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(54) **DISPLAY SUBSTRATE, METHOD FOR MANUFACTURING THE SAME AND ELECTRONIC APPARATUS**

(57) The present disclosure relates to a display substrate, a method for manufacturing the same and an electronic apparatus. The display substrate includes: a base (1); a thin film transistor (2), formed on a side of the base

(1); an organic light emitting layer (3), formed on a side of the thin film transistor (2) away from the base (1); and a touch electrode layer (4), formed in the organic light emitting layer (3).

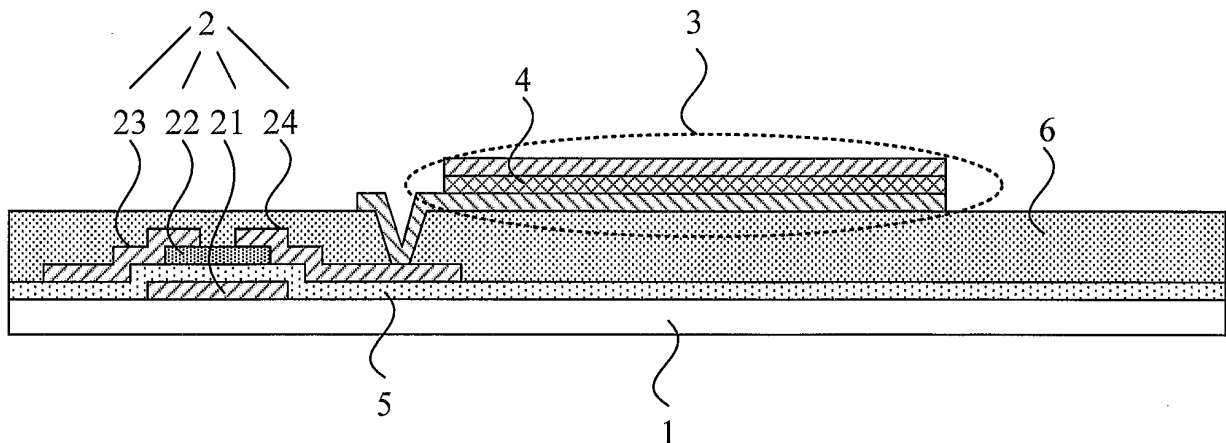


Fig. 1

Description

TECHNICAL FIELD

[0001] The present disclosure generally relates to the field of terminal technology, and more particularly, to a display substrate, a method for manufacturing the same and an electronic apparatus.

BACKGROUND

[0002] As touch functions are applied more and more widely, structures of touch electrodes for recognizing the touch operation are also becoming more and more diversified, so as to be provided at different positions of a display device. However, currently, a majority of the touch electrodes are still manufactured independently of the display device, and the level of the touch electrodes integrating with the display device is low, which results in a cumbersome technological process and large product volume.

SUMMARY

[0003] The present disclosure provides a display substrate, a method for manufacturing the same and an electronic apparatus, to overcome shortcomings in the related art.

[0004] According to a first aspect of embodiments of the present disclosure, there is provided a display substrate, including:

- a base;
- a thin film transistor, formed on a side of the base;
- an organic light emitting layer, formed on a side of the thin film transistor away from the base; and
- a touch electrode layer, formed in the organic light emitting layer.

[0005] Optionally, the organic light emitting layer includes:

- an anode layer, formed on a side of the thin film transistor away from the base;
- a hole injection layer, formed on a side of the anode layer away from the thin film transistor;
- a hole transport layer, formed on a side of the hole injection layer away from the anode layer;
- an organic material layer, formed on a side of the hole transport layer away from the hole injection layer;
- an electron transport layer, formed on a side of the organic material layer away from the hole transport layer;
- an electron injection layer, formed on a side of the electron transport layer away from the organic material layer; and
- a cathode layer, formed on a side of the electron

injection layer away from the electron transport layer.

[0006] Optionally, the touch electrode layer is formed between the anode layer and the hole injection layer, or between the hole injection layer and the hole transport layer, or between the hole transport layer and the organic material layer, or between the organic material layer and the electron transport layer, or between the electron transport layer and the electron injection layer, or between the electron injection layer and the cathode layer.

[0007] Optionally, the display substrate further includes:

- an insulating layer, disposed between the touch electrode layer and a layer structure adjacent to the touch electrode layer.

[0008] Optionally, the touch electrode layer is a self-induction capacitor.

[0009] According to a second aspect of embodiments of the present disclosure, there is provided a method for manufacturing a display substrate, including:

- forming a thin film transistor on a base;
- forming an organic light emitting layer on a side of the thin film transistor away from the base; and
- wherein when the organic light emitting layer is formed, forming a touch electrode layer in the organic light emitting layer.

[0010] Optionally, the forming an organic light emitting layer on a side of the thin film transistor away from the base includes:

- forming an anode layer on a side of the thin film transistor away from the base;
- forming a hole injection layer on a side of the anode layer away from the thin film transistor;
- forming a hole transport layer on a side of the hole injection layer away from the anode layer;
- forming an organic material layer on a side of the hole transport layer away from the hole injection layer;
- forming an electron transport layer on a side of the organic material layer away from the hole transport layer;
- forming an electron injection layer on a side of the electron transport layer away from the organic material layer; and
- forming a cathode layer on a side of the electron injection layer away from the electron transport layer.

[0011] Optionally, forming the touch electrode layer in the organic light emitting layer includes:

- forming the touch electrode layer between the anode layer and the hole injection layer; or
- forming the touch electrode layer between the hole

injection layer and the hole transport layer; or
 forming the touch electrode layer between the hole
 transport layer and the organic material layer; or
 forming the touch electrode layer between the or-
 ganic material layer and the electron transport layer;
 or
 forming the touch electrode layer between the elec-
 tron transport layer and the electron injection layer;
 or
 forming the touch electrode layer between the elec-
 tron injection layer and the cathode layer.

[0012] Optionally, the above manufacturing method further includes:

forming an insulating layer between the touch elec-
 trode layer and a layer structure adjacent to the touch
 electrode layer.

[0013] Optionally, the touch electrode layer is a self-
 induction capacitor.

[0014] According to a third aspect of embodiments of
 the present disclosure, there is provided an electronic
 apparatus, including:

a processor; and
 a memory for storing instructions executable by the
 processor,
 wherein the electronic apparatus further includes a
 display substrate including:
 a base;
 a thin film transistor, formed on a side of the base;
 an organic light emitting layer, formed on a side of
 the thin film transistor away from the base; and
 a touch electrode layer, formed in the organic light
 emitting layer.

[0015] The technical scheme according to embodi-
 ments of the present disclosure may have the following
 beneficial effects.

[0016] Through the above embodiments of the present
 disclosure, a touch electrode layer is formed in the or-
 ganic light emitting layer, which may increase the inte-
 gration level of the display substrate. In addition, since
 an area of the organic light emitting layer may be set
 larger, or even the organic light emitting layer may be
 disposed directly over the thin film transistor and thus a
 touch electrode layer is formed in the organic light emit-
 ting layer, which facilitates setting the touch electrode
 layer to be larger, and further senses touch signals in a
 larger range.

[0017] It is to be understood that both the foregoing
 general description and the following detailed description
 are exemplary and explanatory only and are not restric-
 tive of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The accompanying drawings, which are incor-
 porated in and constitute a part of this specification, il-
 lustrate embodiments consistent with the present disclo-
 sure and, together with the description, serve to explain
 the principles of the present disclosure.

Fig. 1 is a schematic diagram showing a display sub-
 strate according to an exemplary embodiment.

Fig. 2 is a schematic diagram showing an organic
 light emitting layer according to an exemplary em-
 bodiment.

Fig. 3 is a schematic diagram showing an organic
 light emitting layer according to another exemplary
 embodiment.

Fig. 4 is a flow chart showing a method for manufac-
 turing a display substrate according to an exemplary
 embodiment.

Fig. 5 is a flow chart showing a method for manufac-
 turing a display substrate according to another ex-
 emplary embodiment.

Fig. 6 is a flow chart showing a method for manufac-
 turing a display substrate according to yet another
 exemplary embodiment.

Fig. 7 is a schematic diagram showing a display de-
 vice according to an exemplary embodiment.

DETAILED DESCRIPTION

[0019] Reference will now be made in detail to exem-
 plary 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 sim-
 ilar elements unless otherwise represented. The imple-
 mentations set forth in the following description of exem-
 plary embodiments do not represent all implementations
 consistent with the present disclosure. Instead, they are
 merely examples of devices and methods consistent with
 aspects related to the present disclosure as recited in
 the appended claims.

[0020] Fig. 1 is a schematic diagram showing a display
 substrate according to an exemplary embodiment. As
 shown in Fig. 1, the display substrate includes: a base
 1, a thin film transistor 2, an organic light emitting layer
 3 and a touch electrode layer 4.

[0021] In an embodiment, the material of the base may
 be glass. When the display substrate is applied to a flex-
 ible display device, the material of the base may be flex-
 ible resin.

[0022] The thin film transistor 2 is formed on a side of
 the base 1.

[0023] In an embodiment, as shown in Fig. 2, the thin
 film transistor 2 may include structures such as a gate
 electrode 21, an active layer 22, a source electrode 23
 and a drain electrode 24. A gate insulating layer 5 may
 also be provided between the gate electrode 21 and the

active layer 22.

[0024] The organic light emitting layer 3 is formed on a side of the thin film transistor 2 away from the base 1.

[0025] In an embodiment, the organic light emitting layer being formed on a side of the thin film transistor away from the base means that the organic light emitting layer is formed after the thin film transistor is formed. A passivation layer 6 may be provided between the organic light emitting layer 3 and the thin film transistor 2. The organic light emitting layer 3 is electrically connected to the thin film transistor through a via hole in the passivation layer 6. In the embodiment, the thin film transistor may be formed by a patterning process, and the organic light emitting layer may be formed by a vapor deposition process.

[0026] It should be noted that, in Fig. 1, the relationship between sizes and positions of the organic light emitting layer and the thin film transistor is only an example, which may be adjusted as needed. For example, an area of the organic light emitting layer is increased, so that the organic light emitting layer also lies above the thin film transistor. In addition, a pixel defining layer may also be provided between the sub-pixels constituted by the organic light emitting layer, which will not be repeated in the present disclosure.

[0027] The touch electrode layer 4 is formed in the organic light emitting layer 3.

[0028] In an embodiment, the organic light emitting layer may include a multi-layer structure, and the touching electrode layer may be formed between two adjacent layers among the multi-layer structure. In the embodiment, the touch electrode layer may be formed by a patterning process, and a wiring electrically connected to the touch electrode layer may be formed in the display substrate, which will not be repeated herein.

[0029] In an embodiment, a touch electrode layer is formed in the organic light emitting layer, which may increase the integration level of the display substrate. In addition, since an area of the organic light emitting layer may be set to be larger, or even the organic light emitting layer may be disposed directly over the thin film transistor and thus a touch electrode layer is formed in the organic light emitting layer, which facilitates setting a the touch electrode layer with a larger size, and further senses touch signals in a larger range.

[0030] Fig. 2 is a schematic diagram showing an organic light emitting layer according to an exemplary embodiment. The organic light emitting layer includes:

an anode layer 31, formed on a side of the thin film transistor 2 away from the base 1;

a hole injection layer 32, formed on a side of the anode layer 31 away from the thin film transistor 2;

a hole transport layer 33, formed on a side of the hole injection layer 32 away from the anode layer 31;

an organic material layer 34, formed on a side of the hole transport layer 33 away from the hole injection layer 32;

an electron transport layer 35, formed on a side of the organic material layer 34 away from the hole transport layer 33;

an electron injection layer 36, formed on a side of the electron transport layer 35 away from the organic material layer 34; and

a cathode layer 37, formed on a side of the electron injection layer 36 away from the electron transport layer 35.

[0031] Optionally, the touch electrode layer is formed between the anode layer and the hole injection layer, or between the hole injection layer and the hole transport layer, or between the hole transport layer and the organic material layer, or between the organic material layer and the electron transport layer, or between the electron transport layer and the electron injection layer, or between the electron injection layer and the cathode layer.

[0032] In an embodiment, as shown in Fig. 2, the touch electrode layer 4 may be disposed between the hole injection layer 32 and the hole transport layer 33. A specific position of the touch electrode layer may be set as desired. In the embodiment, a positive voltage may be applied to the anode layer, and a negative voltage may be applied to the cathode layer, thus forming a current flowing from the anode layer to the cathode layer. Electrons from the cathode layer sequentially pass through the electron injection layer, the electron transport layer, the organic material layer, the hole transport layer, the hole injection layer, reach the anode layer, and excite the organic material in the organic material layer to emit light when electrons pass through the organic material layer.

[0033] In an embodiment, the organic material layers in all of the sub-pixels emit white light when being excited. A color filter, such as a red filter, a green filter and a blue filter, is required to be provided in a substrate arranged corresponding to the display substrate, so that the lights emitted from the sub-pixels corresponding to the filters with different colors are different in color, and thus the light emission color of the corresponding pixel may be changed by adjusting the light emission intensity of the sub-pixel.

[0034] In an embodiment, the organic material layers in different sub-pixels emit lights with different colors when being excited, for example, they may emit red light, green light and blue light respectively, so that the lights emitted from different sub-pixels are different in color, and thus the light emission color of the corresponding pixel may be changed by adjusting the light emission intensity of the sub-pixel.

[0035] In an embodiment, if a display substrate is applied to a display device of a bottom emission structure, an anode may be formed by transparent conductive material and a cathode may be formed by conductive material with a high reflectivity, so that the light may be emitted from the bottom. If the display substrate is applied to a display device of a top emission structure, a cathode may be formed by transparent conductive material and

an anode may be formed by conductive material with a high reflectivity, so that the light may be emitted from the top. In the embodiment, the transparent conductive material may be ITO (indium tin oxide), and the conductive material with a higher reflectivity may be a metal, such as aluminum or silver.

[0036] Fig. 3 is a schematic diagram showing an organic light emitting layer according to another exemplary embodiment.

[0037] An insulating layer 7 is disposed between the touch electrode layer 4 and a layer structure adjacent to the touch electrode layer 4.

[0038] In an embodiment, for example, on the basis of Fig. 2, an insulating layer may be provided between the touch electrode layer 4 and the hole injection layer 32, and between the touch electrode layer 4 and the hole transport layer 33. Since there are electrons flowing from the cathode layer to the anode layer in respective layer structures in the organic light emitting layer, and electrons may stay in the layer structure adjacent to the touch electrode layer, thereby touch signals generated by the touch electrode layer may be affected. An insulating layer is provided between the touch electrode layer and a layer structure adjacent thereto, so that the touch electrode layer may be less influenced by other layer structures, thereby the accuracy of sensing touch operation of the touch electrode may be improved.

[0039] Optionally, the touch electrode layer is a self-induction capacitor.

[0040] In an embodiment, when a user touches the display device where the above display substrate is applied in, the cathode layer will be located between a finger and the touch electrode layer, thereby generating a shielding effect on the touch signal generated by sensing of the touch electrode layer. The intensity of touch signals generated by the self-induction capacitor sensing the touch operation is large, which is more conducive to obtain accurate touch results.

[0041] Corresponding to the above embodiments of the display substrate, the present disclosure further provides embodiments of a method for manufacturing a display substrate.

[0042] Fig. 4 is a flow chart showing a method for manufacturing a display substrate according to an exemplary embodiment. As shown in Fig. 4, the method includes following steps.

[0043] At step S41, a thin film transistor is formed on a base.

[0044] At step S42, an organic light emitting layer is formed on a side of the thin film transistor away from the base.

[0045] At step S43, when the organic light emitting layer is formed, a touch electrode layer is formed in the organic light emitting layer.

[0046] Fig. 5 is a flow chart showing a method for manufacturing a display substrate according to another exemplary embodiment. On the basis of the embodiment as shown in Fig. 4, the forming an organic light emitting

layer on a side of the thin film transistor away from the base includes following steps.

[0047] At step S421, an anode layer is formed on a side of the thin film transistor away from the base.

5 **[0048]** At step S422, a hole injection layer is formed on a side of the anode layer away from the thin film transistor.

10 **[0049]** At step S423, a hole transport layer is formed on a side of the hole injection layer away from the anode layer.

[0050] At step S424, an organic material layer is formed on a side of the hole transport layer away from the hole injection layer.

15 **[0051]** At step S425, an electron transport layer is formed on a side of the organic material layer away from the hole transport layer.

[0052] At step S426, an electron injection layer is formed on a side of the electron transport layer away from the organic material layer.

20 **[0053]** At step S427, a cathode layer is formed on a side of the electron injection layer away from the electron transport layer.

[0054] Optionally, forming the touch electrode layer in the organic light emitting layer includes:

forming the touch electrode layer between the anode layer and the hole injection layer; or

forming the touch electrode layer between the hole injection layer and the hole transport layer; or

30 forming the touch electrode layer between the hole transport layer and the organic material layer; or

forming the touch electrode layer between the organic material layer and the electron transport layer; or

35 forming the touch electrode layer between the electron transport layer and the electron injection layer; or

forming the touch electrode layer between the electron injection layer and the cathode layer.

40 **[0055]** Fig. 6 is a flow chart showing a method for manufacturing a display substrate according to yet another exemplary embodiment. On the basis of the embodiment as shown in Fig. 5, the above manufacturing method further includes:

at step S44, forming an insulating layer between the touch electrode layer and a layer structure adjacent to the touch electrode layer.

50 **[0056]** It should be noted that, the execution order of the steps in the above-described manufacturing method may be adjusted as needed. For example, step S43 may be performed between step S422 and step S423, and step S44 may be performed between step S422 and step S44, and step S423 and step S44.

55 **[0057]** Optionally, the touch electrode layer is a self-induction capacitor.

[0058] With respect to the manufacturing method according to the above embodiments, specific manners of all the steps have been detailed in the embodiments of the related display substrate, which will not be described repeatedly herein.

[0059] Fig. 7 is a schematic diagram showing a display device 700 according to an exemplary embodiment. For example, the device 700 may be a mobile phone, a computer, a digital broadcast terminal, a messaging device, a gaming console, a tablet, a medical device, exercise equipment, a personal digital assistant, and the like.

[0060] Referring to Fig. 7, the device 700 may include one or more of the following components: a processing component 702, a memory 704, a power component 706, a multimedia component 708, an audio component 710, an input/output (I/O) interface 712, a sensor component 714, and a communication component 716.

[0061] The processing component 702 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 702 may include one or more processors 720 to execute instructions. Moreover, the processing component 702 may include one or more modules which facilitate the interaction between the processing component 702 and other components. For instance, the processing component 702 may include a multimedia module to facilitate the interaction between the multimedia component 708 and the processing component 702.

[0062] The memory 704 is configured to store various types of data to support the operation of 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 704 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.

[0063] The power component 706 provides power to various components of the device 700. The power component 706 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.

[0064] The multimedia component 708 includes a screen providing an output interface between the device 700 and the user. In some embodiments, the screen may include a liquid crystal display (LCD) and a touch panel (TP). If the screen includes the touch panel, the screen may be implemented as a touch screen to receive input signals from the user. The touch panel includes one or more touch sensors to sense touches, swipes, and gestures on the touch panel. The touch sensors may not only

sense a boundary of a touch or swipe action, but also sense a period of time and a pressure associated with the touch or swipe action. In some embodiments, the multimedia component 708 includes a front camera and/or a rear camera. The front camera and/or the rear camera may receive an external multimedia datum while the device 700 is in an operation mode, such as a photographing mode or a video mode. Each of the front camera and the rear camera may be a fixed optical lens system or have focus and optical zoom capability.

[0065] The audio component 710 is configured to output and/or input audio signals. For example, the audio component 710 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 704 or transmitted via the communication component 716. In some embodiments, the audio component 710 further includes a speaker to output audio signals.

[0066] The I/O interface 712 provides an interface between the processing component 702 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.

[0067] The sensor component 714 includes one or more sensors to provide status assessments of various aspects of the device 700. For instance, the sensor component 714 may detect an open/closed status of the device 700, relative positioning of components, e.g., the display and the keypad, of the device 700, a change in position of the device 700 or a component of the device 700, a presence or absence of user contact with the device 700, an orientation or an acceleration/deceleration of the device 700, and a change in temperature of the device 700. The sensor component 714 may include a proximity sensor configured to detect the presence of nearby objects without any physical contact. The sensor component 714 may further include a light sensor, such as a CMOS or CCD image sensor, for use in imaging applications. In some embodiments, the sensor component 714 may further include an accelerometer sensor, a gyroscope sensor, a magnetic sensor, a pressure sensor or a temperature sensor.

[0068] The communication component 716 is configured to facilitate communication, wired or wirelessly, between the device 700 and other devices. The device 700 may access a wireless network based on a communication standard, such as WiFi, 2G, or 3G, or a combination thereof. In one exemplary embodiment, the communication component 716 receives a broadcast signal or broadcast associated information from an external broadcast management system via a broadcast channel. In one exemplary embodiment, the communication component 716 further includes a near field communication (NFC) module to facilitate short-range communications. For example, the NFC module may be implemented based on

a radio frequency identification (RFID) technology, an infrared data association (IrDA) technology, an ultra-wideband (UWB) technology, a Bluetooth (BT) technology, and other technologies.

[0069] In exemplary embodiments, the device 700 may be implemented with one or more application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), controllers, micro-controllers, microprocessors, or other electronic components.

[0070] In exemplary embodiments, there is further provided a non-transitory computer-readable storage medium including instructions, such as included in the memory 704, executable by the processor 720 in the device 700. For example, the non-transitory computer-readable storage medium may be a ROM, a RAM, a CD-ROM, a magnetic tape, a floppy disc, an optical data storage device, and the like.

Claims

1. A display substrate, comprising:
 - a base (1);
 - a thin film transistor (2), formed on a side of the base (1);
 - an organic light emitting layer (3), formed on a side of the thin film transistor (2) away from the base (1); and
 - a touch electrode layer (4), formed in the organic light emitting layer (3).
2. The display substrate of claim 1, wherein the organic light emitting layer (3) comprises:
 - an anode layer (31), formed on a side of the thin film transistor (2) away from the base (1);
 - a hole injection layer (32), formed on a side of the anode layer (31) away from the thin film transistor (2);
 - a hole transport layer (33), formed on a side of the hole injection layer (32) away from the anode layer (31);
 - an organic material layer (34), formed on a side of the hole transport layer (33) away from the hole injection layer (32);
 - an electron transport layer (35), formed on a side of the organic material layer (34) away from the hole transport layer (33);
 - an electron injection layer (36), formed on a side of the electron transport layer (35) away from the organic material layer (34); and
 - a cathode layer (37), formed on a side of the electron injection layer (36) away from the electron transport layer (35).
3. The display substrate of claim 2, wherein the touch electrode layer (4) is formed between the anode layer (31) and the hole injection layer (32), or between the hole injection layer (32) and the hole transport layer (33), or between the hole transport layer (33) and the organic material layer (34), or between the organic material layer (34) and the electron transport layer (35), or between the electron transport layer (35) and the electron injection layer (36), or between the electron injection layer (36) and the cathode layer (37).
4. The display substrate of claim 3, further comprising:
 - an insulating layer (7), disposed between the touch electrode layer (4) and a layer structure adjacent to the touch electrode layer (4).
5. The display substrate of any one of claims 1 to 4, wherein the touch electrode layer (4) is a self-induction capacitor.
6. A method for manufacturing a display substrate, comprising:
 - forming (S41) a thin film transistor (2) on a base (1);
 - forming (S42) an organic light emitting layer (3) on a side of the thin film transistor (2) away from the base (1); and
 - wherein when the organic light emitting layer (3) is formed, forming (S43) a touch electrode layer (4) in the organic light emitting layer (3).
7. The method of claim 6, wherein the forming (S42) an organic light emitting layer (3) on a side of the thin film transistor (2) away from the base (1) comprises:
 - forming (S421) an anode layer (31) on a side of the thin film transistor (2) away from the base (1);
 - forming (S422) a hole injection layer (32) on a side of the anode layer (31) away from the thin film transistor (2);
 - forming (S423) a hole transport layer (33) on a side of the hole injection layer (32) away from the anode layer (31);
 - forming (S424) an organic material layer (34) on a side of the hole transport layer (33) away from the hole injection layer (32);
 - forming (S425) an electron transport layer (35) on a side of the organic material layer (34) away from the hole transport layer (33);
 - forming (S426) an electron injection layer (36) on a side of the electron transport layer (35) away from the organic material layer (34); and
 - forming (S427) a cathode layer (37) on a side of the electron injection layer (36) away from the

electron transport layer (35).

8. The method of claim 7, wherein forming (S43) the touch electrode layer (4) in the organic light emitting layer (3) comprises:

forming the touch electrode layer (4) between the anode layer (31) and the hole injection layer (32); or
 forming the touch electrode layer (4) between the hole injection layer (32) and the hole transport layer (33); or
 forming the touch electrode layer (4) between the hole transport layer (33) and the organic material layer (34); or
 forming the touch electrode layer (4) between the organic material layer (34) and the electron transport layer (35); or
 forming the touch electrode layer (4) between the electron transport layer (35) and the electron injection layer (36); or
 forming the touch electrode layer (4) between the electron injection layer (36) and the cathode layer (37).

9. The method of claim 8, further comprising:

forming (S44) an insulating layer (7) between the touch electrode layer (4) and a layer structure adjacent to the touch electrode layer (4).

10. The method of any one of claims 6 to 9, wherein the touch electrode layer (4) is a self-induction capacitor.

11. An electronic apparatus, comprising:

a processor (720); and
 a memory (704) for storing instructions executable by the processor (720),
 wherein the electronic apparatus further comprises a display substrate comprising:

a base (1);
 a thin film transistor (2), formed on a side of the base (1);
 an organic light emitting layer (3), formed on a side of the thin film transistor (2) away from the base (1); and
 a touch electrode layer (4), formed in the organic light emitting layer (3).

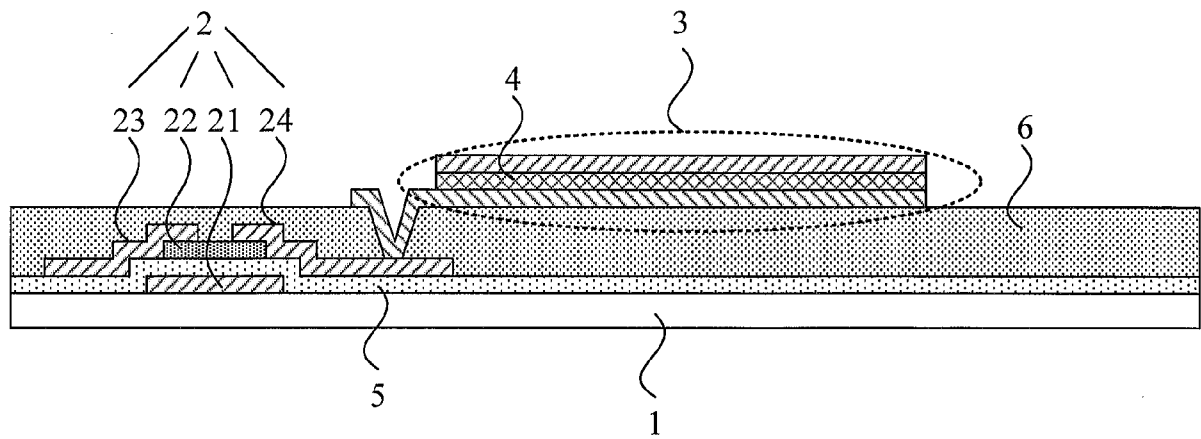


Fig. 1

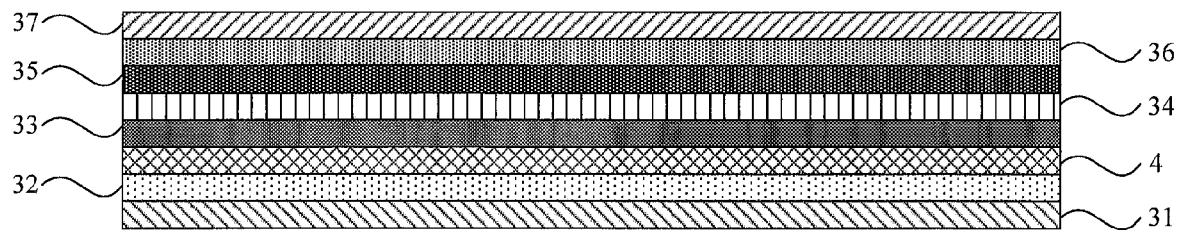


Fig. 2

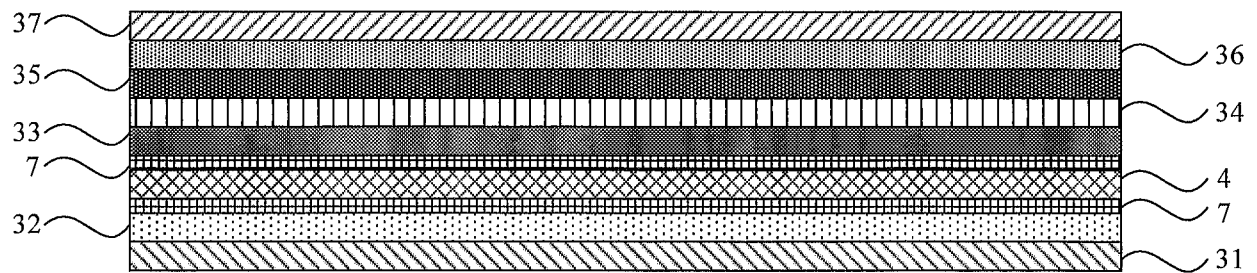


Fig. 3

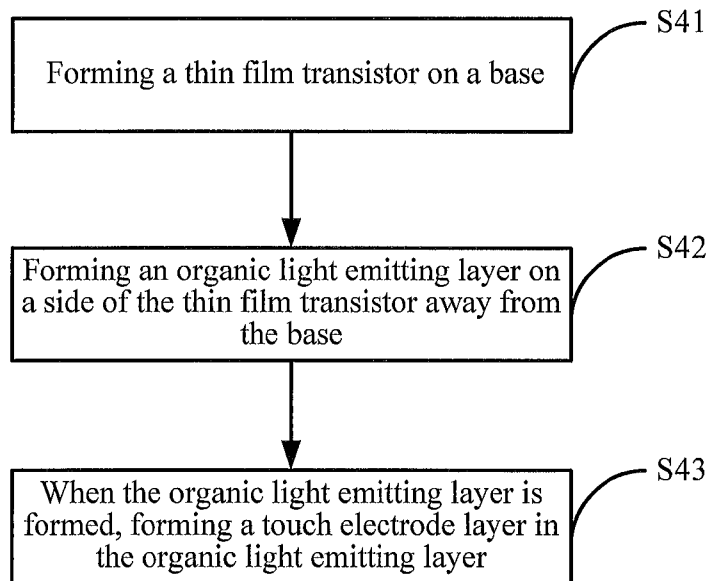


Fig. 4

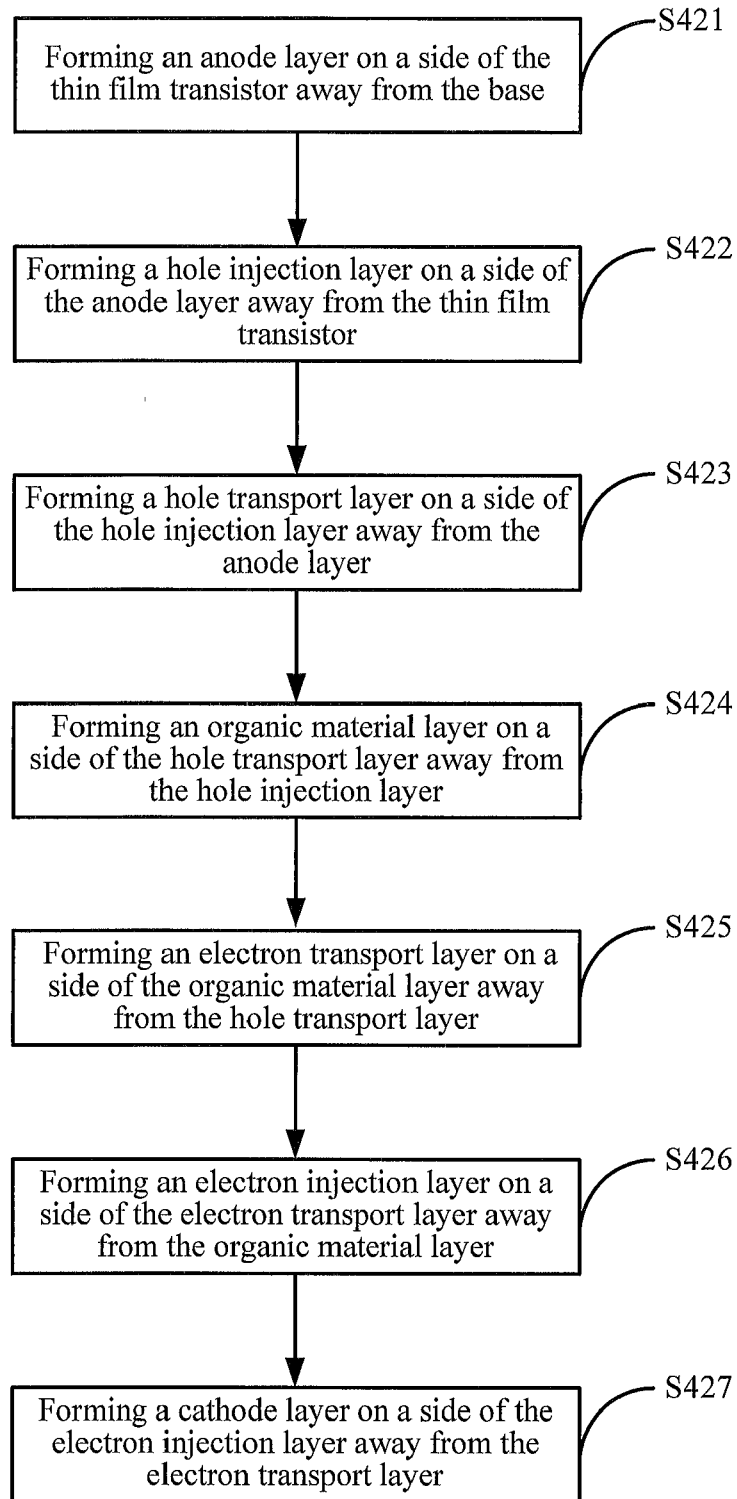


Fig. 5

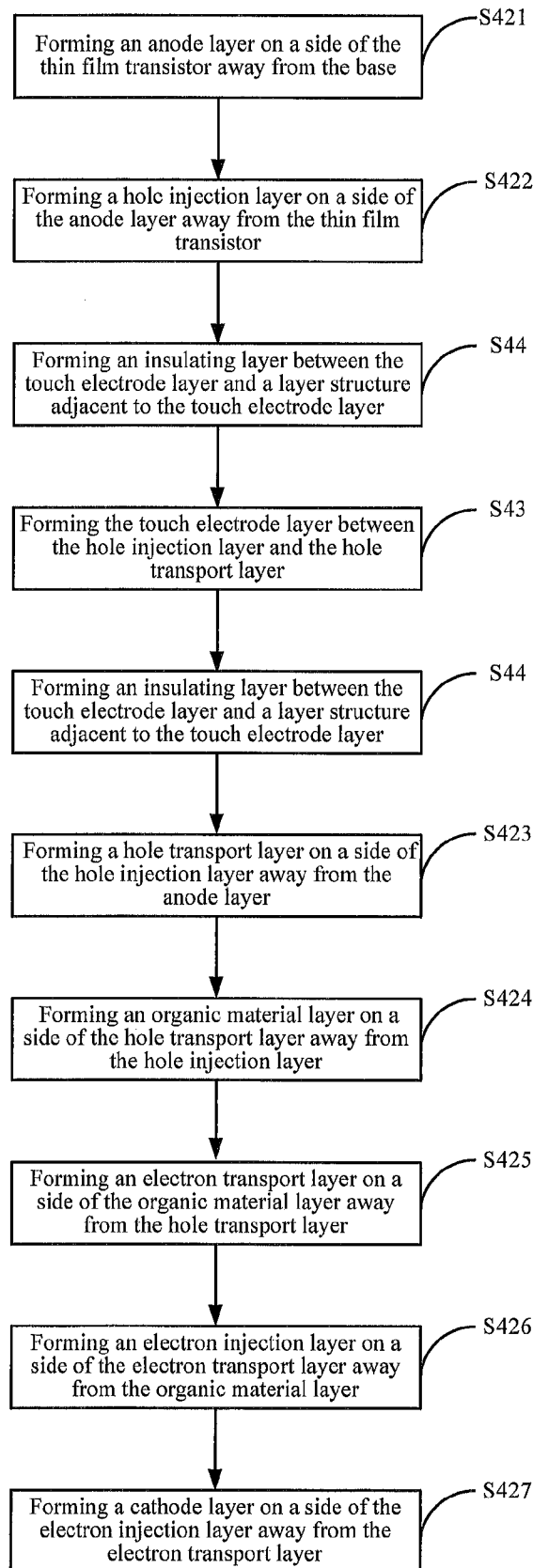


Fig. 6

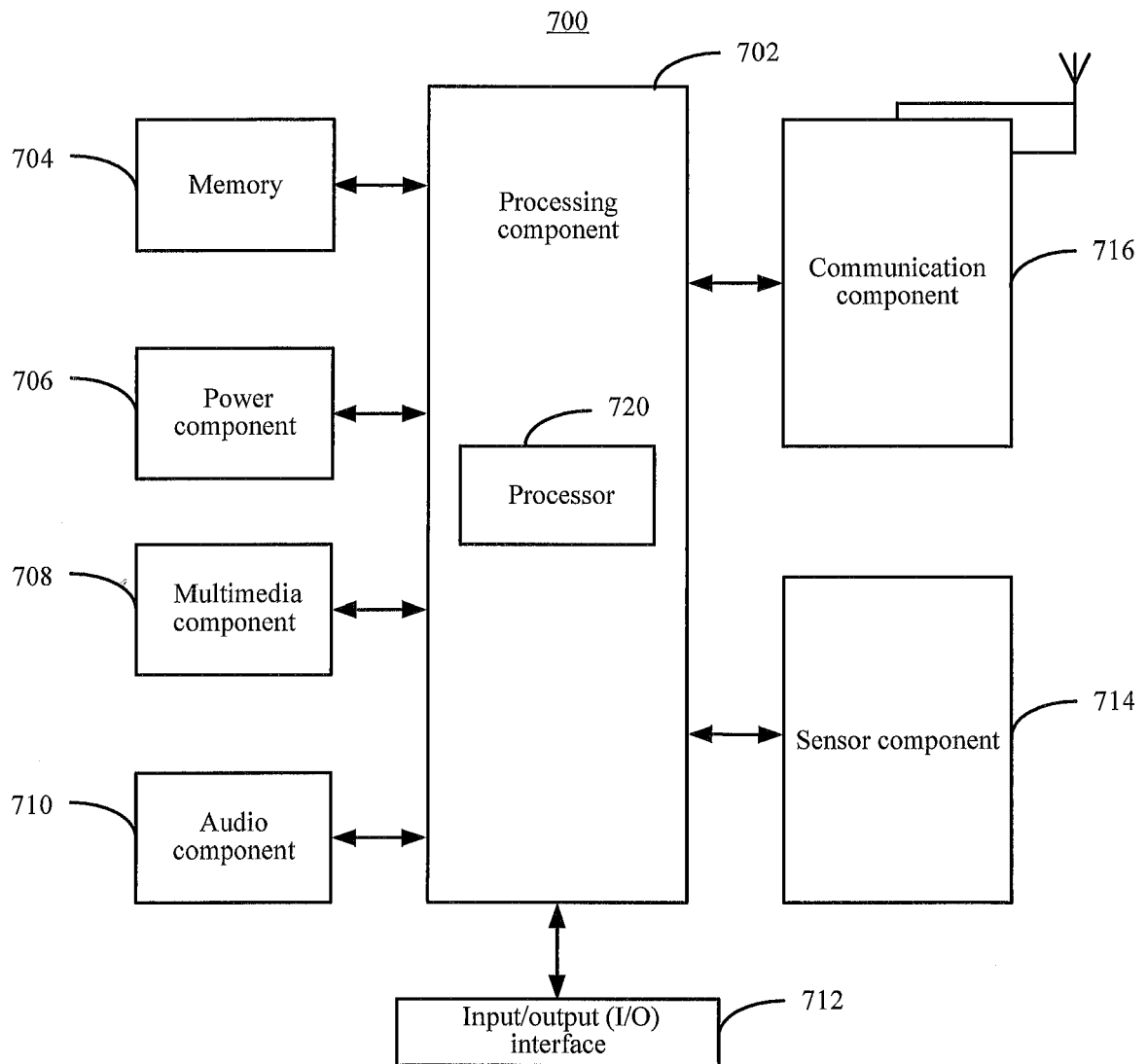


Fig. 7



EUROPEAN SEARCH REPORT

 Application Number
 EP 17 19 8792

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 105 518 863 A (BOE TECHNOLOGY GROUP CO LTD; BEIJING BOE OPTOELECTRONICS TECH CO LTD) 20 April 2016 (2016-04-20)	1,6,11	INV. H01L51/52 H01L27/32
Y	* figure 2 *	2-5,7-10	
X,P	& WO 2017/045133 A1 (BOE TECHNOLOGY GROUP CO LTD [CN]; BEIJING BOE OPTOELECTRONICS TECH CO) 23 March 2017 (2017-03-23)	1,6,11	
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	* figure 1 *		

The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		9 March 2018	Bernabé Prieto, A
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 03/82 (P04C01)

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

EP 17 19 8792

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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.

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专利名称(译)	显示基板，其制造方法和电子设备		
公开(公告)号	EP3316331A1	公开(公告)日	2018-05-02
申请号	EP2017198792	申请日	2017-10-27
[标]申请(专利权)人(译)	北京小米移动软件有限公司		
申请(专利权)人(译)	北京赛美移动软件有限公司		
当前申请(专利权)人(译)	北京赛美移动软件有限公司		
[标]发明人	LIU ANYU		
发明人	LIU, ANYU		
IPC分类号	H01L51/52 H01L27/32		
CPC分类号	G06F3/0412 G06F3/044 G06F2203/04103 H01L27/323 H01L51/56 H01L27/3244 H01L51/5203 H01L27/307 H01L29/786 H01L51/5068 H01L51/5084 H01L51/5221 H01L27/32 H01L51/508		
优先权	201610957966.3 2016-10-27 CN		
外部链接	Espacenet		

摘要(译)

显示基板及其制造方法和电子设备技术领域本发明涉及显示基板，其制造方法和电子设备。该显示基板包括：基座（1）；薄膜晶体管（2），形成在基座（1）的一侧；有机发光层（3），形成在所述薄膜晶体管（2）远离所述基底（1）的一侧；和形成在有机发光层（3）中的触摸电极层（4）。

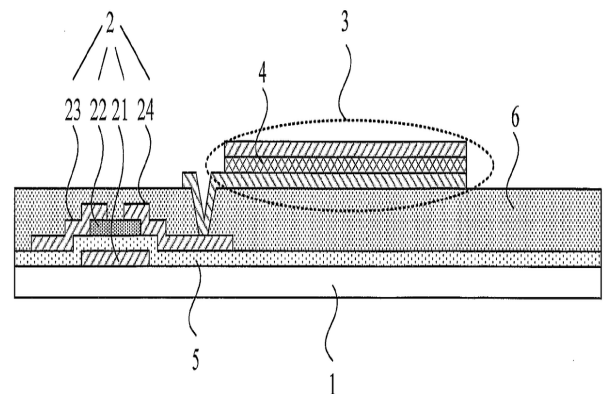


Fig. 1