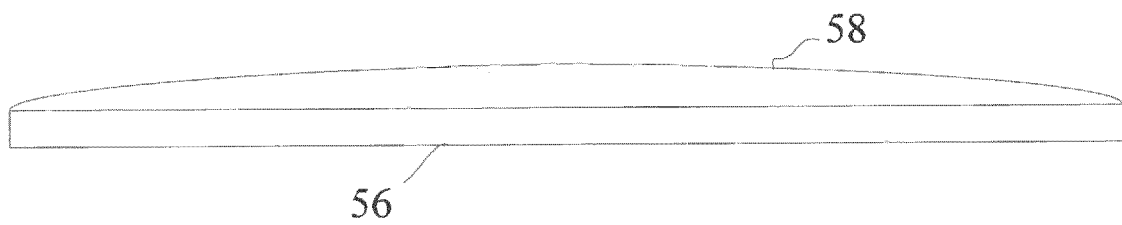


Fig. 6B

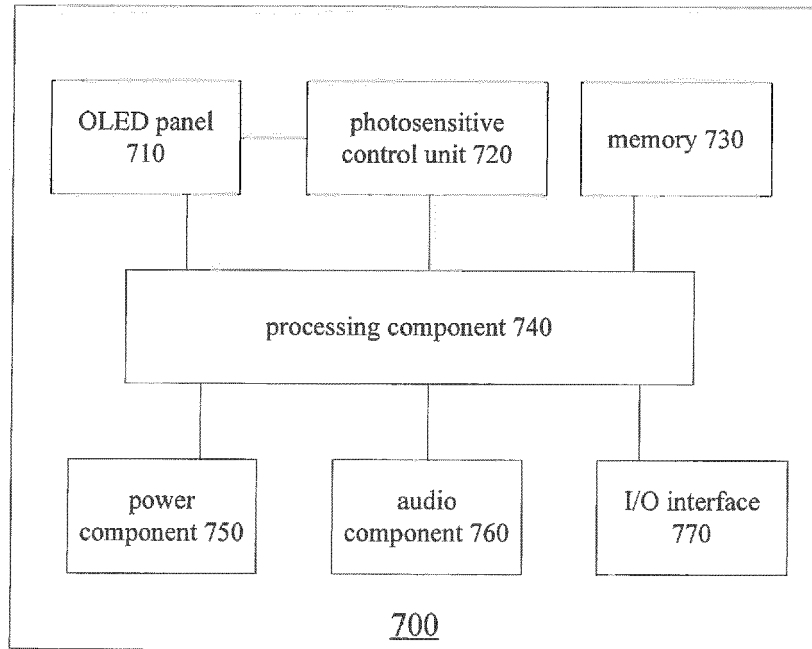


Fig. 7

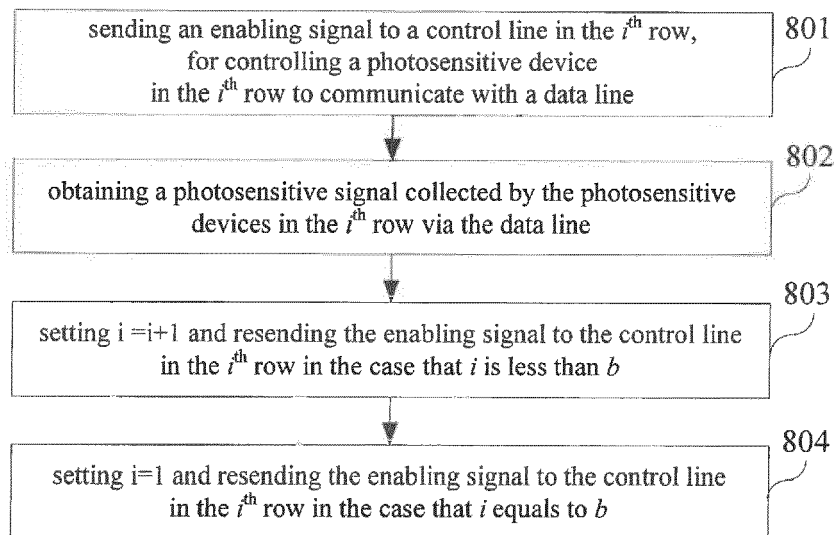


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 16 19 0076

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2010/201275 A1 (COK RONALD S [US] ET AL) 12 August 2010 (2010-08-12) * paragraphs [0035] - [0071]; figures 1,2b,3b,6,7,8,10 *	1-12	INV. H01L27/32
X	US 2007/236428 A1 (TSENG CHANG-HO [TW] ET AL) 11 October 2007 (2007-10-11) * paragraphs [0023] - [0032]; figures 3f-3l *	1-3,5,6,9-12	
X	US 2001/052597 A1 (YOUNG NIGEL D [GB] ET AL) 20 December 2001 (2001-12-20) * paragraphs [0007] - [0047]; figures 1,4,5 *	1-3,9-12	
			TECHNICAL FIELDS SEARCHED (IPC)
			H01L
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 27 March 2017	Examiner Boero, Mauro
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03/02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 19 0076

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-03-2017

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ORM P0459

专利名称(译)	OLED面板，端子和用于控制光敏性的方法		
公开(公告)号	EP3168881A1	公开(公告)日	2017-05-17
申请号	EP2016190076	申请日	2016-09-22
[标]申请(专利权)人(译)	小米科技有限责任公司		
申请(专利权)人(译)	小蜜INC.		
当前申请(专利权)人(译)	小蜜INC.		
[标]发明人	LI GUOSHENG ZHONG GUILIN FENG WEI		
发明人	LI, GUOSHENG ZHONG, GUILIN FENG, WEI		
IPC分类号	H01L27/32		
CPC分类号	H01L27/3227 H01L27/3269 H01L51/50 G09G3/3208 G09G2300/0404 H01L27/3213 H01L27/3248 H04N5/2253 H04N5/2257		
优先权	201510779976.8 2015-11-13 CN		
外部链接	Espacenet		

摘要(译)

本发明提供一种OLED面板，端子及光敏性控制方法，属于显示技术领域。OLED面板包括：阵列基板110；OLED层120设置在阵列基板上；光敏器件阵列130，设置在阵列基板中，或光敏器件阵列，设置在阵列基板和OLED层之间；和连接到光敏器件阵列的控制电路。

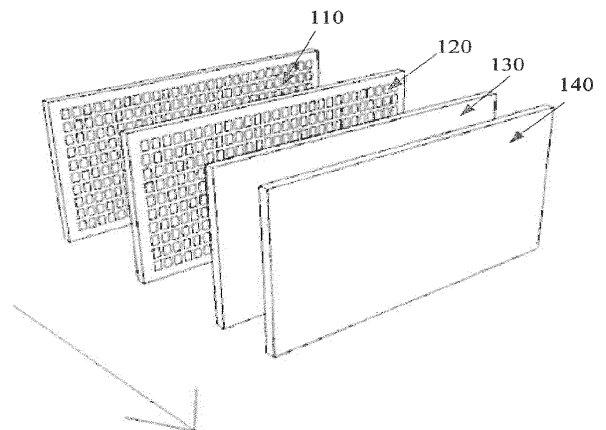


Fig. 1