

**POWER OF ATTORNEY  
and  
CORRESPONDENCE ADDRESS INDICATION FORM**

**Attorney Docket Number:** AUOP0537USA

**Invention title:** ORGANIC LIGHT EMITTING DISPLAY  
HAVING THRESHOLD VOLTAGE  
COMPENSATION MECHANISM AND DRIVING  
METHOD THEREOF

I hereby revoke all previous powers of attorney  
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**POWER OF ATTORNEY**  
**and**  
**CORRESPONDENCE ADDRESS INDICATION FORM**

**Inventor(s):**

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<b>Application Data Sheet 37 CFR 1.76</b>		<b>Attorney Docket Number</b>	AUOP0537USA
		<b>Application Number</b>	
<b>Title of Invention</b>	ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF		
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<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Chun-Yen		Liu		
<b>Residence Information (Select One)</b> <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Hsin-Chu	<b>Country Of Residence<sup>i</sup></b>	TW		
<b>Citizenship under 37 CFR 1.41(b)<sup>i</sup></b>		TW			
<b>Mailing Address of Applicant:</b>					
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<b>Applicant 2</b>					<b>Remove</b>
<b>Applicant Authority</b>		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Chia-Yuan		Yeh		
<b>Residence Information (Select One)</b> <input type="radio"/> US Residency <input checked="" type="radio"/> Non US Residency <input type="radio"/> Active US Military Service					
<b>City</b>	Hsin-Chu	<b>Country Of Residence<sup>i</sup></b>	TW		
<b>Citizenship under 37 CFR 1.41(b)<sup>i</sup></b>		TW			
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<b>Applicant Authority</b>		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117	<input type="radio"/> Party of Interest under 35 U.S.C. 118
<b>Prefix</b>	<b>Given Name</b>	<b>Middle Name</b>	<b>Family Name</b>	<b>Suffix</b>	
	Cheng-Chieh		Tseng		
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<b>City</b>	Hsin-Chu	<b>Country Of Residence<sup>i</sup></b>	TW		

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Citizenship under 37 CFR 1.41(b) i		TW		
<b>Mailing Address of Applicant:</b>				
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Address 2				
City	Hsin-Chu	State/Province		
Postal Code		Country <sup>i</sup>	TW	
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<input type="checkbox"/> An Address is being provided for the correspondence Information of this application.			
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**Application Information:**

Title of the Invention	ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF		
Attorney Docket Number	AUOP0537USA	Small Entity Status Claimed	<input type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	

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<input type="checkbox"/> <b>Request Not to Publish.</b> I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application <b>has not and will not</b> be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	AUOP0537USA
		Application Number	
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Customer Number	27765		

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This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.			
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Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the <b>Add</b> button.			<a href="#">Add</a>

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<a href="#">Remove</a>			
Application Number	Country <sup>i</sup>	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
100109157	TW	2011-03-17	<input checked="" type="radio"/> Yes <input type="radio"/> No
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<b>Application Data Sheet 37 CFR 1.76</b>		Attorney Docket Number	AUOP0537USA
		Application Number	
Title of Invention	ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF		

<b>Signature</b>	/Scott Margo/		<b>Date (YYYY-MM-DD)</b>	2011-11-14	
<b>First Name</b>	Scott	<b>Last Name</b>	Margo	<b>Registration Number</b>	56277

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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Chun-Yen Liu
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	AUOP0537USA

U.S.PATENTS							
Examiner Initial*	Cite No	Patent Number	Kind Code	Issue Date	Name	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1	7038392		2006-05-02	Libsch	all	
	2	7773054		2010-08-10	Jeong	all	
U.S.PATENT APPLICATION PUBLICATIONS							
Examiner Initial*	Cite No	Publication Number	Kind Code	Publication Date	Name	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1						
FOREIGN PATENT DOCUMENTS							
Examiner Initial*	Cite No	Foreign Document Number	Country Code	Kind Code	Publication Date	Name	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1						
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<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Chun-Yen Liu
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	AUOP0537USA

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	
	1		
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**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**  
( Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Chun-Yen Liu
Art Unit	N/A
Examiner Name	N/A
Attorney Docket Number	AUOP0537USA

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

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☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

**SIGNATURE**

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Signature	/Scott Margo/	Date (YYYY-MM-DD)	2011-11-14
Name/Print	Scott Margo	Registration Number	56277

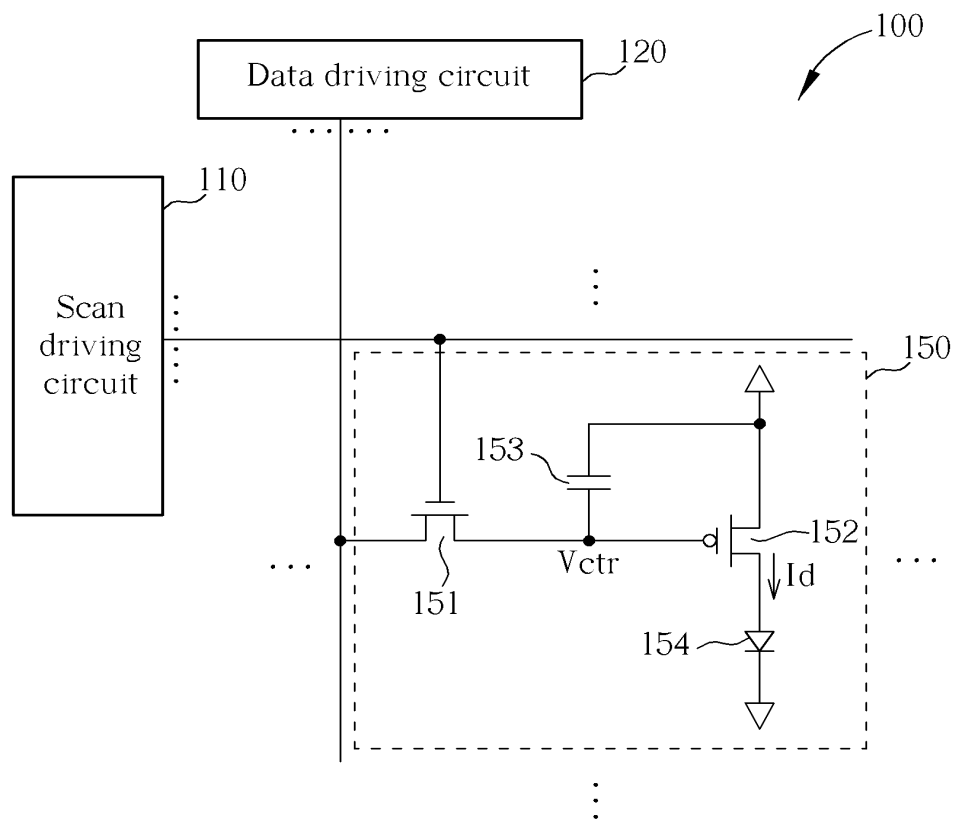


FIG. 1 PRIOR ART

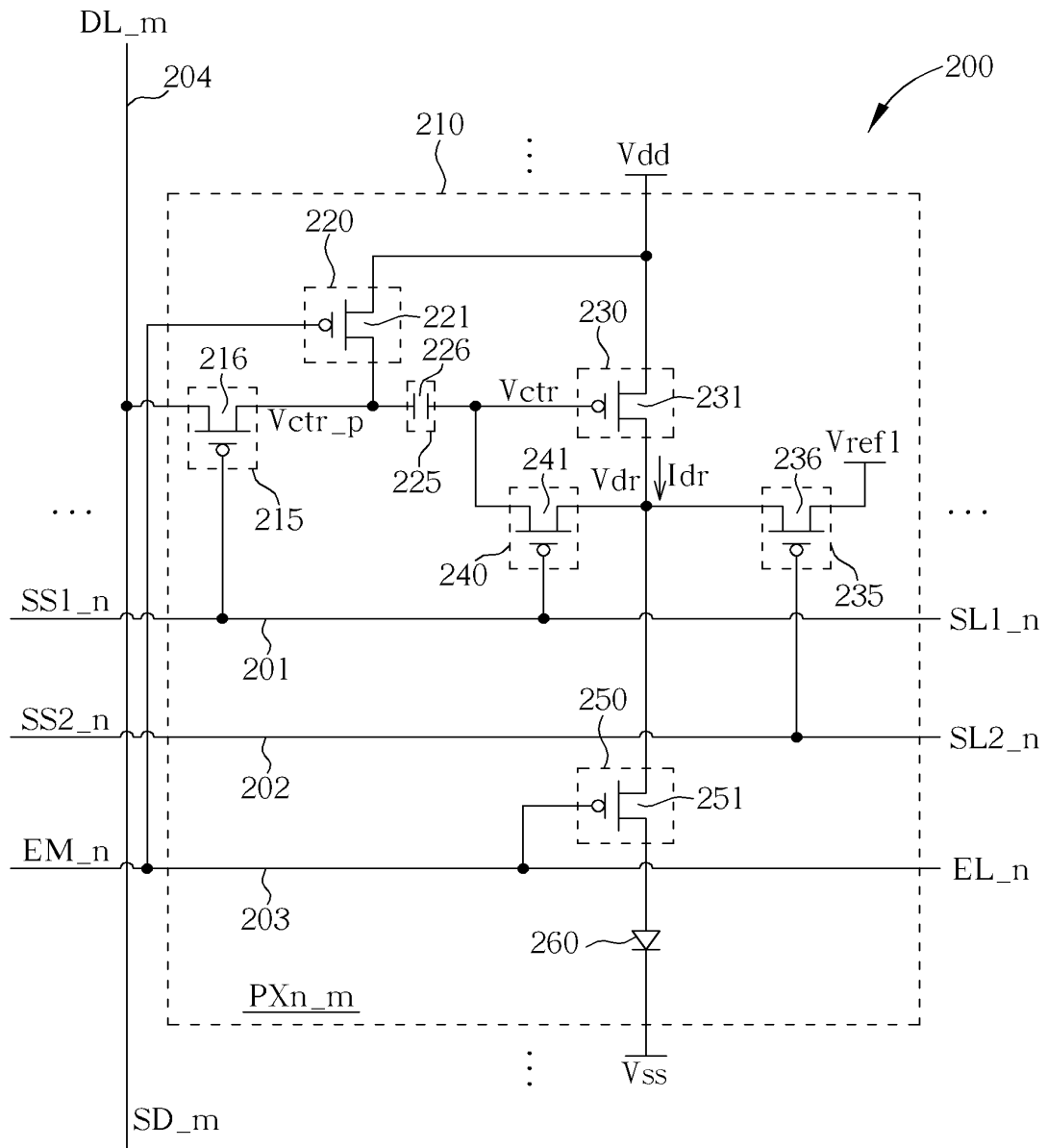


FIG. 2

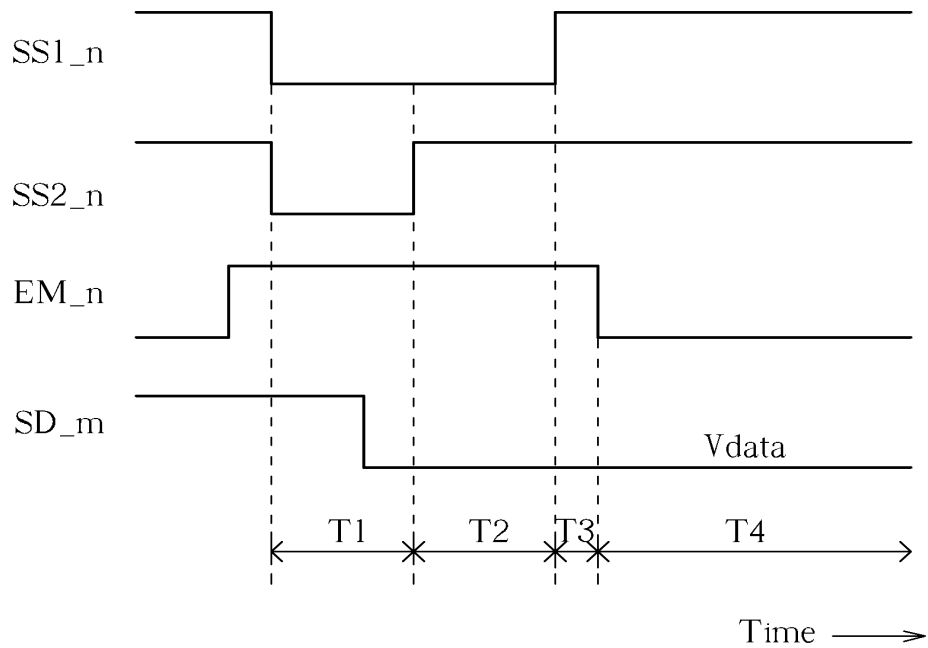


FIG. 3

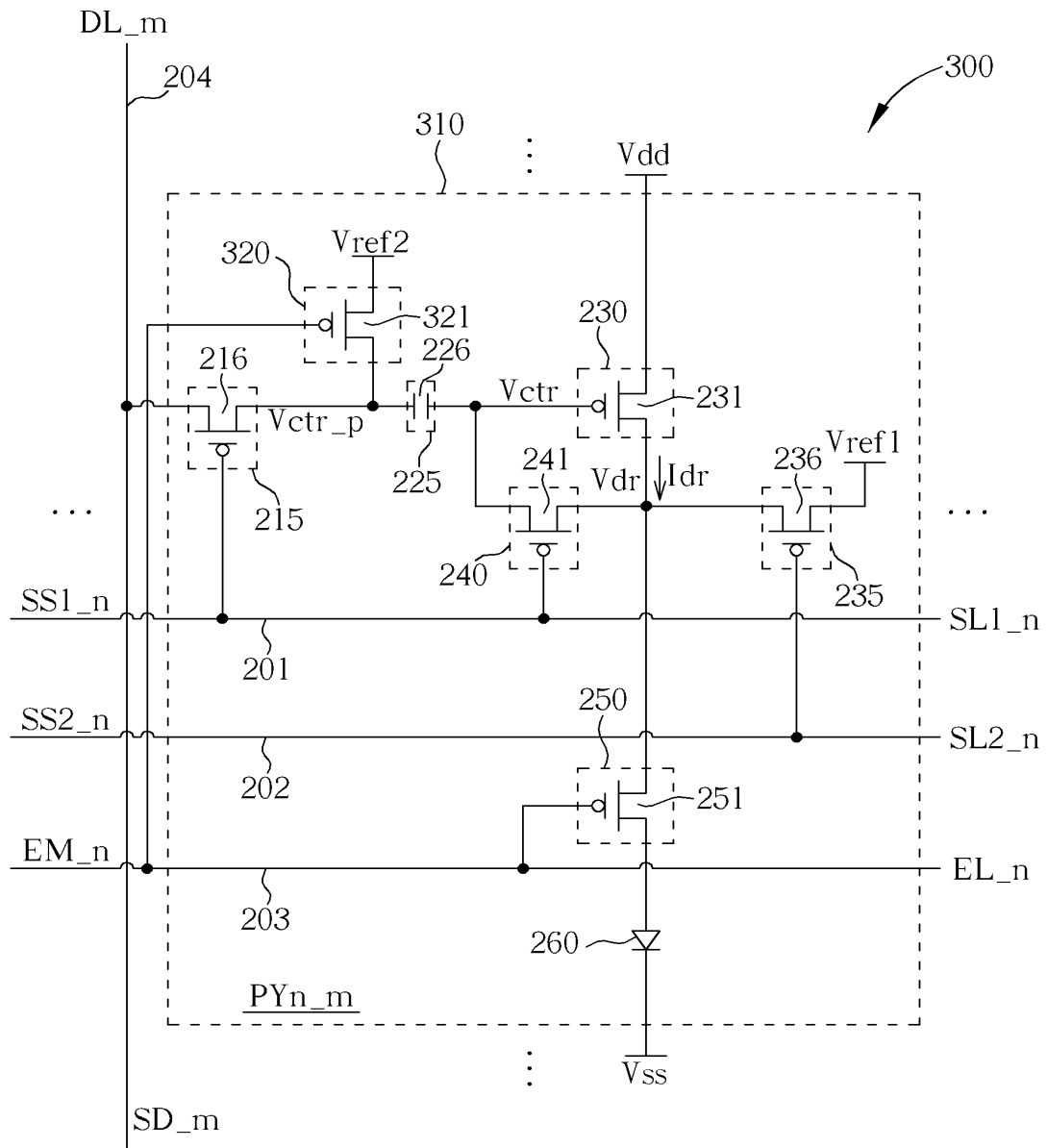


FIG. 4

#### Abstract of Disclosure

An organic light emitting display (OLED) includes a voltage adjustment unit for adjusting a preliminary control voltage according to a second reference voltage, a couple unit for coupling a change of the preliminary control voltage to adjust a control voltage, a driving unit for providing a driving current and a driving voltage according to the control voltage, a first reset unit for resetting the driving voltage according to a first reference voltage, a second reset unit for resetting the control voltage according to the driving voltage, an organic light emitting diode for generating output light according to the driving current, and an emission enable unit for providing a control of furnishing the driving current to the organic light emitting diode. Through the circuit operation of the reset units and the voltage adjustment unit, occurrences of image retention phenomenon and pixel brightness distortion on the OLED screen can be avoided.

## Claims

What is claimed is:

1. An organic light emitting display, comprising:
  - a data line for transmitting a data signal;
  - a first scan line for transmitting a first scan signal;
  - a second scan line for transmitting a second scan signal;
  - a transmission line for transmitting an emission signal;
  - an input unit, electrically connected to the data line and the first scan line, for outputting a preliminary control voltage according to the data signal and the first scan signal;
  - a voltage adjustment unit, electrically connected to the transmission line and the input unit, for adjusting the preliminary control voltage according to the emission signal and a second reference voltage;
  - a couple unit, electrically connected to the input unit and the voltage adjustment unit, for adjusting a control voltage through coupling a change of the preliminary control voltage;
  - a driving unit, electrically connected to the couple unit, for providing a driving current and a driving voltage according to the control voltage and a first power voltage;
  - a first reset unit, electrically connected to the driving unit and the second scan line, for resetting the driving voltage according to the second scan signal and a first reference voltage;
  - a second reset unit, electrically connected to the driving unit, the first reset unit and the first scan line, for resetting the control voltage according to the first scan signal and the driving voltage;
  - an organic light emitting diode for generating output light according to the driving current; and
  - an emission enable unit, electrically connected to the transmission line, the driving unit and the organic light emitting diode, for providing a control of furnishing the driving current to the organic light emitting diode according to the emission signal.



2. The organic light emitting display of claim 1, wherein the input unit comprises a first transistor, the first transistor having a first end electrically connected to the data line, a gate end electrically connected to the first scan line, and a second end electrically connected to the voltage adjustment unit and the couple unit.
3. The organic light emitting display of claim 2, wherein the first transistor comprises a thin film transistor or a field effect transistor.
4. The organic light emitting display of claim 1, wherein the driving unit comprises a second transistor, the second transistor having a first end for receiving the first power voltage, a gate end for receiving the control voltage, and a second end for outputting the driving current and the driving voltage.
5. The organic light emitting display of claim 4, wherein the second transistor comprises a thin film transistor or a field effect transistor.
6. The organic light emitting display of claim 1, wherein the couple unit comprises a capacitor electrically connected between the input unit and the driving unit.
7. The organic light emitting display of claim 1, wherein the first reset unit comprises a third transistor, the third transistor having a first end for receiving the first reference voltage, a gate end electrically connected to the second scan line, and a second end electrically connected to the driving unit, the second reset unit and the emission enable unit.
8. The organic light emitting display of claim 7, wherein the third transistor comprises a thin film transistor or a field effect transistor.

transistor.

9. The organic light emitting display of claim 1, wherein the second reset unit comprises a fourth transistor, the fourth transistor having a first end electrically connected to the driving unit, the first reset unit and the emission enable unit, a gate end electrically connected to the first scan line, and a second end electrically connected to the couple unit and the driving unit.
10. The organic light emitting display of claim 9, wherein the fourth transistor comprises a thin film transistor or a field effect transistor.
11. The organic light emitting display of claim 1, wherein the voltage adjustment unit comprises a fifth transistor, the fifth transistor having a first end for receiving the second reference voltage, a gate end electrically connected to the transmission line, and a second end electrically connected to the input unit and the couple unit.
12. The organic light emitting display of claim 11, wherein the fifth transistor comprises a thin film transistor or a field effect transistor.
13. The organic light emitting display of claim 11, wherein the second reference voltage is the first power voltage.
14. The organic light emitting display of claim 1, wherein the emission enable unit comprises a sixth transistor, the sixth transistor having a first end electrically connected to the driving unit, the first reset unit and the second reset unit, a gate end electrically connected to the transmission line, and a second end electrically connected to the organic light emitting diode.
15. The organic light emitting display of claim 14, wherein the sixth

transistor comprises a thin film transistor or a field effect transistor.

16. The organic light emitting display of claim 1, wherein the organic light emitting diode comprises an anode electrically connected to the emission enable unit and a cathode for receiving a second power voltage.

17. A driving method, comprising:

providing an organic light emitting display having threshold voltage compensation mechanism, the organic light emitting display comprising:

an input unit for outputting a preliminary control voltage according to a data signal and a first scan signal;

a voltage adjustment unit for adjusting the preliminary control voltage according to an emission signal and a second reference voltage;

a couple unit for adjusting a control voltage through coupling a change of the preliminary control voltage;

a driving unit for providing a driving current and a driving voltage according to the control voltage and a power voltage;

a first reset unit for resetting the driving voltage according to a second scan signal and a first reference voltage;

a second reset unit for resetting the control voltage according to the first scan signal and the driving voltage;

an organic light emitting diode for generating output light according to the driving current; and

an emission enable unit for providing a control of furnishing the driving current to the organic light emitting diode according to the emission signal;

providing the first scan signal with a first level to the input unit and the second reset unit, providing the second scan signal with the first level to the first reset unit, providing the emission signal with a second level different from the first level for disabling a voltage adjusting operation of the voltage

adjustment unit and disabling a current furnishing operation of the emission enable unit, and providing the data signal to the input unit during a first interval;

the input unit outputting the preliminary control voltage according to the data signal and the first scan signal during the first interval;

the first reset unit resetting the driving voltage according to the second scan signal and the first reference voltage during the first interval;

the second reset unit resetting the control voltage according to the first scan signal and the driving voltage during the first interval;

switching the second scan signal from the first level to the second level for disabling a resetting operation of the first reset unit during a second interval following the first interval;

the second reset unit and the driving unit performing a threshold voltage compensation operation on the control voltage according to the first scan signal and the power voltage during the second interval;

switching the first scan signal from the first level to the second level for disabling a resetting operation of the second reset unit and disabling an inputting operation of the input unit during a third interval following the second interval;

switching the emission signal from the second level to the first level during a fourth interval following the third interval;

the voltage adjustment unit adjusting the preliminary control voltage according to the emission signal and the second reference voltage during the fourth interval;

the couple unit adjusting the control voltage through coupling a change of the preliminary control voltage during the fourth interval;

the driving unit providing the driving current according to the control voltage and the power voltage during the fourth interval;

the emission enable unit furnishing the driving current to the

organic light emitting diode according to the emission signal during the fourth interval; and  
the organic light emitting diode generating output light according to the driving current during the fourth interval.

18. The driving method of claim 17, wherein the second level is greater than the first level.

19. The driving method of claim 17, wherein the first level is greater than the second level.

20. The driving method of claim 17, wherein the second reference voltage is the power voltage.

21. The driving method of claim 17, wherein a length of the second interval is greater than a length of the first interval.

## Title

ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF

## Background

### 1. Technical Field

**[0001]** The disclosure relates to an organic light emitting display, and more particularly, to an organic light emitting display having threshold voltage compensation mechanism and driving method thereof.

### 2. Description of the Related Art

**[0002]** Because flat panel displays (FPDs) have advantages of thin appearance, low power consumption, and low radiation, various kinds of flat panel displays have been developed and widely applied in a variety of electronic products such as computer monitors, mobile phones, personal digital assistants (PDAs), or flat panel televisions. Among them, active matrix organic light emitting displays (AMOLEDs) have gained more and more attention due to further advantages of self-emitting light source, high brightness, high emission rate, high contrast, fast reaction, wide viewing angle, and extensive range of working temperature.

**[0003]** Fig. 1 is a structure diagram schematically showing a prior-art active matrix organic light emitting display 100. As shown in Fig. 1, the active matrix organic light emitting display 100 comprises a scan driving circuit 110, a data driving circuit 120, and a plurality of pixel units 150. Each pixel unit 150 includes an input transistor 151, a driving transistor 152, a storage capacitor 153, and an organic light emitting diode 154. The scan driving circuit 110 and the data driving circuit 120 are utilized for providing plural scan signals and plural data signals respectively. Each pixel unit 150 is employed to control a driving current  $I_d$  based on corresponding scan and data signals, for controlling the light-emitting operation of one organic light emitting diode 154 disposed therein. However, in the operation of the active matrix organic light emitting display 100, the threshold voltage of the driving transistor 152 has an effect on the driving

current  $I_d$ , and therefore the threshold voltage variation of the driving transistors 152 in the pixel units 150 will cause pixel brightness distortion on the OLED screen, thereby degrading display quality. Besides, the voltage/current hysteresis effect of the driving transistor 152 is likely to incur image retention phenomenon. For instance, if two adjacent pixel units 150 are employed to illustrate a white-color grey level and a black-color grey level respectively in a first frame, and the control voltages  $V_{ctr}$  of the two pixel units 150 are both set to one and the same voltage corresponding to a middle grey level between the white-color and black-color grey levels in a second frame following the first frame, the driving currents  $I_d$  of the two pixel units 150 are then different due to the aforementioned hysteresis effect, which results in edge residual phenomenon.

#### Summary

**[0004]** In accordance with an embodiment, an organic light emitting display having threshold voltage compensation mechanism is provided. The organic light emitting display comprises a data line for transmitting a data signal, a first scan line for transmitting a first scan signal, a second scan line for transmitting a second scan signal, a transmission line for transmitting an emission signal, an input unit, a voltage adjustment unit, a couple unit, a driving unit, a first reset unit, a second reset unit, an emission enable unit, and an organic light emitting diode.

**[0005]** The input unit, electrically connected to the data line and the first scan line, is utilized for outputting a preliminary control voltage according to the data signal and the first scan signal. The voltage adjustment unit, electrically connected to the transmission line and the input unit, is put in use for adjusting the preliminary control voltage according to the emission signal and a second reference voltage. The couple unit, electrically connected to the input unit and the voltage adjustment unit, is employed to adjust a control voltage through coupling a change of the preliminary control voltage. The driving unit, electrically connected to the couple unit,

is used for providing a driving current and a driving voltage according to the control voltage and a power voltage. The first reset unit, electrically connected to the driving unit and the second scan line, is utilized for resetting the driving voltage according to the second scan signal and a first reference voltage. The second reset unit, electrically connected to the driving unit, the first reset unit and the first scan line, is utilized for resetting the control voltage according to the first scan signal and the driving voltage. The emission enable unit, electrically connected to the transmission line, the driving unit and the organic light emitting diode, is employed to provide a control of furnishing the driving current to the organic light emitting diode according to the emission signal. The organic light emitting diode, electrically connected to the emission enable unit, is utilized for generating output light according to the driving current.

**[0006]** In accordance with the embodiment, a driving method for use in the aforementioned organic light emitting display having threshold voltage compensation mechanism is further provided. The driving method comprises providing the first scan signal with a first level to the input unit and the second reset unit, providing the second scan signal with the first level to the first reset unit, providing the emission signal with a second level different from the first level for disabling a voltage adjusting operation of the voltage adjustment unit and disabling a current furnishing operation of the emission enable unit, and providing the data signal to the input unit during a first interval; the input unit outputting the preliminary control voltage according to the data signal and the first scan signal during the first interval; the first reset unit resetting the driving voltage according to the second scan signal and the first reference voltage during the first interval; the second reset unit resetting the control voltage according to the first scan signal and the driving voltage during the first interval; switching the second scan signal from the first level to the second level for disabling a resetting operation of the first reset unit during a second interval following the first interval; the second reset unit and the driving unit performing a



threshold voltage compensation operation on the control voltage according to the first scan signal and the power voltage during the second interval; switching the first scan signal from the first level to the second level for disabling a resetting operation of the second reset unit and disabling an inputting operation of the input unit during a third interval following the second interval; switching the emission signal from the second level to the first level during a fourth interval following the third interval; the voltage adjustment unit adjusting the preliminary control voltage according to the emission signal and the second reference voltage during the fourth interval; the couple unit adjusting the control voltage through coupling a change of the preliminary control voltage during the fourth interval; the driving unit providing the driving current according to the control voltage and the power voltage during the fourth interval; the emission enable unit furnishing the driving current to the organic light emitting diode according to the emission signal during the fourth interval; and the organic light emitting diode generating output light according to the driving current during the fourth interval.

**[0007]** These and other objectives of the present invention will no doubt become obvious to those of ordinary skill in the art after reading the following detailed description of the preferred embodiment that is illustrated in the various figures and drawings.  
Brief Description of the Drawings

**[0008]** Fig. 1 is a structure diagram schematically showing a prior-art active matrix organic light emitting display.

**[0009]** Fig. 2 is a structure diagram schematically showing an organic light emitting display in accordance with a first embodiment.

**[0010]** Fig. 3 is a schematic diagram showing related signal waveforms regarding the operation of the organic light emitting display illustrated in Fig. 2 based on a preferred driving method, having time along the abscissa.

**[0011]** Fig. 4 is a structure diagram schematically showing an organic light emitting display in accordance with a second embodiment.

#### Detailed Description

**[0012]** Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. Here, it is to be noted that the present invention is not limited thereto.

**[0013]** Fig. 2 is a structure diagram schematically showing an organic light emitting display 200 in accordance with a first embodiment. As shown in Fig. 2, the organic light emitting display 200 comprises a plurality of first scan lines 201, a plurality of second scan lines 202, a plurality of transmission lines 203, a plurality of data lines 204, and a plurality of pixel units 210. The first scan lines 201 include a first scan line SL1\_n for transmitting a first scan signal SS1\_n, the second scan lines 202 include a second scan line SL2\_n for transmitting a second scan signal SS2\_n, the transmission lines 203 include a transmission line EL\_n for transmitting an emission signal EM\_n, the data lines 204 include a data line DL\_m for transmitting a data signal SD\_m, and the pixel units 210 include a pixel unit PXn\_m for performing a light-emitting operation according to the first scan signal SS1\_n, the second scan signal SS2\_n, the emission signal EM\_n and the data signal SD\_m. The pixel unit PXn\_m includes an input unit 215, a voltage adjustment unit 220, a couple unit 225, a driving unit 230, a first reset unit 235, a second reset unit 240, an emission enable unit 250 and an organic light emitting diode 260.

**[0014]** The input unit 215, electrically connected to the data line DL\_m and the first scan line SL1\_n, is utilized for outputting a preliminary control voltage Vctr\_p according to the data signal SD\_m and the first scan signal SS1\_n. The voltage adjustment unit 220, electrically connected to the transmission line EL\_n and the input unit 215, is put in use for adjusting the preliminary control voltage Vctr\_p according to the emission signal EM\_n and the first power voltage Vdd. The couple unit 225, electrically connected to the input unit 215 and the voltage adjustment unit 220, is employed to adjust a control voltage Vctr through coupling a change of the preliminary

control voltage  $V_{ctr\_p}$ . The driving unit 230, electrically connected to the couple unit 225, is utilized for providing a driving current  $I_{dr}$  and a driving voltage  $V_{dr}$  according to the control voltage  $V_{ctr}$  and the first power voltage  $V_{dd}$ . The first reset unit 235, electrically connected to the driving unit 230 and the second scan line  $SL2\_n$ , is used for resetting the driving voltage  $V_{dr}$  according to the second scan signal  $SS2\_n$  and a first reference voltage  $V_{ref1}$ . The second reset unit 240, electrically connected to the driving unit 230, the first reset unit 235 and the first scan line  $SL1\_n$ , is used for resetting the control voltage  $V_{ctr}$  according to the first scan signal  $SS1\_n$  and the driving voltage  $V_{dr}$ . The emission enable unit 250, electrically connected to the transmission line  $EL\_n$ , the driving unit 230 and the organic light emitting diode 260, is utilized for providing a control of furnishing the driving current  $I_{dr}$  to the organic light emitting diode 260 according to the emission signal  $EM\_n$ . The organic light emitting diode 260 is employed to generate output light based on the driving current  $I_{dr}$ .

**[0015]** In the embodiment shown in Fig. 2, the input unit 215 comprises a first transistor 216, the couple unit 225 comprises a capacitor 226, the driving unit 230 comprises a second transistor 231, the first reset unit 235 comprises a third transistor 236, the second reset unit 240 comprises a fourth transistor 241, the voltage adjustment unit 220 comprises a fifth transistor 221, the emission enable unit 250 comprises a sixth transistor 251, and the organic light emitting diode 260 comprises an anode electrically connected to the sixth transistor 251 and a cathode for receiving a second power voltage  $V_{ss}$ . The first transistor 216 through the sixth transistor 251 may each be a P-type thin film transistor (TFT) or a P-type field effect transistor (FET). In another embodiment, the first transistor 216 and the third transistor 236 to the sixth transistor 251 may each be an N-type thin film transistor or an N-type field effect transistor, and the second transistor 231 may be a P-type thin film transistor or a P-type field effect transistor.

**[0016]** The first transistor 216 comprises a first end electrically connected to the data line  $DL\_m$ , a gate end electrically connected

to the first scan line SL1\_n, and a second end electrically connected to the fifth transistor 221 and the capacitor 226. The second transistor 231 comprises a first end for receiving the first power voltage Vdd, a gate end for receiving the control voltage Vctr, and a second end for outputting the driving current Idr and the driving voltage Vdr. The capacitor 226 is electrically connected between the second end of the first transistor 216 and the gate end of the second transistor 231. The third transistor 236 comprises a first end for receiving the first reference voltage Vref1, a gate end electrically connected to the second scan line SL2\_n, and a second end electrically connected to the second end of the second transistor 231. The fourth transistor 241 comprises a first end electrically connected to the second end of the second transistor 231, a gate end electrically connected to the first scan line SL1\_n, and a second end electrically connected to the gate end of the second transistor 231. It is noted that the second transistor 231 functions as a diode when the fourth transistor 241 is turned on. The fifth transistor 221 comprises a first end for receiving the first power voltage Vdd, a gate end electrically connected to the transmission line EL\_n, and a second end electrically connected to the second end of the first transistor 216. The sixth transistor 251 comprises a first end electrically connected to the second end of the second transistor 231, a gate end electrically connected to the transmission line EL\_n, and a second end electrically connected to the anode of the organic light emitting diode 260.

**[0017]** Fig. 3 is a schematic diagram showing related signal waveforms regarding the operation of the organic light emitting display 200 illustrated in Fig. 2 based on a preferred driving method, having time along the abscissa. The signal waveforms in Fig. 3, from top to bottom, are the first scan signal SS1\_n, the second scan signal SS2\_n, the emission signal EM\_n, and the data signal SD\_m. Referring to Fig. 3 in conjunction with Fig. 2, during a first interval T1, the first scan line SL1\_n transmits the first scan signal SS1\_n with a first level to the input unit 215 and the second reset unit 240, the second scan line SL2\_n transmits the second scan signal SS2\_n

with the first level to the first reset unit 235, the transmission line EL<sub>n</sub> transmits the emission signal EM<sub>n</sub> with a second level different from the first level for disabling the voltage adjusting operation of the voltage adjustment unit 220 and disabling the current furnishing operation of the emission enable unit 250, and the data line DL<sub>m</sub> transmits the data signal SD<sub>m</sub> to the input unit 215. At this time, the input unit 215 outputs the preliminary control voltage Vctr<sub>p</sub> according to the data signal SD<sub>m</sub> and the first scan signal SS1<sub>n</sub>, the first reset unit 235 resets the driving voltage Vdr according to the second scan signal SS2<sub>n</sub> and the first reference voltage Vref1, and the second reset unit 240 resets the control voltage Vctr according to the first scan signal SS1<sub>n</sub> and the driving voltage Vdr. In view of that, the driving operation of the driving unit 230 is reset for avoiding an occurrence of image retention phenomenon.

**[0018]** During a second interval T2 following the first interval T1, the second scan signal SS2<sub>n</sub> is switched from the first level to the second level for disabling the resetting operation of the first reset unit 235. At this time, the second reset unit 240 and the driving unit 230 perform a threshold voltage compensation operation on the control voltage Vctr according to the first scan signal SS1<sub>n</sub> and the first power voltage Vdd. After the threshold voltage compensation operation, the control voltage Vctr can be expressed as Formula (1) listed below.

$$V_{ctr} = V_{dd} - |V_{th}| \quad \text{Formula (1)}$$

**[0019]** In Formula (1), V<sub>th</sub> represents the threshold voltage of the second transistor 231. In one embodiment, the length of the second interval T2 is greater than the length of the first interval T1, such that the threshold voltage compensation operation may be fully performed.

**[0020]** During a third interval T3 following the second interval T2, the first scan signal SS1<sub>n</sub> is switched from the first level to the second level for disabling the resetting operation of the second reset unit 240 and disabling the inputting operation of the input unit 215. At this time, the preliminary control voltage Vctr<sub>p</sub> is substantially identical to the voltage level Vdata of the data signal SD<sub>m</sub>. During

a fourth interval T4 following the third interval T3, the emission signal EM\_n is switched from the second level to the first level. At this time, the voltage adjustment unit 220 adjusts the preliminary control voltage Vctr\_p according to the emission signal EM\_n and the first power voltage Vdd, and the couple unit 225 adjusts the control voltage Vctr through coupling the change of the preliminary control voltage Vctr\_p. After the voltage adjustment operation, the control voltage Vctr can be expressed as Formula (2) listed below.

$$V_{ctr} = 2V_{dd} - |V_{th}| - V_{data} \quad \text{Formula (2)}$$

**[0021]** Thereafter, the driving unit 230 provides the driving current Idr according to the control voltage Vctr and the first power voltage Vdd, and the driving current Idr provided can be expressed as Formula (3) listed below.

$$I_{dr} = \frac{\beta}{2}(V_{data} - V_{dd})^2 \quad \text{Formula (3)}$$

**[0022]** In Formula (3),  $\beta$  represents a proportional constant. At this time, the emission enable unit 250 furnishes the driving current Idr to the organic light emitting diode 260 according to the emission signal EM\_n, such that the organic light emitting diode 260 is able to generate output light according to the driving current Idr. It is noted that the driving current Idr is not affected by the threshold voltage Vth of the second transistor 231, and therefore the threshold voltage variation regarding the transistors in the driving units of the pixel units 210 has no effect on pixel brightness, thereby avoiding an occurrence of pixel brightness distortion. That is, through the aforementioned reset and threshold voltage compensation operation, occurrences of image retention phenomenon and pixel brightness distortion on the OLED screen can be avoided, for achieving high image display quality.

**[0023]** It is noted that, in the preferred driving method described above, if the first transistor 216 and the third transistor 236 to the sixth transistor 251 are P-type thin film transistors or P-type field effect transistors, the second level is greater than the first level. Alternatively, if the first transistor 216 and the third transistor 236 to the sixth transistor 251 are N-type thin film

transistors or N-type field effect transistors, the first level is greater than the second level.

**[0024]** Fig. 4 is a structure diagram schematically showing an organic light emitting display 300 in accordance with a second embodiment. As shown in Fig. 4, the organic light emitting display 300 is similar to the organic light emitting display 200 shown in Fig. 2, differing in that the pixel units 210 are replaced with a plurality of pixel units 310, wherein the pixel unit PX<sub>n</sub>\_m is replaced with a pixel unit PY<sub>n</sub>\_m. Further, the pixel unit PY<sub>n</sub>\_m is similar to the pixel unit PX<sub>n</sub>\_m, differing primarily in that the voltage adjustment unit 220 is replaced with a voltage adjustment unit 320. The voltage adjustment unit 320, electrically connected to the transmission line EL<sub>n</sub>, the input unit 215 and the couple unit 225, is utilized for adjusting the preliminary control voltage Vctr\_p according to the emission signal EM<sub>n</sub> and a second reference voltage Vref2. In the embodiment shown in Fig. 4, the voltage adjustment unit 320 includes a fifth transistor 321 which may be a thin film transistor or a field effect transistor. The fifth transistor 321 comprises a first end for receiving the second reference voltage Vref2, a gate end electrically connected to the transmission line EL<sub>n</sub>, and a second end electrically connected to the second end of the first transistor 216.

**[0025]** In the display operation of the organic light emitting display 300, after the voltage adjustment unit 320 adjusts the preliminary control voltage Vctr\_p according to the emission signal EM<sub>n</sub> and the second reference voltage Vref2, and the couple unit 225 adjusts the control voltage Vctr through coupling a change of the preliminary control voltage Vctr\_p, the control voltage Vctr adjusted can be expressed as Formula (4) listed below.

$$V_{ctr} = V_{dd} - |V_{th}| + V_{ref2} - V_{data} \quad \text{Formula (4)}$$

**[0026]** Thereafter, the driving unit 230 provides the driving current Idr according to the control voltage Vctr of Formula (4) and the first power voltage Vdd, and the driving current Idr provided can be expressed as Formula (5) listed below.

$$I_{dr} = \frac{\beta}{2} (V_{data} - V_{ref2})^2 \quad \text{Formula (5)}$$

**[0027]** As shown in Formula (5), neither the threshold voltage  $V_{th}$  of the second transistor 231 nor the first power voltage  $V_{dd}$  has an effect on the driving current  $I_{dr}$ . For that reason, the voltage drop occurring to a conductive line for transmitting the first power voltage  $V_{dd}$  has no effect on the driving current  $I_{dr}$ , and therefore an occurrence of pixel brightness distortion on the OLED screen due to the trace resistance of aforementioned conductive line can also be avoided, for improving image display quality of large-size display panels.

**[0028]** To sum up, with the aid of the reset and threshold voltage compensation mechanism according to the present invention described above, occurrences of image retention phenomenon and pixel brightness distortion can be avoided in the operation of the organic light emitting display, thereby achieving high image display quality on the OLED screen.

**[0029]** The present invention is by no means limited to the embodiments as described above by referring to the accompanying drawings, which may be modified and altered in a variety of different ways without departing from the scope of the present invention. Thus, it should be understood by those skilled in the art that various modifications, combinations, sub-combinations and alternations might occur depending on design requirements and other factors insofar as they are within the scope of the appended claims or the equivalents thereof.



Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF		
First Named Inventor/Applicant Name:		Chun-Yen Liu		
Filer:		Winston Hsu/Eve Hsieh		
Attorney Docket Number:		AUOP0537USA		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
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Basic Filing:				
Utility application filing	1011	1	380	380
Utility Search Fee	1111	1	620	620
Utility Examination Fee	1311	1	250	250
Pages:				
Claims:				
Claims in excess of 20	1202	1	60	60
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
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Post-Allowance-and-Post-Issuance:				
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<b>Title of Invention:</b>	ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF
<b>First Named Inventor/Applicant Name:</b>	Chun-Yen Liu
<b>Customer Number:</b>	27765
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<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Oath or Declaration filed	1245230.PDF	439786	no	4
			5299e1df8ab309e854398bbbcfd920d560729f2a		
<b>Warnings:</b>					
<b>Information:</b>					
2	Power of Attorney	1245229.PDF	128808	no	2
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<b>Information:</b>					
3	Application Data Sheet	1244985.PDF	871700	no	5
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<b>Information:</b>					
4	Information Disclosure Statement (IDS) Form (SB08)	1244972.PDF	28648	no	3
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5	Drawings-only black and white line drawings	1244889.PDF	46426	no	4
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6	Abstract	1244888.PDF	22393	no	1
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7	Claims	1244887.PDF	31394	no	6
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<b>Information:</b>					

8	Specification	1244886.PDF	90829 e4076de2e77bef9305b7962a9ac2cd8bab48b7f5	no	11
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<b>Information:</b>					
9	Fee Worksheet (SB06)	fee-info.pdf	36495 75fd1b73a1c0b26c6538c4b0ae2f0f1b3b26998a	no	2
<b>Warnings:</b>					
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<b>DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION</b>		Attorney Docket Number	AUOP0537USA
		First Named Inventor	Chun-Yen Liu
<input checked="" type="checkbox"/> Declaration Submitted With Initial Filing      OR <input type="checkbox"/> Declaration Submitted After Initial Filing (surcharge (37 CFR 1.16(f)) required)		COMPLETE IF KNOWN	
		Application Number	
		Filing Date	
		Art Unit	
		Examiner Name	

I hereby declare that: (1) Each inventor's residence, mailing address, and citizenship are as stated below next to their name; and (2) I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention titled:

ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM  
AND DRIVING METHOD THEREOF

(Title of the Invention)

the application of which

☒ is attached hereto

OR

☐ was filed on (MM/DD/YYYY) \_\_\_\_\_ as United States Application Number or PCT International  
Application Number \_\_\_\_\_ and was amended on (MM/DD/YYYY) \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

#### Authorization To Permit Access To Application by Participating Offices

☒ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

[Page 1 of 3]

Appl.Case#AU1012074



## DECLARATION — Utility or Design Patent Application

### Claim of Foreign Priority Benefits

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
100109157	TW	03/17/2011	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application number(s) are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

[Page 2 of 3]

Appl. Case#AU1012074



# DECLARATION — Utility or Design Patent Application

Direct all correspondence to:	<input checked="" type="checkbox"/>	The address associated with Customer Number:	27765	OR	<input type="checkbox"/>	Correspondence address below
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NAME OF SOLE OR FIRST INVENTOR:		<input type="checkbox"/> A petition has been filed for this unsigned inventor				
Given Name (first and middle [if any])		Family Name or Surname				
Chun-Yen		Liu				
Inventor's Signature				Date		
Chun-Yen Liu				2011/11/04		
Citizenship						
TW						
<input checked="" type="checkbox"/> Additional inventors or a legal representative are being named on the 1 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto						

[Page 3 of 3]

Appl. Case#AU1012074





DECLARATION		ADDITIONAL INVENTOR(S) Supplemental Sheet	
		Page <u>1</u> of <u>1</u>	
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
Chia-Yuan		Yeh	
Inventor's Signature Chia-Yuan Yeh		Date 2011/11/04	
Citizenship TW			
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
Cheng-Chieh		Tseng	
Inventor's Signature Cheng-Chieh Tseng		Date 2011/11/04	
Citizenship TW			
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
Inventor's Signature		Date	
Citizenship			
Name of Additional Joint Inventor, if any:		<input type="checkbox"/> A petition has been filed for this unsigned inventor	
Given Name (first and middle (if any))		Family Name or Surname	
Inventor's Signature		Date	
Citizenship			

Appl. Case#AU1012074





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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO.	TOT CLAIMS	IND CLAIMS
13/296,238	11/15/2011	2838	1310	AUOP0537USA	21	2

CONFIRMATION NO. 9731

FILING RECEIPT

27765  
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION  
P.O. BOX 506  
MERRIFIELD, VA 22116



OC000000051147984

Date Mailed: 12/01/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

**Applicant(s)**

Chun-Yen Liu, Hsin-Chu, TAIWAN;  
Chia-Yuan Yeh, Hsin-Chu, TAIWAN;  
Cheng-Chieh Tseng, Hsin-Chu, TAIWAN;

**Power of Attorney:** The patent practitioners associated with Customer Number 27765

**Domestic Priority data as claimed by applicant**

**Foreign Applications** (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)  
TAIWAN 100109157 03/17/2011

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

**If Required, Foreign Filing License Granted:** 11/25/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/296,238**

**Projected Publication Date:** 09/20/2012

**Non-Publication Request:** No

**Early Publication Request:** No

**Title**

ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION  
MECHANISM AND DRIVING METHOD THEREOF

**Preliminary Class**

363

**PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES**

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA

**CONFIRMATION NO. 9731**

**POA ACCEPTANCE LETTER**

27765  
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION  
P.O. BOX 506  
MERRIFIELD, VA 22116



Date Mailed: 12/01/2011

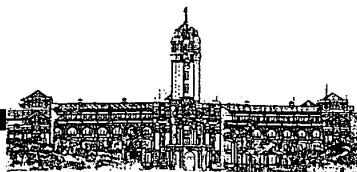
**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 11/15/2011.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/hnguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



AUO-537

USA

Priority Document for

USA Appl. No. 13/296,738

中華民國經濟部智慧財產局

INTELLECTUAL PROPERTY OFFICE  
MINISTRY OF ECONOMIC AFFAIRS  
REPUBLIC OF CHINA

茲證明所附文件，係本局存檔中原申請案的副本，正確無訛，  
其申請資料如下：

This is to certify that annexed is a true copy from the records of this office of  
the application as originally filed which is identified hereunder：

申請日：西元 2011 年 03 月 17 日  
Application Date Mar. 17, 2011

申請案號：100109157  
Application No.

申請人：友達光電股份有限公司  
Applicant(s)

發明人 / 創作人：劉俊彥、葉佳元、曾卿杰  
Inventor(s)

局長  
Director General

王美花

西元 2011 年 05 月 03 日  
May. 3, 2011



# 發明專利說明書

(本說明書格式、順序，請勿任意更動，※記號部分請勿填寫)

※申請案號：

※申請日：

※IPC 分類：

## 一、發明名稱：(中文/英文)

具臨界電壓補償機制之有機發光顯示裝置及其驅動方法/ORGANIC  
LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE  
COMPENSATION MECHANISM AND DRIVING METHOD THEREOF

## 二、中文發明摘要：

一種有機發光顯示裝置，其包含用來根據第二參考電壓以調整前置控制電壓的電壓調整單元、用來對前置控制電壓之電壓變化執行耦合運作以調整控制電壓的耦合單元、用來根據控制電壓以提供驅動電流與驅動電壓的驅動單元、用來根據第一參考電壓以重置驅動電壓的第一重置單元、用來根據驅動電壓以重置控制電壓的第二重置單元、用來根據驅動電流以產生輸出光的有機發光二極體、以及用來控制將驅動電流饋入至有機發光二極體之運作的發光致能單元。藉由重置單元與電壓調整單元的電路運作，可避免影像殘留現象與畫素亮度失真發生於有機發光顯示螢幕。

## 三、英文發明摘要：

An organic light emitting display (OLED) includes a voltage adjustment unit for adjusting a preliminary control voltage according to a second reference voltage, a couple unit for coupling a change of the preliminary control voltage to adjust a control voltage, a driving unit for



providing a driving current and a driving voltage according to the control voltage, a first reset unit for resetting the driving voltage according to a first reference voltage, a second reset unit for resetting the control voltage according to the driving voltage, an organic light emitting diode for generating output light according to the driving current, and an emission enable unit for providing a control of furnishing the driving current to the organic light emitting diode. Through the circuit operation of the reset units and the voltage adjustment unit, occurrences of image retention phenomenon and pixel brightness distortion on the OLED screen can be avoided.




#### 四、指定代表圖：

(一)本案指定代表圖為：第（ 2 ）圖。

(二)本代表圖之元件符號簡單說明：


200	有機發光顯示裝置
201	第一掃描線
202	第二掃描線
203	傳輸線
204	資料線
210	畫素單元
215	輸入單元
216	第一電晶體
220	電壓調整單元
221	第五電晶體
225	耦合單元
226	電容
230	驅動單元
231	第二電晶體
235	第一重置單元
236	第三電晶體
240	第二重置單元



241	第四電晶體
250	發光致能單元
251	第六電晶體
260	有機發光二極體
DL_m	資料線
EL_n	傳輸線
EM_n	發光訊號
Idr	驅動電流
PXn_m	畫素單元
SD_m	資料訊號
SL1_n	第一掃描線
SL2_n	第二掃描線
SS1_n	第一掃描訊號
SS2_n	第二掃描訊號
Vctr	控制電壓
Vctr_p	前置控制電壓
Vdd	第一電源電壓
Vdr	驅動電壓
Vrefl	第一參考電壓
Vss	第二電源電壓

五、本案若有化學式時，請揭示最能顯示發明特徵的化學式：

無



## 六、發明說明：

### 【發明所屬之技術領域】

本發明係有關於一種有機發光顯示裝置，尤指一種具臨界電壓補償機制之有機發光顯示裝置及其驅動方法。

### 【先前技術】

平面顯示裝置(Flat Panel Display) 具有外型輕薄、省電以及無輻射等優點，所以被廣泛地應用於電腦螢幕、行動電話、個人數位助理(PDA)、平面電視等電子產品上。在各種平面顯示裝置中，主動式矩陣有機發光顯示裝置(Active Matrix Organic Light Emitting Display; AMOLED)更具有自發光、高亮度、高發光效率、高對比、反應速度快、廣視角、以及可使用溫度範圍大等進一步之優點，因此此在平面顯示裝置的市場上極具競爭性。

第 1 圖為習知主動式矩陣有機發光顯示裝置的結構示意圖。如第 1 圖所示，主動式矩陣有機發光顯示裝置 100 包含掃描驅動電路 110、資料驅動電路 120、以及複數畫素單元 150。每一畫素單元 150 包含輸入電晶體 151、驅動電晶體 152、儲存電容 153 以及有機發光二極體(Organic Light Emitting Diode; OLED)154。掃描驅動電路 110 與資料驅動電路 120 分別用來提供複數掃描訊號與複數資料訊號。每一畫素單元 150 即根據對應掃描訊號與對應資料訊號控制驅動電流  $I_d$ ，進而控制有機發光二極體 154 的發光運作。然而，在主動式矩陣有機發光顯示裝置 100 的運作中，驅動電流  $I_d$  係受驅動電晶體

152 之臨界電壓所影響，故複數畫素單元 150 之驅動電晶體 152 的臨界電壓誤差會導致畫素亮度失真而降低顯示品質。此外，驅動電晶體 152 之電壓/電流磁滯(Hysteresis)效應則可能導致影像殘留現象，譬如若二相鄰畫素單元 150 於第一畫面內係分別用以顯示白色灰階與黑色灰階，且在相續第一畫面之第二畫面的驅動運作中，該兩畫素單元 150 之控制電壓  $V_{ctr}$  均被設為對應於中間灰階的相同電壓，則該兩畫素單元 150 之驅動電流  $I_d$  會因上述磁滯效應而相異，從而導致邊緣殘影現象。

#### 【發明內容】

依據本發明之實施例，揭露一種具臨界電壓補償機制之有機發光顯示裝置，其包含一用來傳輸資料訊號的資料線、一用來傳輸第一掃描訊號的第一掃描線、一用來傳輸第二掃描訊號的第二掃描線、一用來傳輸發光訊號的傳輸線、一電連接於資料線與第一掃描線的輸入單元、一電連接於傳輸線與輸入單元的電壓調整單元、一電連接於輸入單元與電壓調整單元的耦合單元、一電連接於耦合單元的驅動單元、一電連接於驅動單元與第二掃描線的第一重置單元、一電連接於驅動單元、第一重置單元與第一掃描線的第二重置單元、一電連接於傳輸線與驅動單元的發光致能單元、以及一電連接於發光致能單元的有機發光二極體。輸入單元係用來根據資料訊號與第一掃描訊號以輸出前置控制電壓。電壓調整單元係用來根據發光訊號與第二參考電壓以調整前置控制電壓。耦合單元係用來對前置控制電壓之電壓變化執行耦合運作以調整控制電壓。驅動單元

係用來根據控制電壓與電源電壓以提供驅動電流與驅動電壓。第一重置單元係用來根據第二掃描訊號與第一參考電壓以重置驅動電壓。第二重置單元係用來根據第一掃描訊號與驅動電壓以重置控制電壓。發光致能單元係用來根據發光訊號控制將驅動電流饋入至有機發光二極體的運作。有機發光二極體係用來根據驅動電流以產生輸出光。

本發明另揭露一種用於上述具臨界電壓補償機制之有機發光顯示裝置的驅動方法，其包含：於第一時段內，提供具第一準位之第一掃描訊號至輸入單元與第二重置單元，提供具第一準位之第二掃描訊號至第一重置單元，提供具第二準位之發光訊號以除能電壓調整單元之電壓調整運作及除能發光致能單元之電流饋入運作，並提供資料訊號至輸入單元；於第一時段內，輸入單元根據資料訊號與第一掃描訊號以輸出前置控制電壓；於第一時段內，第一重置單元根據第二掃描訊號與第一參考電壓以重置驅動電壓；於第一時段內，第二重置單元根據第一掃描訊號與驅動電壓以重置控制電壓；於第一時段後之第二時段內，將第二掃描訊號從第一準位切換為第二準位以除能第一重置單元之重置運作；於第二時段內，第二重置單元與驅動單元根據第一掃描訊號與電源電壓對控制電壓執行臨界電壓補償運作；於第二時段後之第三時段內，將第一掃描訊號從第一準位切換為第二準位以除能第二重置單元之重置運作並除能輸入單元之輸入運作；於第三時段後之第四時段內，將發光訊號從第二準位切換為第一準位；於第四時段內，電壓調整單元根據發光訊號與第二參考電壓以調整前置控制電壓；於第四時段內，耦合單元對

前置控制電壓之電壓變化執行耦合運作以調整控制電壓；於第四時段內，驅動單元根據控制電壓與電源電壓以提供驅動電流；於第四時段內，發光致能單元根據發光訊號將驅動電流饋入至有機發光二極體；以及於第四時段內，有機發光二極體根據驅動電流以產生輸出光。

### 【實施方式】

下文依本發明的具臨界電壓補償機制之有機發光顯示裝置及相關驅動方法，特舉實施例配合所附圖式作詳細說明，但所提供之實施例並非用以限制本發明所涵蓋的範圍。

第2圖為本發明有機發光顯示裝置之第一實施例的結構示意圖。如第2圖所示，有機發光顯示裝置200包含複數第一掃描線201、複數第二掃描線202、複數傳輸線203、複數資料線204、以及複數畫素單元210。該些第一掃描線201之第一掃描線SL1\_n係用來傳輸第一掃描訊號SS1\_n，該些第二掃描線202之第二掃描線SL2\_n係用來傳輸第二掃描訊號SS2\_n，該些傳輸線203之傳輸線EL\_n係用來傳輸發光訊號EM\_n，該些資料線204之資料線DL\_m係用來傳輸資料訊號SD\_m，該些畫素單元210之畫素單元PXn\_m係用來根據第一掃描訊號SS1\_n、第二掃描訊號SS2\_n、發光訊號EM\_n及資料訊號SD\_m以進行發光運作。畫素單元PXn\_m包含輸入單元215、電壓調整單元220、耦合單元225、驅動單元230、第一重置單元235、第二重置單元240、發光致能單元250、以及有機發光二極體260。

電連接於資料線 DL<sub>m</sub> 與第一掃描線 SL1<sub>m</sub> 的輸入單元 215 係用來根據資料訊號 SD<sub>m</sub> 與第一掃描訊號 SS1<sub>n</sub> 以輸出前置控制電壓 Vctr<sub>p</sub>。電連接於傳輸線 EL<sub>n</sub> 與輸入單元 215 的電壓調整單元 220 係用來根據發光訊號 EM<sub>n</sub> 與第一電源電壓 Vdd 以調整前置控制電壓 Vctr<sub>p</sub>。電連接於輸入單元 215 與電壓調整單元 220 的耦合單元 225 係用來對前置控制電壓 Vctr<sub>p</sub> 之電壓變化執行耦合運作以調整控制電壓 Vctr。電連接於耦合單元 225 的驅動單元 230 係用來根據控制電壓 Vctr 與第一電源電壓 Vdd 以提供驅動電流 Idr 與驅動電壓 Vdr。電連接於驅動單元 230 與第二掃描線 SL2<sub>n</sub> 的第一重置單元 235 係用來根據第二掃描訊號 SS2<sub>n</sub> 與第一參考電壓 Vref1 以重置驅動電壓 Vdr。電連接於驅動單元 230、第一重置單元 235 與第一掃描線 SL1<sub>n</sub> 的第二重置單元 240 係用來根據第一掃描訊號 SS1<sub>n</sub> 與驅動電壓 Vdr 以重置控制電壓 Vctr。電連接於傳輸線 EL<sub>n</sub>、驅動單元 230 與有機發光二極體 260 的發光致能單元 250 係用來根據發光訊號 EM<sub>n</sub> 控制將驅動電流 Idr 饋入至有機發光二極體 260 的運作，而有機發光二極體 260 即用來根據驅動電流 Idr 以產生輸出光。

在第 2 圖所示的實施例中，輸入單元 215 包含第一電晶體 216，耦合單元 225 包含電容 226，驅動單元 230 包含第二電晶體 231，第一重置單元 235 包含第三電晶體 236，第二重置單元 240 包含第四電晶體 241，電壓調整單元 220 包含第五電晶體 221，發光致能單元 250 包含第六電晶體 251，有機發光二極體 260 具有一電連接於第六電晶體 251 的陽極以及一用來接收第二電源電壓 Vss 的陰極。第一



電晶體 216 至第六電晶體 251 可為 P 型薄膜電晶體或 P 型場效電晶體。在另一實施例中，第一電晶體 216 與第三電晶體 236 至第六電晶體 251 可為 N 型薄膜電晶體或 N 型場效電晶體，而第二電晶體 231 可為 P 型薄膜電晶體或 P 型場效電晶體。

第一電晶體 216 具有一電連接於資料線  $DL_m$  的第一端、一電連接於第一掃描線  $SL1_n$  的閘極端、及一電連接於第五電晶體 221 與電容 226 的第二端。第二電晶體 231 具有一用來接收第一電源電壓  $V_{dd}$  的第一端、一用來接收控制電壓  $V_{ctr}$  的閘極端、及一用來輸出驅動電流  $I_{dr}$  與驅動電壓  $V_{dr}$  的第二端。電容 226 係電連接於第一電晶體 216 之第二端與第二電晶體 231 之閘極端間。第三電晶體 236 具有一用來接收第一參考電壓  $V_{ref1}$  的第一端、一電連接於第二掃描線  $SL2_n$  的閘極端、及一電連接於第二電晶體 231 之第二端的第二端。第四電晶體 241 具有一電連接於第二電晶體 231 之第二端的第一端、一電連接於第一掃描線  $SL1_n$  的閘極端、及一電連接於第二電晶體 231 之閘極端的第二端。請注意，當第四電晶體 241 導通時，第二電晶體 231 之運作特性係類似於二極體之電路運作。第五電晶體 221 具有一用來接收第一電源電壓  $V_{dd}$  的第一端、一電連接於傳輸線  $EL_n$  的閘極端、及一電連接於第一電晶體 216 之第二端的第二端。第六電晶體 251 具有一電連接於第二電晶體 231 之第二端的第一端、一電連接於傳輸線  $EL_n$  的閘極端、及一電連接於有機發光二極體 260 之陽極的第二端。

第 3 圖為第 2 圖之有機發光顯示裝置運用本發明較佳驅動方法的工作相關訊號波形示意圖，其中橫軸為時間軸。在第 3 圖中，由

上往下的訊號分別為第一掃描訊號 SS1\_n、第二掃描訊號 SS2\_n、發光訊號 EM\_n、以及資料訊號 SD\_m。參閱第 3 圖與第 2 圖，於時段 T1 內，第一掃描線 SS1\_n 傳輸具第一準位之第一掃描訊號 SS1\_n 至輸入單元 215 與第二重置單元 240，第二掃描線 SS2\_n 傳輸具第一準位之第二掃描訊號 SS2\_n 至第一重置單元 235，傳輸線 EL\_n 傳輸具異於第一準位的第二準位之發光訊號 EM\_n 以除能電壓調整單元 220 之電壓調整運作及除能發光致能單元 250 之電流饋入運作，且資料線 DL\_m 傳輸資料訊號 SD\_m 至輸入單元 215。此時，輸入單元 215 根據資料訊號 SD\_m 與第一掃描訊號 SS1\_n 以輸出前置控制電壓 Vctr\_p，第一重置單元 235 根據第二掃描訊號 SS2\_n 與第一參考電壓 Vrefl 以重置驅動電壓 Vdr，第二重置單元 240 根據第一掃描訊號 SS1\_n 與驅動電壓 Vdr 以重置控制電壓 Vctr，而驅動單元 230 之驅動運作即被重置以避免發生影像殘留現象。

於第一時段 T1 後之第二時段 T2 內，將第二掃描訊號 SS2\_n 從第一準位切換為第二準位以除能第一重置單元 235 之重置運作。此時，第二重置單元 240 與驅動單元 230 根據第一掃描訊號 SS1\_n 與第一電源電壓 Vdd 對控制電壓 Vctr 執行臨界電壓補償運作，經臨界電壓補償運作後之控制電壓 Vctr 即可以下列公式(1)表示。

$$V_{ctr} = V_{dd} - |V_{th}| \dots\dots\dots \text{公式(1)}$$

在公式(1)中，Vth 為第二電晶體 231 之臨界電壓。在一實施例中，第二時段 T2 之時間長度係大於第一時段 T1 之時間長度，據以充分執行臨界電壓補償運作。

於第二時段 T2 後之第三時段 T3 內，將第一掃描訊號 SS1\_n 從第一準位切換為第二準位以除能第二重置單元 240 之重置運作並除能輸入單元 215 之輸入運作，此時前置控制電壓 Vctr\_p 係實質上等於資料訊號 SD\_m 之電壓準位 Vdata。於第三時段 T3 後之第四時段 T4 內，將發光訊號 EM\_n 從第二準位切換為第一準位。此時，電壓調整單元 220 根據發光訊號 EM\_n 與第一電源電壓 Vdd 以調整前置控制電壓 Vctr\_p，耦合單元 225 對前置控制電壓 Vctr\_p 之電壓變化執行耦合運作以調整控制電壓 Vctr，調整後之控制電壓 Vctr 可以下列公式(2)表示。

$$Vctr = 2Vdd - |Vth| - Vdata \quad \cdots \cdots \text{公式(2)}$$

其後，驅動單元 230 根據控制電壓 Vctr 與第一電源電壓 Vdd 以提供驅動電流 Idr，而驅動電流 Idr 可以下列公式(3)表示。

$$Idr = \frac{\beta}{2}(Vdata - Vdd)^2 \quad \cdots \cdots \text{公式(3)}$$

在公式(3)中， $\beta$  為比例常數。此時，發光致能單元 250 根據發光訊號 EM\_n 將驅動電流 Idr 饋入至有機發光二極體 260，而有機發光二極體 260 就可根據驅動電流 Idr 以產生輸出光。請注意，驅動電流 Idr 並不受第二電晶體 231 之臨界電壓 Vth 所影響，故複數畫素單元 210 之驅動單元的電晶體臨界電壓誤差不會導致畫素亮度失真。由上述可知，藉由重置與臨界電壓補償運作，影像殘留現象與畫素亮度失真並不會發生於有機發光顯示裝置 200 的螢幕畫面，故可提供高影像品質。

請注意，在上述本發明較佳驅動方法中，若第一電晶體 216 與

第三電晶體 236 至第六電晶體 251 為 P 型薄膜電晶體或 P 型場效電晶體，則第二準位係大於第一準位。或者，若第一電晶體 216 與第三電晶體 236 至第六電晶體 251 為 N 型薄膜電晶體或 N 型場效電晶體，則第一準位係大於第二準位。

第 4 圖為本發明有機發光顯示裝置之第二實施例的結構示意圖。如第 4 圖所示，有機發光顯示裝置 300 係類似於第 2 圖所示之有機發光顯示裝置 200，主要差異在於將複數畫素單元 210 置換為複數畫素單元 310，其中畫素單元  $PX_n\_m$  被置換為畫素單元  $PY_n\_m$ 。畫素單元  $PY_n\_m$  係類似於畫素單元  $PX_n\_m$ ，主要差異在於將電壓調整單元 220 置換為電壓調整單元 320。電連接於傳輸線  $EL\_n$ 、輸入單元 215 與耦合單元 225 的電壓調整單元 320 係用來根據發光訊號  $EM\_n$  與第二參考電壓  $V_{ref2}$  以調整前置控制電壓  $V_{ctr\_p}$ 。在第 4 圖所示的實施例中，電壓調整單元 320 包含第五電晶體 321，第五電晶體 321 可為薄膜電晶體或場效電晶體。第五電晶體 321 具有一用來接收第二參考電壓  $V_{ref2}$  的第一端、一電連接於傳輸線  $EL\_n$  的閘極端、及一電連接於第一電晶體 216 之第二端的第二端。

在有機發光顯示裝置 300 的顯示運作中，於電壓調整單元 320 根據發光訊號  $EM\_n$  與第二參考電壓  $V_{ref2}$  以調整前置控制電壓  $V_{ctr\_p}$ ，且耦合單元 225 對前置控制電壓  $V_{ctr\_p}$  之電壓變化執行耦合運作以調整控制電壓  $V_{ctr}$  後，所產生之控制電壓  $V_{ctr}$  可以下列公式(4)表示。

$$V_{ctr} = V_{dd} - |V_{th}| + V_{ref2} - V_{data} \quad \cdots \cdots \text{公式(4)}$$

其後，驅動單元 230 根據公式(4)之控制電壓  $V_{ctr}$  與第一電源電壓  $V_{dd}$  所提供之驅動電流  $I_{dr}$  可以下列公式(5)表示。

$$I_{dr} = \frac{\beta}{2}(V_{data} - V_{ref})^2 \dots\dots\dots \text{公式(5)}$$

由公式(5)可知，驅動電流  $I_{dr}$  除不受第二電晶體 231 之臨界電壓  $V_{th}$  影響外，亦不受第一電源電壓  $V_{dd}$  所影響，故有機發光顯示裝置 300 的螢幕畫面並不會因第一電源電壓  $V_{dd}$  之傳輸壓降而發生畫素亮度失真，據以提高大尺寸顯示面板的影像品質。

綜上所示，藉由本發明重置與臨界電壓補償機制的輔助運作，有機發光顯示裝置可避免影像殘留現象與畫素亮度失真發生於所顯示的螢幕畫面，故可提供高影像品質。

雖然本發明已以實施例揭露如上，然其並非用以限定本發明，任何具有本發明所屬技術領域之通常知識者，在不脫離本發明之精神和範圍內，當可作各種更動與潤飾，因此本發明之保護範圍當視後附之申請專利範圍所界定者為準。

#### 【圖式簡單說明】

第 1 圖為習知主動式矩陣有機發光顯示裝置的結構示意圖。

第 2 圖為本發明有機發光顯示裝置之第一實施例的結構示意圖。

第 3 圖為第 2 圖之有機發光顯示裝置運用本發明較佳驅動方法的工作相關訊號波形示意圖，其中橫軸為時間軸。

第 4 圖為本發明有機發光顯示裝置之第二實施例的結構示意圖。

【主要元件符號說明】

100	主動式矩陣有機發光顯示裝置
110	掃描驅動電路
120	資料驅動電路
150	畫素單元
151	輸入電晶體
152	驅動電晶體
153	儲存電容
154	有機發光二極體
200、300	有機發光顯示裝置
201	第一掃描線
202	第二掃描線
203	傳輸線
204	資料線
210、310	畫素單元
215	輸入單元
216	第一電晶體
220、320	電壓調整單元
221、321	第五電晶體
225	耦合單元
226	電容
230	驅動單元

231	第二電晶體
235	第一重置單元
236	第三電晶體
240	第二重置單元
241	第四電晶體
250	發光致能單元
251	第六電晶體
260	有機發光二極體
DL <sub>m</sub>	資料線
EL <sub>n</sub>	傳輸線
EM <sub>n</sub>	發光訊號
Idr、Id	驅動電流
PX <sub>n_m</sub>	畫素單元
PY <sub>n_m</sub>	
SD <sub>m</sub>	資料訊號
SL1 <sub>n</sub>	第一掃描線
SL2 <sub>n</sub>	第二掃描線
SS1 <sub>n</sub>	第一掃描訊號
SS2 <sub>n</sub>	第二掃描訊號
T1	第一時段
T2	第二時段
T3	第三時段

T4	第四時段
Vctr	控制電壓
Vctr_p	前置控制電壓
Vdata	資料訊號之電壓準位
Vdd	第一電源電壓
Vdr	驅動電壓
Vref1	第一參考電壓
Vref2	第二參考電壓
Vss	第二電源電壓



## 七、申請專利範圍：

1. 一種具臨界電壓補償機制之有機發光顯示裝置，其包含：
  - 一資料線，用來傳輸一資料訊號；
  - 一第一掃描線，用來傳輸一第一掃描訊號；
  - 一第二掃描線，用來傳輸一第二掃描訊號；
  - 一傳輸線，用來傳輸一發光訊號；
  - 一輸入單元，電連接於該資料線與該第一掃描線，該輸入單元係用來根據該資料訊號與該第一掃描訊號以輸出一前置控制電壓；
  - 一電壓調整單元，電連接於該傳輸線與該輸入單元，該電壓調整單元係用來根據該發光訊號與一第二參考電壓以調整該前置控制電壓；
  - 一耦合單元，電連接於該輸入單元與該電壓調整單元，該耦合單元係用來對該前置控制電壓之電壓變化執行耦合運作以調整一控制電壓；
  - 一驅動單元，電連接於該耦合單元，該驅動單元係用來根據該控制電壓與一第一電源電壓以提供一驅動電流與一驅動電壓；
  - 一第一重置單元，電連接於該驅動單元與該第二掃描線，該第一重置單元係用來根據該第二掃描訊號與一第一參考電壓以重置該驅動電壓；
  - 一第二重置單元，電連接於該驅動單元、該第一重置單元與該

第一掃描線，該第二重置單元係用來根據該第一掃描訊號與該驅動電壓以重置該控制電壓；

一有機發光二極體，用來根據該驅動電流以產生輸出光；以及一發光致能單元，電連接於該傳輸線、該驅動單元與該有機發光二極體，該發光致能單元係用來根據該發光訊號控制將該驅動電流饋入至該有機發光二極體的運作。

2. 如請求項 1 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該輸入單元包含一第一電晶體，該第一電晶體具有一電連接於該資料線的第一端、一電連接於該第一掃描線的閘極端、及一電連接於該電壓調整單元與該耦合單元的第二端。
3. 如請求項 2 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第一電晶體係為一薄膜電晶體或一場效電晶體。
4. 如請求項 1 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該驅動單元包含一第二電晶體，該第二電晶體具有一用來接收該第一電源電壓的第一端、一用來接收該控制電壓的閘極端、及一用來輸出該驅動電流與該驅動電壓的第二端。
5. 如請求項 4 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第二電晶體係為一薄膜電晶體或一場效電晶體。

6. 如請求項 1 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該耦合單元包含一電容，該電容係電連接於該輸入單元與該驅動單元之間。
7. 如請求項 1 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第一重置單元包含一第三電晶體，該第三電晶體具有一用來接收該第一參考電壓的第一端、一電連接於該第二掃描線的閘極端、及一電連接於該驅動單元、該第二重置單元與該發光致能單元的第二端。
8. 如請求項 7 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第三電晶體係為一薄膜電晶體或一場效電晶體。
9. 如請求項 1 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第二重置單元包含一第四電晶體，該第四電晶體具有一電連接於該驅動單元、該第一重置單元與該發光致能單元的第一端、一電連接於該第一掃描線的閘極端、及一電連接於該耦合單元與該驅動單元的第二端。
10. 如請求項 9 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第四電晶體係為一薄膜電晶體或一場效電晶體。
11. 如請求項 1 所述之具臨界電壓補償機制之有機發光顯示裝置，

其中該電壓調整單元包含一第五電晶體，該第五電晶體具有一用來接收該第二參考電壓的第一端、一電連接於該傳輸線的閘極端、及一電連接於該輸入單元與該耦合單元的第二端。

12. 如請求項 11 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第五電晶體係為一薄膜電晶體或一場效電晶體。
13. 如請求項 11 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第二參考電壓係為該第一電源電壓。
14. 如請求項 1 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該發光致能單元包含一第六電晶體，該第六電晶體具有一電連接於該驅動單元、該第一重置單元與該第二重置單元的第一端、一電連接於該傳輸線的閘極端、及一電連接於該有機發光二極體的 second 端。
15. 如請求項 14 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該第六電晶體係為一薄膜電晶體或一場效電晶體。
16. 如請求項 1 所述之具臨界電壓補償機制之有機發光顯示裝置，其中該有機發光二極體具有一電連接於該發光致能單元的陽極、及一用來接收一第二電源電壓的陰極。

17. 一種有機發光顯示裝置之驅動方法，其包含：

提供具臨界電壓補償機制之一有機發光顯示裝置，該有機發光顯示裝置包含：

- 一輸入單元，用來根據一資料訊號與一第一掃描訊號以輸出一前置控制電壓；
- 一電壓調整單元，用來根據一發光訊號與一第二參考電壓以調整該前置控制電壓；
- 一耦合單元，用來對該前置控制電壓之電壓變化執行耦合運作以調整一控制電壓；
- 一驅動單元，用來根據該控制電壓與一電源電壓以提供一驅動電流與一驅動電壓；
- 一第一重置單元，用來根據一第二掃描訊號與一第一參考電壓以重置該驅動電壓；
- 一第二重置單元，用來根據該第一掃描訊號與該驅動電壓以重置該控制電壓；
- 一有機發光二極體，用來根據該驅動電流以產生輸出光；
- 以及
- 一發光致能單元，用來根據該發光訊號控制將該驅動電流饋入至該有機發光二極體的運作；

於一第一時段內，提供具一第一準位之該第一掃描訊號至該輸入單元與該第二重置單元，提供具該第一準位之該第二掃描訊號至該第一重置單元，提供具一異於該第一準位的第二準位之該發光訊號以除能該電壓調整單元之電壓調整運作及

除能該發光致能單元之電流饋入運作，並提供該資料訊號至該輸入單元；

於該第一時段內，該輸入單元根據該資料訊號與該第一掃描訊號以輸出該前置控制電壓；

於該第一時段內，該第一重置單元根據該第二掃描訊號與該第一參考電壓以重置該驅動電壓；

於該第一時段內，該第二重置單元根據該第一掃描訊號與該驅動電壓以重置該控制電壓；

於該第一時段後之一第二時段內，將該第二掃描訊號從該第一準位切換為該第二準位以除能該第一重置單元之重置運作；

於該第二時段內，該第二重置單元與該驅動單元根據該第一掃描訊號與該電源電壓對該控制電壓執行臨界電壓補償運作；

於該第二時段後之一第三時段內，將該第一掃描訊號從該第一準位切換為該第二準位以除能該第二重置單元之重置運作並除能該輸入單元之輸入運作；

於該第三時段後之一第四時段內，將該發光訊號從該第二準位切換為該第一準位；

於該第四時段內，該電壓調整單元根據該發光訊號與該第二參考電壓以調整該前置控制電壓；

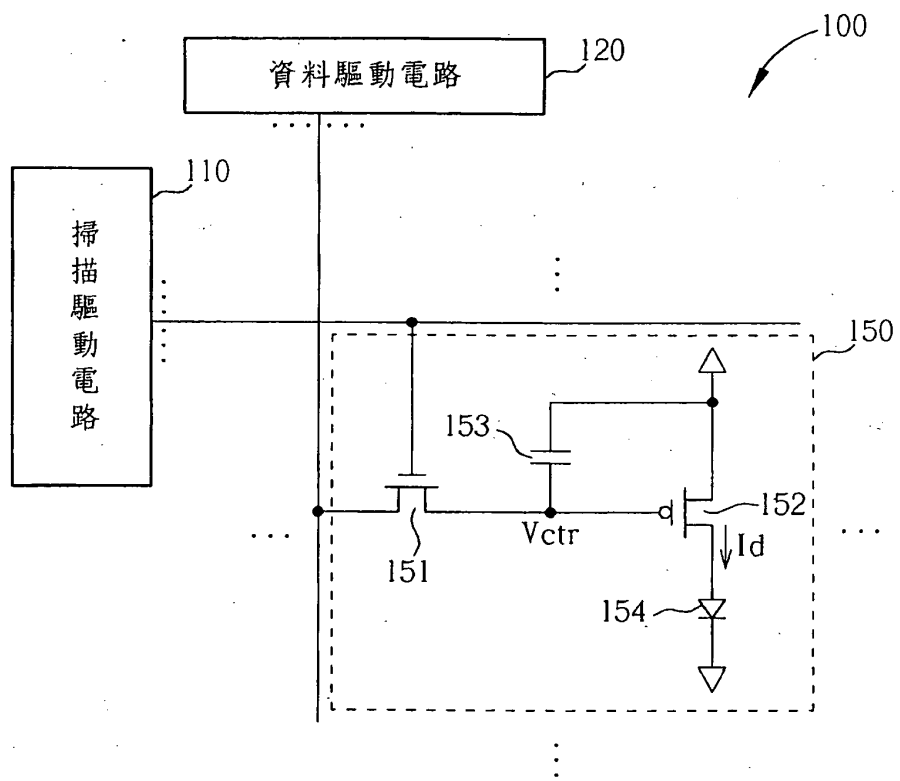
於該第四時段內，該耦合單元對該前置控制電壓之電壓變化執行耦合運作以調整該控制電壓；

於該第四時段內，該驅動單元根據該控制電壓與該電源電壓以提供該驅動電流；

於該第四時段內，該發光致能單元根據該發光訊號將該驅動電  
流饋入至該有機發光二極體；以及  
於該第四時段內，該有機發光二極體根據該驅動電流以產生輸  
出光。

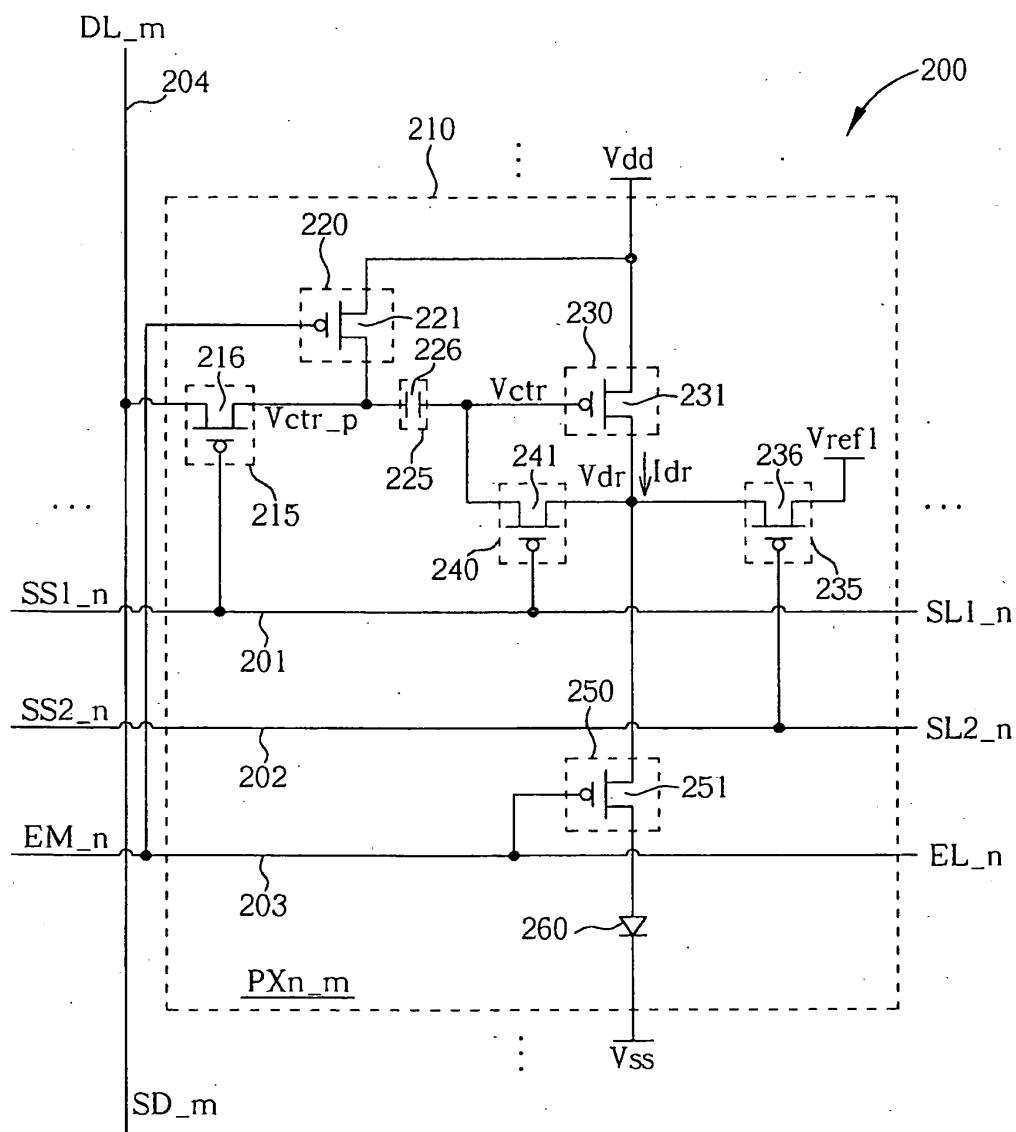
18. 如請求項 17 所述之有機發光顯示裝置之驅動方法，其中該第二  
準位係大於該第一準位。
19. 如請求項 17 所述之有機發光顯示裝置之驅動方法，其中該第一  
準位係大於該第二準位。
20. 如請求項 17 所述之有機發光顯示裝置之驅動方法，其中該第二  
參考電壓係為該電源電壓。
21. 如請求項 17 所述之有機發光顯示裝置之驅動方法，其中該第二  
時段之時間長度係大於該第一時段之時間長度。

#### 八、圖式：

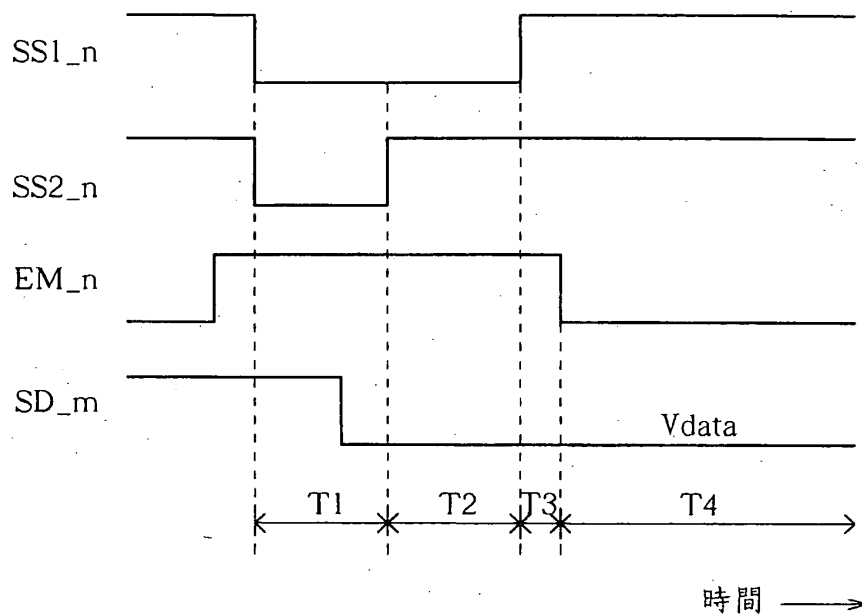


第1圖

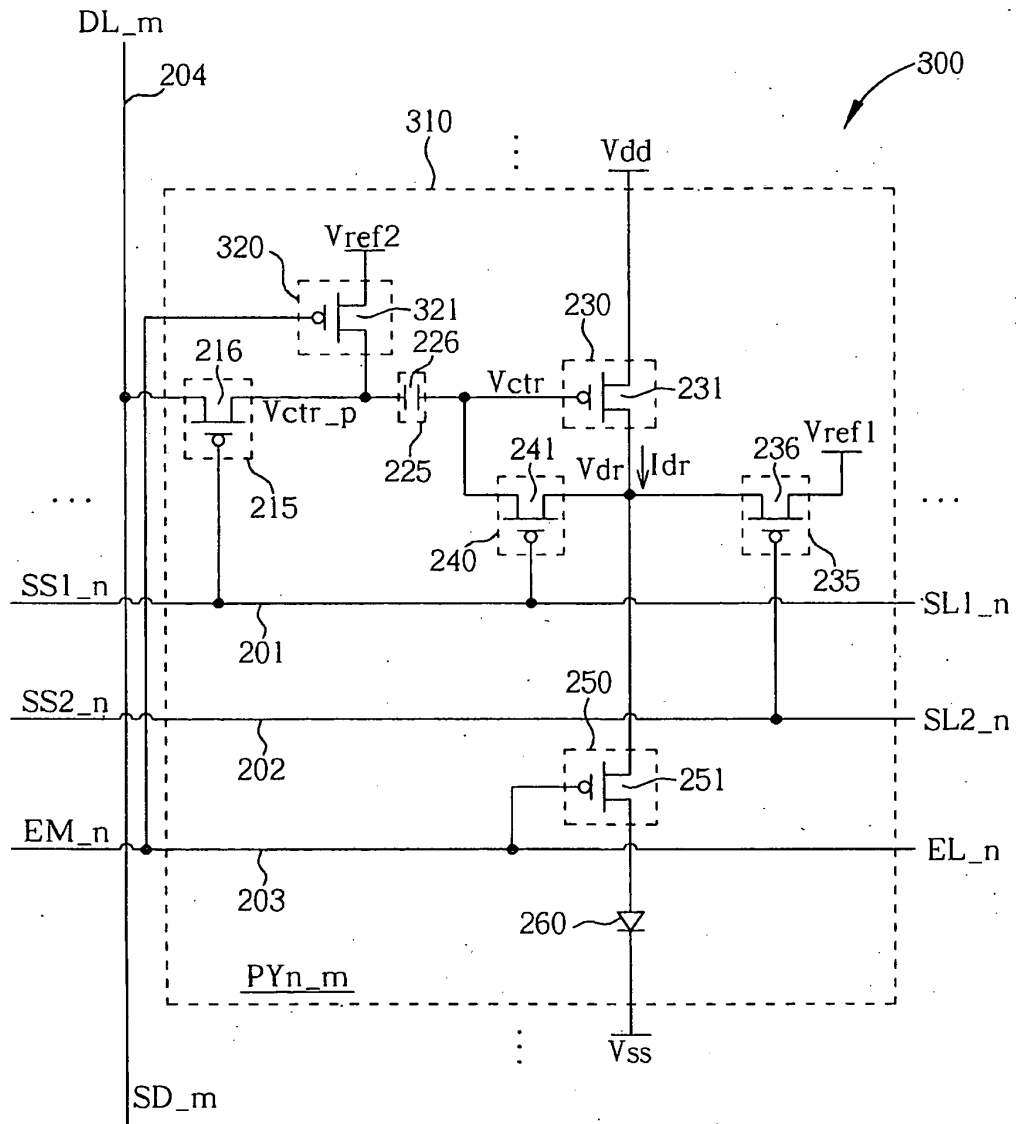




第2圖



第3圖



第4圖

Doc Code: TRAN.LET

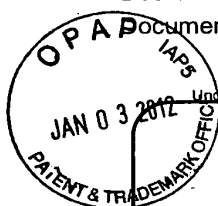
Document Description: Transmittal Letter

PTO/SB/21 (07-09)

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**TRANSMITTAL  
FORM**

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

3

Application Number

13/296,238

Filing Date

11/15/2011

First Named Inventor

Chun-Yen Liu

Art Unit

N/A

Examiner Name

N/A

Attorney Docket Number

AUOP0537USA

**ENCLOSURES (Check all that apply)**

<input checked="" type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> After Allowance Communication to TC
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Petition	<input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Power of Attorney, Revocation	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Change of Correspondence Address	<input type="checkbox"/> Other Enclosure(s) (please identify below):
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<input type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> Request for Refund	
<input checked="" type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Reply to Missing Parts/Incomplete Application	<input type="checkbox"/> Landscape Table on CD	
<input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<b>Remarks</b>	

**SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT**

Firm Name	North America Intellectual Property Corporation		
Signature	/Winston Hsu/		
Printed name	Winston Hsu		
Date	12/20/2011	Reg. No.	41,526

**CERTIFICATE OF TRANSMISSION/MAILING**

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Signature	/Sandra Yen/		
Typed or printed name	Sandra Yen	Date	12/29/2011

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PTO/SB/17 (09-11)  
Approved for use through 01/31/2014. OMB 0651-0032  
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FEE TRANSMITTAL		Complete if Known	
		Application Number	13/296,238
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		Filing Date	11/15/2011
TOTAL AMOUNT OF PAYMENT (\$)		First Named Inventor	Chun-Yen Liu
		Examiner Name	N/A
		Art Unit	N/A
		Attorney Docket No.	AUOP0537USA

**METHOD OF PAYMENT (check all that apply)**

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): \_\_\_\_\_

☒ Deposit Account Deposit Account Number: 50-3105 Deposit Account Name: North America Intellectual Property Corporation

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**FEE CALCULATION**

**1. BASIC FILING, SEARCH, AND EXAMINATION FEES**

Application Type	FILING FEES		SEARCH FEES		EXAMINATION FEES		Fees Paid (\$)
	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	Fee (\$)	Small Entity Fee (\$)	
Utility	380	190	620	310	250	125	
Design	250	125	120	60	160	80	
Plant	250	125	380	190	200	100	
Reissue	380	190	620	310	750	375	
Provisional	250	125	0	0	0	0	

**2. EXCESS CLAIM FEES**

Fee Description	Fee (\$)	Small Entity Fee (\$)
Each claim over 20 (including Reissues)	60	30
Each independent claim over 3 (including Reissues)	250	125
Multiple dependent claims	450	225

**Total Claims** - 20 or HP = \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_

HP = highest number of total claims paid for, if greater than 20.

**Indep. Claims** - 3 or HP = \_\_\_\_\_ x \_\_\_\_\_ = \_\_\_\_\_

HP = highest number of independent claims paid for, if greater than 3.

**3. APPLICATION SIZE FEE**

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
_____	_____	_____	_____	_____

**4. OTHER FEE(S)**

Non-English Specification, \$130 fee (no small entity discount) \_\_\_\_\_

Other (e.g., late filing surcharge): \_\_\_\_\_

SUBMITTED BY			
Signature	/Winston Hsu/	Registration No. (Attorney/Agent)	41,526
Name (Print/Type)	Winston Hsu	Telephone	3027291562
		Date	12/20/2011

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PTO/SB/02B (07-07)

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**DECLARATION – Supplemental Priority Data Sheet****Foreign applications:**

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
100109157	TW	03/17/2011	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA

**CONFIRMATION NO. 9731**

27765

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION  
P.O. BOX 506  
MERRIFIELD, VA 22116

**PUBLICATION NOTICE**



\*OC000000056649845\*

**Title:**ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF

**Publication No.**US-2012-0235972-A1

**Publication Date:**09/20/2012

**NOTICE OF PUBLICATION OF APPLICATION**

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at [www.uspto.gov](http://www.uspto.gov). The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at [www.uspto.gov](http://www.uspto.gov) using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA	9731
27765 7590 04/25/2013 NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116			EXAMINER NGUYEN, THANG V	
			ART UNIT 4163	PAPER NUMBER
			NOTIFICATION DATE 04/25/2013	DELIVERY MODE ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

Patent.admin.uspto.Rcv@naipo.com  
mis.ap.uspto@naipo.com



<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	13/296,238	LIU ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	THANG NGUYEN	4163	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 2 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 11/15/2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☒ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 5) ☒ Claim(s) 1-21 is/are pending in the application.
- 5a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 6) ☒ Claim(s) 1-21 is/are allowed.
- 7) ☐ Claim(s) \_\_\_\_ is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

\* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

#### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
 Paper No(s)/Mail Date 11/15/2011.
- 3) ☐ Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_.
- 4) ☐ Other: \_\_\_\_.

**DETAILED ACTION**

***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Information Disclosure Statement***

2. The references cited on the Information Disclosure Statement filed on 11/17/2011 have been entered and considered by examiner (see attached PTO-1449).

**QUAYLE ACTION**

3. This application is in condition for allowance except for the following formal matters:

Claim 17

A driving method, comprising:

providing an organic light emitting display having threshold voltage compensation mechanism, the organic light emitting display comprising steps of:

~~An input unit for~~ outputting a preliminary control voltage by an input unit according to a data signal and a first scan signal;

~~A voltage adjustment unit for~~ adjusting the preliminary control voltage by a voltage adjustment unit according to an emission signal and a second reference voltage;

~~A couple unit~~ for adjusting a control voltage by a couple unit through coupling a change of the preliminary control voltage;

~~A driving unit~~ for providing a driving current and a driving voltage by a driving unit according to the control voltage and a power voltage;

~~A first reset unit~~ for resetting the driving voltage by a first reset unit according to a second scan signal and a first reference voltage;

~~A second reset unit~~ for resetting the control voltage by a second reset unit according to the first scan signal and the driving voltage;

~~an organic light emitting diode~~ for generating output light by an organic light emitting diode according to the driving current; and

~~An emission enable unit~~ for providing a control of furnishing the driving current to the organic light emitting diode by an emission enable unit according to the emission signal;

providing the first scan signal with a first level to the input unit and the second reset unit, providing the second scan signal with the first level to the first reset unit, providing the emission signal with a second level different from the first level for disabling a voltage adjusting operation of the voltage adjustment unit and disabling a current furnishing operation of the emission enable unit, and providing the data signal to the input unit during a first interval;

~~The input unit~~ outputting the preliminary control voltage by the input unit according to the data signal and the first scan signal during the first interval;

~~The first reset unit~~ resetting the driving voltage by the first reset unit according to the second scan signal and the first reference voltage during the first interval;

~~The second reset unit~~ resetting the control voltage by the second reset unit according to the first scan signal and the driving voltage during the first interval;

switching the second scan signal from the first level to the second level for disabling a resetting operation of the first reset unit during a second interval following the first interval;

~~the second reset unit and the driving unit~~ performing a threshold voltage compensation operation on the control voltage by the second reset unit and the driving unit according to the first scan signal and the power voltage during the second interval;

switching the first scan signal from the first level to the second level for disabling a resetting operation of the second reset unit and disabling an inputting operation of the input unit during a third interval following the second interval;

switching the emission signal from the second level to the first level during a fourth interval following the third interval;

~~The voltage adjustment unit~~ adjusting the preliminary control voltage by the voltage adjustment unit according to the emission signal and the second reference voltage during the fourth interval;

~~The couple unit~~ adjusting the control voltage by the couple unit through coupling a change of the preliminary control voltage during the fourth interval;

~~The driving unit~~ providing the driving current by the driving unit according to the control voltage and the power voltage during the fourth interval;

~~the emission enable unit~~ furnishing the driving current to the organic light emitting diode by the emission enable unit according to the emission signal during the fourth interval; and

~~The organic light emitting diode~~ generating output light by the organic light emitting diode according to the driving current during the fourth interval.

These changes will make the claim read better and is in appropriate method form.

Prosecution on the merits is closed in accordance with the practice under *Ex parte Quayle*, 25 USPQ 74, 453 O.G. 213, (Comm'r Pat. 1935).

A shortened statutory period for reply to this action is set to expire **TWO MONTHS** from the mailing date of this letter.

### ***Conclusion***

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The closest prior art of **Chung, Bo Yong; et al. (US Patent Application #20070024543)** teaches, an input unit (Fig. 3, M1nm) electrically connected to the data line (Fig. 3, Dm) and the first scan line (Fig.3, Sn, where the scan line Sn can be the first scan line), for outputting a preliminary control voltage according to the data signal and the first scan signal, a voltage adjustment unit (Fig. 3, M3nm) for adjusting the initial

voltage (Fig. 3 Vref, where Vref may be equal to or different from the first voltage [0071]), a couple unit (Fig 3, C2nm) for coupling the voltage from input unit (Fig. 3, M1nm) and the voltage adjustment unit (Fig.3, M3nm), a driving unit (Fig.3, M4nm) for providing a driving current and driving voltage according to the voltage from the couple unit (Fig. 3, C2nm) ([0078]), a reset unit (Fig. 3, M5nm) for current to flow through the driving unit, an enable unit (Fig. 3, M6nm) for control of the driving current and an Organic LED for emitting light, an emission enable unit (Fig.3, M6nm), electrically connected to the transmission line (Fig. 3, En), the driving unit (Fig. 3, M4nm) and the organic light emitting diode (Fig. 3, OLEDnm), for providing a control of furnishing the driving current to the organic light emitting diode according to the emission signal; providing the first scan signal with a first level to the input unit (Fig.3, M1nm) and the second reset unit (Fig. 3, M5nm);

the second reset unit (Fig.3, M5nm) and the driving unit (Fig.3, M4nm) performing a threshold voltage compensation operation on the control voltage according to the first scan signal (Fig.3, Sn) and the power voltage during the second interval;

But Chung does not teach the voltage adjustment unit electrically connected to the transmission line and the input unit, for adjusting the preliminary control voltage according to the emission signal and a second reference voltage and first reset unit for resetting the driving voltage according to the first reference voltage;

providing the first scan signal with a first level to the input unit and the second reset unit, providing the second scan signal with the first level to the first reset unit;

providing the emission signal with a second level different from the first level for disabling a voltage adjusting operation of the voltage adjustment unit and disabling a current furnishing operation of the emission enable unit, and providing the data signal to the input unit during a first interval;

the first reset unit resetting the driving voltage according to the second scan signal and the first reference voltage during the first interval;

switching the first scan signal from the first level to the second level for disabling a resetting operation of the second reset unit and disabling an inputting operation of the input unit during a third interval following the second interval; switching the emission signal from the second level to the first level during a fourth interval following the third interval in combination with other limitation of the claims.

**Choi et al. (US Patent #7,843,442 B2)** teaches, an input unit electrically connected to the data line and the first scan line, for outputting a preliminary control voltage according to the data signal and the first scan signal, a voltage adjustment unit for adjusting the initial voltage, a couple unit for coupling the voltage from input unit and the voltage adjustment unit, a driving unit for providing a driving current and driving voltage according to the voltage from the couple unit, a reset unit for current to flow through the driving unit, an enable unit for control of the driving current and an Organic LED for emitting light, an emission enable unit, electrically connected to the transmission line, the driving unit and the organic light emitting diode for providing a control of furnishing the driving current to the organic light emitting diode according to the emission signal;

providing the first scan signal with a first level to the input unit and the second reset unit; the second reset unit and the driving unit performing a threshold voltage compensation operation on the control voltage according to the first scan signal and the power voltage during the second interval.

But Choi does not teach the voltage adjustment unit electrically connected to the transmission line and the input unit, for adjusting the preliminary control voltage according to the emission signal and a second reference voltage and a first reset unit for resetting the driving voltage according to the first reference voltage; providing the second scan signal with the first level to the first reset unit; providing the emission signal with a second level different from the first level for disabling a voltage adjusting operation of the voltage adjustment unit and disabling a current furnishing operation of the emission enable unit, and providing the data signal to the input unit during a first interval; the first reset unit resetting the driving voltage according to the second scan signal and the first reference voltage during the first interval; switching the first scan signal from the first level to the second level for disabling a resetting operation of the second reset unit and disabling an inputting operation of the input unit during a third interval following the second interval; switching the emission signal from the second level to the first level during a fourth interval following the third interval as recited in the claim.

**Ryu et al. (US PG PUB # US 2007/0024541 A1)** teaches, an input unit electrically connected to the data line and the first scan line, for outputting a preliminary control



voltage according to the data signal and the first scan signal, a voltage adjustment unit for adjusting the initial voltage, a couple unit for coupling the voltage from input unit and the voltage adjustment unit, a driving unit for providing a driving current and driving voltage according to the voltage from the couple unit, a reset unit for current to flow through the driving unit, an enable unit for control of the driving current and an Organic LED for emitting light, an emission enable unit, electrically connected to the transmission line, the driving unit and the organic light emitting diode for providing a control of furnishing the driving current to the organic light emitting diode according to the emission signal;

providing the first scan signal with a first level to the input unit and the second reset unit; the second reset unit and the driving unit performing a threshold voltage compensation operation on the control voltage according to the first scan signal and the power voltage during the second interval.

But Ryu does not teach a first reset unit for resetting the driving voltage according to the first reference voltage, and the voltage adjustment unit electrically connected to the transmission line and the input unit, for adjusting the preliminary control voltage according to the emission signal and a second reference voltage;

providing the second scan signal with the first level to the first reset unit;

providing the emission signal with a second level different from the first level for disabling a voltage adjusting operation of the voltage adjustment unit and disabling a current furnishing operation of the emission enable unit, and providing the data signal to the input unit during a first interval;

the first reset unit resetting the driving voltage according to the second scan signal and the first reference voltage during the first interval;  
switching the first scan signal from the first level to the second level for disabling a resetting operation of the second reset unit and disabling an inputting operation of the input unit during a third interval following the second interval; switching the emission signal from the second level to the first level during a fourth interval following the third interval as recited in the claim.

**Huh (US Patent # 7,411,571 B2)** teaches a light emitting display that is capable of preventing degradation of picture quality, and the driving current controlled independent of the threshold voltage.

**Wei-Chieh Hsueh (US Patent # US 7,317,435 B2)** teaches a pixel driving circuit for use in an active matrix organic light-emitting diode with threshold voltage compensation.

None of the prior art of the records, either singularly or in combination, teaches the limitations the voltage adjustment unit electrically connected to the transmission line and the input unit, for adjusting the preliminary control voltage according to the emission signal and a second reference voltage and a first reset unit for resetting the driving voltage according to the first reference voltage in combination with the other limitations of the claim.

### ***Inquiries***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to THANG NGUYEN whose telephone number is (571)272-4542. The examiner can normally be reached on m-f: 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chanh Nguyen can be reached on 5712727772. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/THANG NGUYEN/  
Patent Examiner, Art Unit 4163

/CHANH NGUYEN/  
Supervisory Patent Examiner, Art Unit 2691

<b>Notice of References Cited</b>	Application/Control No. 13/296,238		Applicant(s)/Patent Under Reexamination LIU ET AL.	
	Examiner THANG NGUYEN		Art Unit 4163	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2007/0024543	02-2007	Chung et al.	345/076
*	B	US-2007/0024541	02-2007	Ryu et al.	345/076
*	C	US-7,843,442	11-2010	Choi et al.	345/204
*	D	US-7,411,571	08-2008	Huh, Jin	345/80
*	E	US-7,317,435	01-2008	Hsueh, Wei-Chieh	345/82
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			


**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<p align="center"><b><i>Index of Claims</i></b></p> 	<b>Application/Control No.</b> 13296238	<b>Applicant(s)/Patent Under Reexamination</b> LIU ET AL.
	<b>Examiner</b> THANG NGUYEN	<b>Art Unit</b> 4163

✓	<b>Rejected</b>	-	<b>Cancelled</b>	N	<b>Non-Elected</b>	A	<b>Appeal</b>
=	<b>Allowed</b>	÷	<b>Restricted</b>	I	<b>Interference</b>	O	<b>Objected</b>

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant										<input type="checkbox"/> CPA										<input type="checkbox"/> T.D.										<input type="checkbox"/> R.1.47									
CLAIM			DATE																																				
Final	Original		04/16/2013																																				
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## BIB DATA SHEET

CONFIRMATION NO. 9731

<b>SERIAL NUMBER</b> 13/296,238	<b>FILING or 371(c) DATE</b> 11/15/2011	<b>CLASS</b> 345	<b>GROUP ART UNIT</b> 4163	<b>ATTORNEY DOCKET NO.</b> AUOP0537USA		
<b>APPLICANTS</b> Chun-Yen Liu, Hsin-Chu, TAIWAN; Chia-Yuan Yeh, Hsin-Chu, TAIWAN; Cheng-Chieh Tseng, Hsin-Chu, TAIWAN; <b>** CONTINUING DATA *****</b> <b>** FOREIGN APPLICATIONS *****</b> TAIWAN 100109157 03/17/2011 <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 11/25/2011						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/THANG V. NGUYEN/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> TAIWAN	<b>SHEETS DRAWINGS</b> 4	<b>TOTAL CLAIMS</b> 21	<b>INDEPENDENT CLAIMS</b> 2
<b>ADDRESS</b> NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116 UNITED STATES						
<b>TITLE</b> ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF						
<b>FILING FEE RECEIVED</b> 1310	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees		
				<input type="checkbox"/> 1.16 Fees (Filing)		
				<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)		
				<input type="checkbox"/> 1.18 Fees (Issue)		
				<input type="checkbox"/> Other _____		
				<input type="checkbox"/> Credit		

<b>Search Notes</b> 	<b>Application/Control No.</b> 13296238	<b>Applicant(s)/Patent Under Reexamination</b> LIU ET AL.
	<b>Examiner</b> THANG NGUYEN	<b>Art Unit</b> 4163

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
345	82, 83, 39, 76, 211		
315	169.1, 169.3		

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/THANG NGUYEN/ Examiner, Art Unit 4163	
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**EAST Search History****EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	2	"20120235972"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/16 12:41
S1	11	"7038392"	US-PGPUB; USPAT	OR	ON	2013/03/25 15:41
S2	1	"7773054"	US-PGPUB; USPAT	OR	ON	2013/03/25 15:43
S3	79476	OLED or "Organic Light Emitting Diode"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:48
S4	11278	S3 and "345".clas.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:48
S5	2754	S4 and (threshold adj voltage)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:51
S6	1632	S5 and compensat\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:51
S7	380	S6 and 345/82.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:52
S8	4	((CHIA-YUAN) near2 (YEH)).INV.	US-PGPUB; USPAT	OR	ON	2013/03/27 11:08
S9	116635	electroluminescence oled organic adj light adj emit\$4 adj diode\$1	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 15:55
S10	1038767	S9 or led	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 16:03
S12	116635	electroluminescence oled (organic adj light adj emit\$4 adj diode\$1)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 16:13
S13	124148	S12 or (organic adj led)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 16:27
S14	15375	S13 and "345".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 16:33
S15	3635	S14 and (threshold adj voltage)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 17:09
S16	116667	electroluminescence oled (organic adj light adj emit\$4 adj diode\$1)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:08



S17	124187	S16 or (organic adj led)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:08
S18	15375	S17 and "345".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:08
S19	3635	S18 and (threshold adj voltage)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:08
S20	1798	S19 and 345/211,76.ccls.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:21
S21	1152	S20 not electroluminescence	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:29
S22	24	S21 and hysteresis	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:36
S23	24	S21 and hysteresis	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/04/08 11:07
S24	1152	S20 not electroluminescence	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/08 11:08
S25	116776	electroluminescence oled (organic adj light adj emit\$4 adj diode\$1)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S26	124301	S25 or (organic adj led)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S27	15393	S26 and "345".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S28	3638	S27 and (threshold adj voltage)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S29	1799	S28 and 345/211,76.ccls.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S30	1152	S29 not electroluminescence	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/09 13:29
S31	255	S30 and 345/82,83,39.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/09 13:30
S32	116776	electroluminescence oled (organic adj light adj emit\$4 adj diode\$1)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S33	124301	S32 or (organic adj led)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S34	15393	S33 and "345".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S35	3638	S34 and (threshold adj voltage)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S36	1799	S35 and 345/211,76.ccls.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S37	1152	S36 not electroluminescence	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/10 17:17
S38	1038	S37 and 345/82,76.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/10 17:17

## EAST Search History

S39	123	S38 and transmission	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/10 17:39
S40	3	"20070024543"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/16 08:20

**4/16/2013 2:27:11 PM****C:\Users\tnguyen63\Documents\EAST Workspaces\OLED with threshold voltage  
compensation mechanism app# 13296238.wsp**

Receipt date: 11/15/2011

13296238 - GAU: 4163

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Chun-Yen Liu
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	AUOP0537USA

U.S.PATENTS							
Examiner Initial*	Cite No	Patent Number	Kind Code	Issue Date	Name	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
/T.N./	1	7038392		2006-05-02	Libsch	all	
/T.N./	2	7773054		2010-08-10	Jeong	all	
U.S.PATENT APPLICATION PUBLICATIONS							
Examiner Initial*	Cite No	Publication Number	Kind Code	Publication Date	Name	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
	1						
FOREIGN PATENT DOCUMENTS							
Examiner Initial*	Cite No	Foreign Document Number	Country Code	Kind Code	Publication Date	Name	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1						
NON-PATENT LITERATURE DOCUMENTS							

Receipt date: 11/15/2011

13296238 - GAU: 4163

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Chun-Yen Liu
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	AUOP0537USA

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	
	1		
<b>EXAMINER SIGNATURE</b>			
Examiner Signature	/Thang Nguyen/		Date Considered 04/16/2013
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			

Receipt date: 11/15/2011

13296238 - GAU: 4163

<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b> ( Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Chun-Yen Liu
	Art Unit	N/A
	Examiner Name	N/A
	Attorney Docket Number	AUOP0537USA

**CERTIFICATION STATEMENT**

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

**OR**

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ None

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/Scott Margo/	Date (YYYY-MM-DD)	2011-11-14
Name/Print	Scott Margo	Registration Number	56277

**ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE  
COMPENSATION MECHANISM AND DRIVING METHOD THEREOF**

Appl. No.	: 13/296,238	Confirmation No.	9731
Applicant	: Chun-Yen Liu et al.		
Filed	: November 15, 2011		
TC/A.U.	: 4163		
Examiner	: NGUYEN, THANG V		
Docket No.	: AUOP0537USA		
Customer No.	: 27765		

Commissioner for Patents  
P.O. Box 1450  
Alexandria VA 22313-1450

**AMENDMENT**

Sir:

- 5      In response to the Office action of April 25, 2013, please amend the above-identified application as follows:

**Amendments to the Claims** are reflected in the listing of claims which begins on page 2 of this paper.

**Remarks/Arguments** begin on page 8 of this paper.

**Amendments to the Claims:**

This listing of claims will replace all prior versions and listings of claims in the application:

**Listing of Claims:**

- 5     1 (original): An organic light emitting display, comprising:  
        a data line for transmitting a data signal;  
        a first scan line for transmitting a first scan signal;  
        a second scan line for transmitting a second scan signal;  
        a transmission line for transmitting an emission signal;  
10     an input unit, electrically connected to the data line and the first scan line, for  
        outputting a preliminary control voltage according to the data signal and the  
        first scan signal;  
        a voltage adjustment unit, electrically connected to the transmission line and the  
        input unit, for adjusting the preliminary control voltage according to the  
15     emission signal and a second reference voltage;  
        a couple unit, electrically connected to the input unit and the voltage adjustment  
        unit, for adjusting a control voltage through coupling a change of the  
        preliminary control voltage;  
        a driving unit, electrically connected to the couple unit, for providing a driving  
20     current and a driving voltage according to the control voltage and a first power  
        voltage;  
        a first reset unit, electrically connected to the driving unit and the second scan line,  
        for resetting the driving voltage according to the second scan signal and a first  
        reference voltage;  
25     a second reset unit, electrically connected to the driving unit, the first reset unit  
        and the first scan line, for resetting the control voltage according to the first  
        scan signal and the driving voltage;  
        an organic light emitting diode for generating output light according to the driving  
        current; and  
30     an emission enable unit, electrically connected to the transmission line, the driving

unit and the organic light emitting diode, for providing a control of furnishing the driving current to the organic light emitting diode according to the emission signal.

- 5     2 (original): The organic light emitting display of claim 1, wherein the input unit comprises a first transistor, the first transistor having a first end electrically connected to the data line, a gate end electrically connected to the first scan line, and a second end electrically connected to the voltage adjustment unit and the couple unit.
- 10
- 3 (original): The organic light emitting display of claim 2, wherein the first transistor comprises a thin film transistor or a field effect transistor.
- 4 (original): The organic light emitting display of claim 1, wherein the driving unit
- 15     comprises a second transistor, the second transistor having a first end for receiving the first power voltage, a gate end for receiving the control voltage, and a second end for outputting the driving current and the driving voltage.
- 5 (original): The organic light emitting display of claim 4, wherein the second
- 20     transistor comprises a thin film transistor or a field effect transistor.
- 6 (original): The organic light emitting display of claim 1, wherein the couple unit comprises a capacitor electrically connected between the input unit and the driving unit.
- 25
- 7 (original): The organic light emitting display of claim 1, wherein the first reset unit comprises a third transistor, the third transistor having a first end for receiving the first reference voltage, a gate end electrically connected to the second scan line, and a second end electrically connected to the driving unit, the second reset unit
- 30     and the emission enable unit.



- 8 (original): The organic light emitting display of claim 7, wherein the third transistor comprises a thin film transistor or a field effect transistor.
- 5 9 (original): The organic light emitting display of claim 1, wherein the second reset unit comprises a fourth transistor, the fourth transistor having a first end electrically connected to the driving unit, the first reset unit and the emission enable unit, a gate end electrically connected to the first scan line, and a second end electrically connected to the couple unit and the driving unit.
- 10 10 (original): The organic light emitting display of claim 9, wherein the fourth transistor comprises a thin film transistor or a field effect transistor.
- 15 11 (original): The organic light emitting display of claim 1, wherein the voltage adjustment unit comprises a fifth transistor, the fifth transistor having a first end for receiving the second reference voltage, a gate end electrically connected to the transmission line, and a second end electrically connected to the input unit and the couple unit.
- 20 12 (original): The organic light emitting display of claim 11, wherein the fifth transistor comprises a thin film transistor or a field effect transistor.
- 25 13 (original): The organic light emitting display of claim 11, wherein the second reference voltage is the first power voltage.
- 30 14 (original): The organic light emitting display of claim 1, wherein the emission enable unit comprises a sixth transistor, the sixth transistor having a first end electrically connected to the driving unit, the first reset unit and the second reset unit, a gate end electrically connected to the transmission line, and a second end electrically connected to the organic light emitting diode.

- 15 (original): The organic light emitting display of claim 14, wherein the sixth transistor comprises a thin film transistor or a field effect transistor.
- 5 16 (original): The organic light emitting display of claim 1, wherein the organic light emitting diode comprises an anode electrically connected to the emission enable unit and a cathode for receiving a second power voltage.
- 17 (currently amended): A driving method, comprising:
- 10 ~~providing an organic light emitting display having threshold voltage compensation mechanism, the organic light emitting display comprising:~~  
~~an input unit for~~ outputting a preliminary control voltage by an input unit  
according to a data signal and a first scan signal;  
~~a voltage adjustment unit for~~ adjusting the preliminary control voltage by a voltage  
15 adjustment unit according to an emission signal and a second reference voltage;  
~~a couple unit for~~ adjusting a control voltage by a couple unit through coupling a change of the preliminary control voltage;  
~~a driving unit for~~ providing a driving current and a driving voltage by a driving  
20 unit according to the control voltage and a power voltage;  
~~a first reset unit for~~ resetting the driving voltage by a first reset unit according to a second scan signal and a first reference voltage;  
~~a second reset unit for~~ resetting the control voltage by a second reset unit according to the first scan signal and the driving voltage;
- 25 ~~an organic light emitting diode for~~ generating output light by an organic light emitting diode according to the driving current; ~~and~~  
~~an emission enable unit for~~ providing a control of furnishing the driving current to the organic light emitting diode by an emission enable unit according to the emission signal;
- 30 providing the first scan signal with a first level to the input unit and the second

reset unit, providing the second scan signal with the first level to the first reset unit, providing the emission signal with a second level different from the first level for disabling a voltage adjusting operation of the voltage adjustment unit and disabling a current furnishing operation of the emission enable unit, and

5 providing the data signal to the input unit during a first interval;  
~~the input unit~~ outputting the preliminary control voltage by the input unit according to the data signal and the first scan signal during the first interval;  
~~the first reset unit~~ resetting the driving voltage by the first reset unit according to the second scan signal and the first reference voltage during the first interval;

10 ~~the second reset unit~~ resetting the control voltage by the second reset unit according to the first scan signal and the driving voltage during the first interval;

switching the second scan signal from the first level to the second level for disabling a resetting operation of the first reset unit during a second interval

15 following the first interval;  
~~the second reset unit and the driving unit~~ performing a threshold voltage compensation operation on the control voltage by the second reset unit and the driving unit according to the first scan signal and the power voltage during the second interval;

20 switching the first scan signal from the first level to the second level for disabling a resetting operation of the second reset unit and disabling an inputting operation of the input unit during a third interval following the second interval;

switching the emission signal from the second level to the first level during a

25 fourth interval following the third interval;  
~~the voltage adjustment unit~~ adjusting the preliminary control voltage by the voltage adjustment unit according to the emission signal and the second reference voltage during the fourth interval;

~~the couple unit~~ adjusting the control voltage by the couple unit through coupling a

30 change of the preliminary control voltage during the fourth interval;

~~the driving unit~~ providing the driving current by the driving unit according to the control voltage and the power voltage during the fourth interval;  
~~the emission enable unit~~ furnishing the driving current to the organic light emitting diode by the emission enable unit according to the emission signal during the  
5        fourth interval; and  
~~the organic light emitting diode~~ generating output light by the organic light emitting diode according to the driving current during the fourth interval.

18 (original): The driving method of claim 17, wherein the second level is greater than  
10        the first level.

19 (original): The driving method of claim 17, wherein the first level is greater than the second level.

15    20 (original): The driving method of claim 17, wherein the second reference voltage is the power voltage.

21 (original): The driving method of claim 17, wherein a length of the second interval is greater than a length of the first interval.

Electronic Acknowledgement Receipt	
EFS ID:	15765574
Application Number:	13296238
International Application Number:	
Confirmation Number:	9731
Title of Invention:	ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF
First Named Inventor/Applicant Name:	Chun-Yen Liu
Customer Number:	27765
Filer:	Winston Hsu/Lydia Wei
Filer Authorized By:	Winston Hsu
Attorney Docket Number:	AUOP0537USA
Receipt Date:	14-MAY-2013
Filing Date:	15-NOV-2011
Time Stamp:	02:03:32
Application Type:	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment		no			
<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant Arguments/Remarks Made in an Amendment	1644270.PDF	581249	no	2
			9391c4f29ed5fdf1e7d86b3e7e7119e31a17628c		
<b>Warnings:</b>					
<b>Information:</b>					

2	Response after Ex Parte Quayle Action	1644269.PDF	75699 e25ef94c3f187b7905a2c6c7843a547058b4404	no	1
<b>Warnings:</b>					
<b>Information:</b>					
3	Claims	1644268.PDF	86459 4a1acaf5a61bd562133291f5870c4d2e07fdde07	no	6
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			743407		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>  If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>  If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>  If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

**REMARKS/ARGUMENTS**

Recognizing that Internet communications are not secure, I hereby authorize the USPTO to communicate with me concerning any subject matter of this application by electronic mail. I understand that a copy of these communications will be made of record  
5 in the application file.

**QUAYLE ACTION**

This application is in condition for allowance except for formal matters.  
10 Claim 17 is recommended to be amended in order to make the claim read better and be in appropriate method form.

**Response:**

Claim 17 has been amended as recommended by the Examiner. The  
15 amended claim 17 is now in proper method form. Applicant believes that claim 17 and all other claims are now in allowable form.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.  
20

Appl. No. 13/296,238  
Reply to Office action of April 25, 2013

Sincerely yours,

/Scott Margo/

Date: 05/13/2013

\_\_\_\_\_  
Scott Margo, Patent Agent No. 56,277

5 P.O. BOX 506, Merrifield, VA 22116, U.S.A.

Voice Mail: 302-729-1562

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e-mail : ScottMargo@naipo.com

- 10 Note: Please leave a message in my voice mail if you need to talk to me. (The time in D.C. is 12 hours behind the Taiwan time, i.e. 9 AM in D.C. = 9 PM in Taiwan.)



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT APPLICATION FEE DETERMINATION RECORD</b> Substitute for Form PTO-875				Application or Docket Number <b>13/296,238</b>		Filing Date <b>11/15/2011</b>		<input type="checkbox"/> To be Mailed	
<b>ENTITY:</b> <input checked="" type="checkbox"/> LARGE <input type="checkbox"/> SMALL <input type="checkbox"/> MICRO									
<b>APPLICATION AS FILED – PART I</b>									
(Column 1)		(Column 2)							
FOR		NUMBER FILED		NUMBER EXTRA		RATE (\$)		FEE (\$)	
<input checked="" type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A		N/A		N/A		<b>380</b>	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))		N/A		N/A		N/A			
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A		N/A		N/A			
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =		*		X \$ =			
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =		*		X \$ =			
<input type="checkbox"/> APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).							
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))									
						TOTAL		<b>380</b>	
* If the difference in column 1 is less than zero, enter "0" in column 2.									
<b>APPLICATION AS AMENDED – PART II</b>									
(Column 1)		(Column 2)		(Column 3)					
<b>AMENDMENT</b>	<b>05/14/2013</b>	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 21	Minus	** 21	= 0	x \$80 =		0	
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	x \$420 =		0	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE		<b>0</b>	
(Column 1)		(Column 2)		(Column 3)					
<b>AMENDMENT</b>		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)		ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =			
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =			
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))								
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
						TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.									
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".									
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".									
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.									

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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## NOTICE OF ALLOWANCE AND FEE(S) DUE

27765 7590 06/24/2013  
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION  
P.O. BOX 506  
MERRIFIELD, VA 22116

EXAMINER

NGUYEN, THANG V

ART UNIT

PAPER NUMBER

2691

DATE MAILED: 06/24/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA	9731

TITLE OF INVENTION: ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1780	\$300	\$0	\$2080	09/24/2013

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

**PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
or Fax (571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27765 7590 06/24/2013  
**NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION**  
P.O. BOX 506  
MERRIFIELD, VA 22116

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA	9731

TITLE OF INVENTION: ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$1780	\$300	\$0	\$2080	09/24/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, THANG V	2691	345-082000

<b>1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).</b> <input type="checkbox"/> Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. <input type="checkbox"/> "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. <b>Use of a Customer Number is required.</b>	<b>2. For printing on the patent front page, list</b> (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____ (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____ 3 _____
---	---

**3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)**

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

**4a. The following fee(s) are submitted:**

- ☐ Issue Fee  
☐ Publication Fee (No small entity discount permitted)  
☐ Advance Order - # of Copies \_\_\_\_\_

**4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)**

- ☐ A check is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

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NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

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Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

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This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA	9731

27765	7590	06/24/2013
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116		

EXAMINER	
NGUYEN, THANG V	

ART UNIT	PAPER NUMBER
2691	

DATE MAILED: 06/24/2013

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 100 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 100 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## Privacy Act Statement

**The Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<b>Notice of Allowability</b>	<b>Application No.</b> 13/296,238	<b>Applicant(s)</b> LIU ET AL.	
	<b>Examiner</b> THANG NGUYEN	<b>Art Unit</b> 2691	<b>AIA (First Inventor to File) Status</b> No

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 5/14/2013.  
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on \_\_\_\_\_.

2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_\_; the restriction requirement and election have been incorporated into this action.

3. ☒ The allowed claim(s) is/are 1-21. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see [http://www.uspto.gov/patents/init\\_events/pph/index.jsp](http://www.uspto.gov/patents/init_events/pph/index.jsp) or send an inquiry to [PPHfeedback@uspto.gov](mailto:PPHfeedback@uspto.gov).

4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
**Certified copies:**  
a) ☒ All    b) ☐ Some    \*c) ☐ None of the:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).  
\* Certified copies not received: \_\_\_\_\_.

**Interim copies:**  
a) ☐ All    b) ☐ Some    c) ☐ None of the: Interim copies of the priority documents have been received.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.  
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

**Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

1. <input type="checkbox"/> Notice of References Cited (PTO-892)	5. <input type="checkbox"/> Examiner's Amendment/Comment
2. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____	6. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance
3. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material	7. <input type="checkbox"/> Other _____.
4. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date _____.	

/THANG NGUYEN/ Examiner, Art Unit 2691	/CHANH NGUYEN/ Supervisory Patent Examiner, Art Unit 2691
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## BIB DATA SHEET

CONFIRMATION NO. 9731


<b>SERIAL NUMBER</b> 13/296,238	<b>FILING or 371(c) DATE</b> 11/15/2011 <b>RULE</b>	<b>CLASS</b> 345	<b>GROUP ART UNIT</b> 2691	<b>ATTORNEY DOCKET NO.</b> AUOP0537USA		
<b>APPLICANTS</b> Chun-Yen Liu, Hsin-Chu, TAIWAN; Chia-Yuan Yeh, Hsin-Chu, TAIWAN; Cheng-Chieh Tseng, Hsin-Chu, TAIWAN; <b>** CONTINUING DATA *****</b> <b>** FOREIGN APPLICATIONS *****</b> TAIWAN 100109157 03/17/2011 <b>** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **</b> 11/25/2011						
Foreign Priority claimed <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 35 USC 119(a-d) conditions met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Verified and Acknowledged <u>/THANG V. NGUYEN/</u> Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	<b>STATE OR COUNTRY</b> TAIWAN	<b>SHEETS DRAWINGS</b> 4	<b>TOTAL CLAIMS</b> 21	<b>INDEPENDENT CLAIMS</b> 2
<b>ADDRESS</b> NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION P.O. BOX 506 MERRIFIELD, VA 22116 UNITED STATES						
<b>TITLE</b> ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF						
<b>FILING FEE RECEIVED</b> 1310	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			<input type="checkbox"/> All Fees		
				<input type="checkbox"/> 1.16 Fees (Filing)		
				<input type="checkbox"/> 1.17 Fees (Processing Ext. of time)		
				<input type="checkbox"/> 1.18 Fees (Issue)		
				<input type="checkbox"/> Other _____		
				<input type="checkbox"/> Credit		





<b>Issue Classification</b> 	<b>Application/Control No.</b> 13296238	<b>Applicant(s)/Patent Under Reexamination</b> LIU ET AL.
	<b>Examiner</b> THANG NGUYEN	<b>Art Unit</b> 2691


/THANG NGUYEN/ Examiner.Art Unit 2691  (Assistant Examiner)	6/14/2013  (Date)	<b>Total Claims Allowed:</b>  21	
/CHANH NGUYEN/ Supervisory Patent Examiner.Art Unit 2691  (Primary Examiner)	06/14/2013  (Date)	O.G. Print Claim(s)  1	O.G. Print Figure  2

<b>Issue Classification</b> 	<b>Application/Control No.</b> 13296238	<b>Applicant(s)/Patent Under Reexamination</b> LIU ET AL.
	<b>Examiner</b> THANG NGUYEN	<b>Art Unit</b> 2691

<input type="checkbox"/> <b>Claims renumbered in the same order as presented by applicant</b> <input type="checkbox"/> <b>CPA</b> <input type="checkbox"/> <b>T.D.</b> <input type="checkbox"/> <b>R.1.47</b>															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	17	17												
2	2	18	18												
3	3	19	19												
4	4	20	20												
5	5	21	21												
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10	10														
11	11														
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13	13														
14	14														
15	15														
16	16														

/THANG NGUYEN/ Examiner.Art Unit 2691  (Assistant Examiner)	6/14/2013  (Date)	<b>Total Claims Allowed:</b>  21	
/CHANH NGUYEN/ Supervisory Patent Examiner.Art Unit 2691  (Primary Examiner)	06/14/2013  (Date)	O.G. Print Claim(s)  1	O.G. Print Figure  2

## EAST Search History

## EAST Search History (Prior Art)


Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	11	"7038392"	US-PGPUB; USPAT	OR	ON	2013/03/25 15:41
S2	1	"7773054"	US-PGPUB; USPAT	OR	ON	2013/03/25 15:43
S3	79476	OLED or "Organic Light Emitting Diode"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:48
S4	11278	S3 and "345".clas.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:48
S5	2754	S4 and (threshold adj voltage)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:51
S6	1632	S5 and compensat\$3	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:51
S7	380	S6 and 345/82.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/03/25 16:52
S8	4	((CHIA-YUAN) near2 (YEH)).INV.	US-PGPUB; USPAT	OR	ON	2013/03/27 11:08
S9	116635	electroluminescence oled organic adj light adj emit\$4 adj diode\$1	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 15:55
S10	1038767	S9 or led	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 16:03
S12	116635	electroluminescence oled (organic adj light adj emit\$4 adj diode\$1)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 16:13
S13	124148	S12 or (organic adj led)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 16:27
S14	15375	S13 and "345".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 16:33
S15	3635	S14 and (threshold adj voltage)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/05 17:09
S16	116667	electroluminescence oled (organic adj light adj emit\$4 adj diode\$1)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:08
S17	124187	S16 or (organic adj led)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:08
S18	15375	S17 and "345".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:08

S19	3635	S18 and (threshold adj voltage)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:08
S20	1798	S19 and 345/211,76.ccls.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:21
S21	1152	S20 not electroluminescence	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:29
S22	24	S21 and hysteresis	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/08 09:36
S23	24	S21 and hysteresis	US-PGPUB; USPAT; EPO; JPO; DERWENT	OR	ON	2013/04/08 11:07
S24	1152	S20 not electroluminescence	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/08 11:08
S25	116776	electroluminescence oled (organic adj light adj emit\$4 adj diode\$1)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S26	124301	S25 or (organic adj led)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S27	15393	S26 and "345".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S28	3638	S27 and (threshold adj voltage)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S29	1799	S28 and 345/211,76.ccls.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/09 13:29
S30	1152	S29 not electroluminescence	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/09 13:29
S31	255	S30 and 345/82,83,39.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/09 13:30
S32	116776	electroluminescence oled (organic adj light adj emit\$4 adj diode\$1)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S33	124301	S32 or (organic adj led)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S34	15393	S33 and "345".clas.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S35	3638	S34 and (threshold adj voltage)	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S36	1799	S35 and 345/211,76.ccls.	US-PGPUB; USPAT; DERWENT	OR	ON	2013/04/10 17:17
S37	1152	S36 not electroluminescence	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/10 17:17
S38	1038	S37 and 345/82,76.ccls.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/10 17:17
S39	123	S38 and transmission	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2013/04/10 17:39

**EAST Search History (Interference)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L15	1	((reset adj unit) same2 (couple adj unit) same2 (enable adj unit)).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2013/06/13: 14:10

**6/ 13/ 2013 3:12:43 PM****C:\Users\tnguyen63\Documents\EAST\Workspaces\ OLED with threshold voltage compensation mechanism app# 13296238.wsp**

<b>Search Notes</b> 	<b>Application/Control No.</b> 13296238	<b>Applicant(s)/Patent Under Reexamination</b> LIU ET AL.
	<b>Examiner</b> THANG NGUYEN	<b>Art Unit</b> 4163

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
345	82, 83, 39, 76, 211	4/22/13	TN
315	169.1, 169.3	4/22/13	TN

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	please see East Search	6/13/13	TN

/THANG NGUYEN/ Examiner.Art Unit 2691	
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# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
or Fax (571) 273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

27765 7590 06/24/2013

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION  
P.O. BOX 506  
MERRIFIELD, VA 22116

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

Sibyl Yu	(Depositor's name)
/Sibyl Yu/	(Signature)
07/05/2013	(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA	9731

## **TITLE OF INVENTION:**

ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	No	\$1780	\$300	\$2080	09/24/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
NGUYEN, THANG V	2691	345-082000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).  
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev. 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list  
 (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,  
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.  
 1 Winston Hsu  
 2 Scott Margo  
 3 \_\_\_\_\_

## **3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)**

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

**AU Optronics Corp.**

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

**No.1, Li-Hsin Road 2, Science-Based Industrial Park, Hsin-Chu, Taiwan, R.O.C.**

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

## **4a. The following fee(s) are enclosed:**

☒ Issue Fee  
☒ Publication Fee (No small entity discount permitted)  
☐ Advance Order - # of Copies \_\_\_\_\_

## **4b. Payment of Fee(s):**

☐ A check in the amount of the fee(s) is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☒ The Director is hereby authorized by charge the required fee(s), or credit any overpayment, to Deposit Account Number 50-3105.

## **5. Change in Entity Status (from status indicated above)**

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

The Director of the USPTO is requested to apply the Issue Fee and Publication Fee (if any) or to re-apply any previously paid issue fee to the application identified above.  
 NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Winston Hsu/ Date 07/04/2013  
 Typed or printed name Winston Hsu Registration No. 41,526

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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Electronic Patent Application Fee Transmittal				
Application Number:		13296238		
Filing Date:		15-Nov-2011		
Title of Invention:		ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF		
First Named Inventor/Applicant Name:		Chun-Yen Liu		
Filer:		Winston Hsu/Sibyl Yu		
Attorney Docket Number:		AUOP0537USA		
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	1780	1780
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				2080

Electronic Acknowledgement Receipt	
<b>EFS ID:</b>	16238037
<b>Application Number:</b>	13296238
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	9731
<b>Title of Invention:</b>	ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF
<b>First Named Inventor/Applicant Name:</b>	Chun-Yen Liu
<b>Customer Number:</b>	27765
<b>Filer:</b>	Winston Hsu/Sibyl Yu
<b>Filer Authorized By:</b>	Winston Hsu
<b>Attorney Docket Number:</b>	AUOP0537USA
<b>Receipt Date:</b>	05-JUL-2013
<b>Filing Date:</b>	15-NOV-2011
<b>Time Stamp:</b>	02:54:45
<b>Application Type:</b>	Utility under 35 USC 111(a)

### Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 2080
RAM confirmation Number	10657
Deposit Account	503105
Authorized User	
<p>The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:</p> <p>Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)</p> <p>Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)</p>	

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)					
Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)					
<b>File Listing:</b>					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	AUOP0537USA0_E2_1_NP072.pdf	41965 c08a5efb56d595ff77764532580f9bad224cd352	no	1
<b>Warnings:</b>					
<b>Information:</b>					
2	Fee Worksheet (SB06)	fee-info.pdf	32124 ad7a834f9140c1a549bcb0711c08f648fdcb8d1c	no	2
<b>Warnings:</b>					
<b>Information:</b>					
<b>Total Files Size (in bytes):</b>			74089		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b>          If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b>          If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b>          If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/296,238	08/06/2013	8502757	AUOP0537USA	9731

27765 7590 07/17/2013  
NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION  
P.O. BOX 506  
MERRIFIELD, VA 22116

### ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

#### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 100 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Chun-Yen Liu, Hsin-Chu, TAIWAN;  
Chia-Yuan Yeh, Hsin-Chu, TAIWAN;  
Cheng-Chieh Tseng, Hsin-Chu, TAIWAN;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit [SelectUSA.gov](http://SelectUSA.gov).

**STATEMENT UNDER 37 CFR 3.73(c)**

Applicant/Patent Owner: OPTRONIC SCIENCES LLC

Application No./Patent No.: 8502757

Filed/Issue Date: August 6, 2013

Titled: ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF  
OPTRONIC SCIENCES LLC, a corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is \_\_\_\_%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: the inventor(s) To: AU OPTRONICS CORPORATION

The document was recorded in the United States Patent and Trademark Office at  
Reel 027863, Frame 0835, or for which a copy thereof is attached.

2. From: AU OPTRONICS CORPORATION To: AUO CORPORATION

The document was recorded in the United States Patent and Trademark Office at  
Reel 063785, Frame 0830, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

*If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.*

**STATEMENT UNDER 37 CFR 3.73(c)**

3. From: AUO CORPORATION To: OPTRONIC SCIENCES LLC

The document was recorded in the United States Patent and Trademark Office at  
Reel 064658, Frame 0572, or for which a copy thereof is attached.

4. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

5. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

6. From: \_\_\_\_\_ To: \_\_\_\_\_

The document was recorded in the United States Patent and Trademark Office at  
Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Szymon M. Gurda/

Signature

Szymon M. Gurda

Printed or Typed Name

September 24, 2024

Date

58451

Title or Registration Number

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.





UNITED STATES  
PATENT AND TRADEMARK OFFICE

Page 1 of 2  
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Alexandria, VA 22313 - 1450  
www.uspto.gov

## ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #  
**13/296,238**

RECEIPT DATE / TIME  
**09/24/2024 08:15:56 PM Z ET**

ATTORNEY DOCKET #  
**AUOP0537USA**

### Title of Invention

ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION  
MECHANISM AND DRIVING METHOD THEREOF

### Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	8502757
CONFIRMATION #	9731	FILED BY	Yi Lu
PATENT CENTER #	67308138	FILING DATE	11/15/2011
CUSTOMER #	27765	FIRST NAMED INVENTOR	Chun-Yen Liu
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Szymon Gurda

### Documents

**TOTAL DOCUMENTS: 2**

DOCUMENT	PAGES	DESCRIPTION	SIZE (KB)
POA-filing.pdf	2	Power of Attorney	956 KB
aia0096.pdf	3	Assignee showing of ownership per 37 CFR 3.73	119 KB

### Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
POA-filing.pdf	2B6EB4E256DA1C3DD0A12D046405C108BAF1D33F69FB2B01 5F2951D76B289F196A2D65E1E7CA6B4412197826610BFE0D5 DC09548F90293430D28C9805FB9C1D7
aia0096.pdf	21AF7A21B459CD8D43D817E452ECA4EAD6989C73F90BAF4

3245761E5999089777D560CFAD50202574B73EBFA998742C93  
9AD1BDE30C2147F89A11B1E55CB461

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

**New Applications Under 35 U.S.C. 111**

If a new application is being filed and the application includes the necessary components for filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application

**National Stage of an International Application under 35 U.S.C. 371**

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

**New International Application Filed with the USPTO as a Receiving Office**

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>PATENT - POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS</b>	Patent Number	8502757
	Issue Date	August 6, 2013
	First Named Inventor	Chun-Yen Liu
	Title	ORGANIC LIGHT EMITTING DISPLAY HAVING THRESHOLD VOLTAGE COMPENSATION MECHANISM AND DRIVING METHOD THEREOF
	Attorney Docket No.	0830-4218

I hereby revoke all previous powers of attorney given in the above-identified patent.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the Customer Number identified in the box at right as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

27197

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) with respect to the patent identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified patent to:

☒ The address associated with the above-identified Customer Number.

OR

☐ The address associated with the Customer Number identified in the box at right:

OR

☐ Firm or  
Individual Name

Address

City

State

Zip

Country

Telephone

Email

I am the:

☐ Applicant.

OR

☒ Patent owner.

Statement under 37 CFR 3.73(c) (Form PTO/AIA/96) submitted herewith or filed on \_\_\_\_\_

SIGNATURE of Applicant or Patent Owner

Signature

Name

Szyden Gorda

Date

September 20, 2024

Title and Company

Authorized Signatory: Optronic Sciences LLC

Telephone

**NOTE:** Signatures of all the applicants or patent owners of the entire interest or their representative(s) are required. If more than one signature is required, submit multiple forms, check the box below, and identify the total number of forms submitted in the blank below.☐ A total of \_\_\_\_\_ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32, and 1.33. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

## Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



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United States Patent and Trademark Office  
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA

**CONFIRMATION NO. 9731**

27765

NORTH AMERICA INTELLECTUAL PROPERTY CORPORATION  
5F., NO.389, FUHE RD., YONGHE DIST.  
NEW TAIPEI CITY,  
TAIWAN

**POWER OF ATTORNEY NOTICE**



\*OC000000078712553\*

Date Mailed: 10/02/2024

**NOTICE REGARDING CHANGE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 09/24/2024.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at  
**(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/s/torres/



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13/296,238	11/15/2011	Chun-Yen Liu	AUOP0537USA

**CONFIRMATION NO. 9731**

**POA ACCEPTANCE LETTER**



\*OC000000078712590\*

27197

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Date Mailed: 10/02/2024

**NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY**

This is in response to the Power of Attorney filed 09/24/2024.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at (571) 272-4000 or (571) 272-4200 or 1-888-786-0101.

/s/torres/