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(54) Organic light emitting display device and method for driving thereof

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Description

BACKGROUND

Field of the Disclosure

[0001] Embodiments relate to an organic light emitting display device and a method for driving the same, for example, to an organic light emitting display device which enables compensating the degradation of an organic light emitting diode, and a method for driving the same.

Discussion of the Related Art

[0002] According to recent developments in multimedia, there is increasing demand for flat panel displays. To satisfy this increasing demand, various flat panel displays such as liquid crystal display devices, plasma display panels, field emission display devices and organic light emitting display devices are used in practice. Among the various flat panel displays, the organic light emitting display device has been attractive as a next-generation flat panel display owing to advantages of rapid response speed and low power consumption. In addition, the organic light emitting display can emit light by itself, whereby the organic light emitting display does not have the problems associated with a narrow viewing angle.

[0003] Generally, the organic light emitting display device may include a display panel having a plurality of pixels, and a panel driver for driving the respective pixels so as to make the respective pixels emit light. In this case, the pixels may be respectively formed in pixel regions, wherein the pixel regions may be defined by the crossing of a plurality of gate lines and a plurality of data lines.

[0004] With reference to FIG. 1, each pixel may include a switching transistor (Tsw), a driving transistor (Tdr), a capacitor (Cst), and an organic light emitting diode (OLED).

[0005] As the switching transistor (Tsw) is switched on by a gate signal (GS) supplied to a gate line (GL), a data voltage (Vdata) supplied to a data line (DL) may be supplied to the driving transistor (Tdr).

[0006] As the driving transistor (Tdr) is switched by the data voltage (Vdata) supplied from the switching transistor (Tsw), it is possible to control a data current (Ioled) flowing to the organic light emitting diode (OLED) by a driving voltage (VDD) (e.g., a first power supply voltage).

[0007] The capacitor (Cst) may be connected between gate and source terminals of the driving transistor (Tdr), wherein the capacitor (Cst) may store a voltage corresponding to the data voltage (Vdata) supplied to the gate terminal of the driving transistor (Tdr), and may turn on the driving transistor (Tdr) by the use of this stored voltage.

[0008] The organic light emitting diode (OLED) may be electrically connected between the source terminal of the driving transistor (Tdr) and a cathode electrode supplied with a cathode voltage (VSS) (e.g., a second power supply voltage), wherein the organic light emitting diode (OLED) may emit light by the flow of data current (Ioled) supplied from the driving transistor (Tdr).

[0009] Each pixel of the organic light emitting display device according to the related art may control an intensity of the data current (Ioled) flowing to the organic light emitting diode (OLED) by the driving voltage (VDD) through the use of switching of the driving transistor (Tdr) according to the data voltage (Vdata), whereby the organic light emitting diode (OLED) emits light and thereby displays an image.

[0010] FIG. 2 is a graph illustrating luminance change in accordance with driving time of the organic light emitting diode (OLED) according to the related art.

[0011] As shown in FIG. 2, the organic light emitting diode (OLED) may degrade as driving time increases, which gradually deteriorates the luminance characteristics. Thus, the organic light emitting display device according to the related art may have problems of lowered luminance and luminance deviation due to the degradation of the organic light emitting diode (OLED).

[0012] US 2003/063053 A1 describes a light emitting device capable of suppressing the variations of luminance of OLEDs associated with the deterioration of an organic light emitting material. An input signal is constantly or periodically sampled to sense a light emission period or displayed gradation level of each of light emitting elements of pixels. A pixel suffering the greatest deterioration and decreased luminance is predicted from the accumulations of the sensed values. A current supply to this target pixel is corrected for achieving a desired luminance. The individual gradation levels of the other pixels are lowered. The correction of the image signal is made by comparing the accumulation of the sensed values of each of the other pixels with a previously stored data on a time-varying luminance characteristic of the light emitting element.

[0013] EP 2068299 A2 describes a method of driving an organic light emitting display that includes generating accumulated data. In an example, a maximum brightness of remaining pixels other than a selected pixel is reduced to a maximum brightness of the selected pixel.

[0014] US 2005/110728 A1 describes a method for controlling aging compensation in an OLED display having one or more light emitting elements includes the steps of periodically measuring the change in display output to calculate a correction signal; restricting the change in the correction signal at each period; and applying the correction signal to the OLED display to effect a correction in the display output.

SUMMARY

[0015] The invention is indicated in the independent claims. Further embodiments are indicated in the dependent claims.

[0016] Accordingly, present embodiments may be directed to an organic light emitting display device and a method for driving the same that substantially obviates one or more problems due to limitations and disadvantages of the related art.

[0017] An aspect of embodiments is to provide an organic light emitting display device which facilitates decreased luminance lowering and luminance deviation caused by the degradation of organic light emitting diodes (OLEDs), and a method for driving the same.

[0018] It is to be understood that both the foregoing general description and the following detailed description of the present embodiments are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The accompanying drawings, which are included to provide a further understanding of the present embodiments and are incorporated in and constitute a part of this application, illustrate examples of the embodiment(s) and together with the description serve to explain principles in accordance with the invention. In the drawings:

FIG. 1 illustrates a pixel structure of an organic light emitting display device according to the related art;

FIG. 2 is a graph illustrating a luminance change in accordance with driving time of an organic light emitting diode (OLED) according to the related art;

FIG. 3 illustrates an organic light emitting display device according to an embodiment;

FIG. 4 is a block diagram illustrating a degradation compensator shown in FIG. 3 according to an example not belonging to the invention;

FIG. 5 is a graph illustrating luminance changes in organic light emitting diodes of the example of FIG. 4 and a first comparative example in accordance with the driving time;

FIG. 6 is a block diagram illustrating a degradation compensator shown in FIG. 3 according to a first embodiment;

FIG. 7 illustrates the degradation characteristics of an organic light emitting diode in accordance with electrical stress;

FIG. 8 illustrates a luminance deviation in accordance with the degradation characteristics of the organic light emitting diode according to the related art;

FIG. 9 is a block diagram illustrating a degradation compensator shown in FIG. 3 according to a second embodiment;

FIG. 10 is a graph illustrating luminance changes in accordance with driving time of a sub-pixel in the organic light emitting display device according to an embodiment;

FIG. 11 is a block diagram illustrating a degradation compensator shown in FIG. 3 according to a third embodiment; and

FIG. 12 is a graph illustrating luminance changes in accordance with driving time of a sub-pixel in the organic light emitting display device according to an embodiment.

DETAILED DESCRIPTION

[0020] Reference will now be made in detail to example embodiments, some of which are illustrated in the accompanying drawings. The same or similar reference numbers may be used throughout the drawings to refer to the same or like parts.

[0021] The following details about some terms should be understood.

[0022] The term of a singular expression should be understood to include a multiple expression as well as the singular expression if there is no specific definition in the context. If using the term such as "the first" or "the second", it is to separate any one element from other elements. Thus, a scope of claims is not limited by these terms.

[0023] Also, it should be understood that the term such as "include" or "have" does not preclude existence or possibility of one or more features, numbers, steps, operations, elements, parts or their combinations.

[0024] It should be understood that the term "at least one" includes all combinations related with any one item. For example, "at least one among a first element, a second element and a third element" may include all combinations of the two or more elements selected from the first, second and third elements as well as each element of the first, second and third elements.

[0025] Hereinafter, an organic light emitting display device according to embodiments and a method for driving the same will be described in detail with reference to the accompanying drawings.

[0026] FIG. 3 illustrates an organic light emitting display device according to an embodiment.

[0027] With reference to FIG. 3, the organic light emitting display device according to an embodiment may include a display panel 100, a panel driver 200, and a memory 300.

[0028] The display panel 100 may include a plurality of sub-pixels (SP). The plurality of sub-pixels (SP) may be formed in pixel regions defined by the crossing of a plurality of gate lines (GL) and a plurality of data lines (DL). On the display panel 100, there may be a plurality of driving voltage lines (PL1) that are supplied with a driving voltage from the panel driver 200, wherein the plurality of driving voltage lines (PL1) may be respectively formed in parallel to the plurality of data lines (DL).

[0029] Each of the sub-pixels (SP) may be any one among red, green, blue, and white sub-pixels. A unit pixel for displaying an image may comprise adjacent red, green, blue, and white sub-pixels, or may comprise adjacent red, green, and blue sub-pixels.

[0030] Each of the sub-pixels (SP) may include an organic light emitting diode (OLED) and a pixel circuit (PC).

[0031] The organic light emitting diode (OLED) may be connected between the pixel circuit (PC) and a second power source line (PL2). The organic light emitting diode (OLED) may emit light in proportion to an amount of data current supplied from the pixel circuit (PC), and may emit light with a predetermined color. To this end, the organic light emitting diode (OLED) may include an anode electrode (or pixel electrode) connected to the pixel circuit (PC), a cathode electrode (or reflective electrode) connected to the second power source line (PL2), and a light emitting cell formed between the anode electrode and the cathode electrode, wherein the light emitting cell may emit any one of red-colored light, green-colored light, blue-colored light, and white-colored light. The light emitting cell may, for example, be formed in a deposition structure of hole transport layer / organic light emitting layer / electron transport layer, or a deposition structure of hole injection layer / hole transport layer / organic light emitting layer / electron transport layer / electron injection layer. Furthermore, the light emitting cell may include a functional layer for improving light-emitting efficiency and/or lifespan of the organic light emitting layer.

[0032] The pixel circuit (PC) may supply the data current, which corresponds to the data voltage (Vdata) supplied from the panel driver 200 to the data line (DL) in response to a gate signal (GS) of a gate-on voltage level supplied from the panel driver 200 to the gate line (GL), to the organic light emitting diode (OLED). The data voltage (Vdata) may have a voltage value obtained by compensating the degradation characteristics of the organic light emitting diode (OLED). To this end, the pixel circuit (PC) may include a switching transistor, a driving transistor, and at least one capacitor, which may be formed on a substrate by a process for forming a thin film transistor. The pixel circuit (PC) may be identical or similar to that of the related art pixel shown in FIG. 1, and a detailed explanation for the pixel circuit (PC) is therefore omitted.

[0033] The panel driver 200 may modulate input data (Idata) of each sub-pixel (SP) of a current frame by calculating a degradation compensation gain value to be applied to each sub-pixel (SP) on the basis of accumulated data (Adata) of each sub-pixel (SP) that may be accumulated in the memory 300 until a preceding frame prior to the current frame. The panel driver 200 may accumulate the modulated data (Mdata) of each sub-pixel (SP) from the accumulated data (Adata) of the corresponding sub-pixel (SP), and store the data obtained by accumulation in the memory 300. The panel driver 200 may convert the modulated data (Mdata) of each sub-pixel (SP) into the data voltage (Vdata), and supply the data voltage (Vdata) to each sub-pixel (SP).

[0034] The memory 300 may store the accumulated data of each sub-pixel (SP), which is accumulated by the panel driver 200 until the preceding frame prior to the current frame, in a unit of each sub-pixel (SP), and provide the accumulated data of each sub-pixel to the panel driver 200. In one embodiment, the accumulated data stored in the memory 300 may not be initialized, that is, it may be continuously accumulated while the organic light emitting display device is driven.

[0035] The panel driver 200 may include a degradation compensator 210, a timing controller 220, a gate driving circuit 230, and a data driving circuit 240.

[0036] As part of the panel driver 200, the degradation compensator 210 may modulate the input data (Idata) of each sub-pixel (SP) of the current frame by calculating the degradation compensation gain value (DCG) to be applied to each sub-pixel (SP) on the basis of accumulated data (Adata) of each sub-pixel (SP), which may be accumulated in the memory 300, may accumulate the modulated data (Mdata) of each sub-pixel (SP) from the accumulated data (Adata) of the corresponding sub-pixel (SP), and may store the data obtained by accumulation in the memory 300 and simultaneously provide the data obtained by accumulation to the timing controller 220.

[0037] The timing controller 220 may control driving timing for each of the gate driving circuit 230 and the data driving circuit 240 in accordance with a timing synchronous signal (TSS) that may be input from an external system body (not shown) or external graphics card (not shown). That is, the timing controller 220 may generate a gate control signal (GCS) and a data control signal (DCS) on the basis of the timing synchronous signal (TSS) such as a vertical synchronous signal, a horizontal synchronous signal, a data enable signal, a dot clock, etc., control the driving timing of the gate driving circuit 230 by the gate control signal (GCS), and control the driving timing of the data driving circuit 240 by the data control signal (DCS).

[0038] Also, the timing controller 220 may align pixel data (DATA) so as to make the modulated data (Mdata) of each sub-pixel (SP), supplied from the degradation compensator 210, appropriate for a pixel arrangement structure of the display panel 100, and then supply the aligned pixel data (DATA) to the data driving circuit 240 on the basis of a predetermined interface mode.

[0039] In one example, the timing controller 220 may include the degradation compensator 210 therein. In this case, the degradation compensator 210 may be provided inside the timing controller 220, wherein the degradation compensator 210 may be provided in a program or logic type.

[0040] The gate driving circuit 230 may generate the gate signal (GS) corresponding to an image-displaying order on the basis of the gate control signal (GCS) supplied from the timing controller 220, and then may supply the generated gate signal (GS) to the corresponding gate line (GL). The gate driving circuit 230 may be formed of a plurality of integrated circuits (IC), or may be directly formed on the display panel 100 during a process for forming the transistors for each sub-pixel (SP), and may be connected with one side or both sides in each of the plurality of gate lines (GL).

[0041] The data driving circuit 240 may be supplied with the pixel data (DATA) and the data control signal (DCS) from the timing controller 220, and may also supplied with a plurality of reference gamma voltages from an external reference gamma voltage supplier (not shown). The data driving circuit 240 may convert the pixel data (DATA) into the analog-type data voltage (Vdata) by the plurality of reference gamma voltages in accordance with the data control signal (DCS), and then supply the data voltage (Vdata) to the data line (DL) of the corresponding sub-pixel (SP). The data driving circuit 240 may be formed of a plurality of integrated circuits (IC), and may be connected with one side and/or both sides in each of the plurality of data lines (DL).

[0042] FIG. 4 is a block diagram illustrating the degradation compensator, shown in FIG. 3, according to an example. FIG. 5 is a graph illustrating luminance changes in the organic light emitting diodes of the example of FIG. 4 and a first comparative example in accordance with the driving time (hours).

[0043] With reference to FIGs. 4 and 5, the degradation compensator 210 according to the example may include a degradation compensation gain value calculator 211, a data modulator 213, and a data accumulator 215.

[0044] The degradation compensation gain value calculator 211 may calculate the degradation compensation gain value (DCG) of each sub-pixel (SP) on the basis of accumulated data of the respective sub-pixels (SP) stored in the memory 300. For example, the degradation compensation gain value calculator 211 calculates the degradation compensation gain value (DCG) for increasing a luminance of each sub-pixel (SP) to a preset initial luminance (or target luminance). In one example, the degradation compensation gain value calculator 211 compares the accumulated data of the corresponding sub-pixel (SP) with compensation point accumulated data (Ref1, Ref2, Ref3). Based on the comparison result, if the accumulated data of the corresponding sub-pixel (SP) is the same as or larger than the compensation point accumulated data (Ref1, Ref2, Ref3), the degradation compensation gain value (DCG) may be calculated to increase the luminance of the corresponding sub-pixel (SP) to the preset initial luminance (or target luminance).

[0045] The compensation point accumulated data (Ref1, Ref2, Ref3) may correspond to prediction accumulated data with gradually increasing values corresponding to a luminance lowering value (Yset) which is preset with respect to the initial luminance of the organic light emitting diode (OLED). The compensation point accumulated data (Ref1, Ref2, Ref3) may be in a Look-Up Table, or relations may be provided with the prediction accumulated data for the luminance lowering point with respect to the initial luminance of the organic light emitting diode (OLED). Also, the degradation compensation gain value calculator 211 may include a Look-Up Table obtained by mapping the degradation compensation gain value (DCG) having a real number which is more than '1' in accordance with the accumulated data, or a logic operation for performing operations to derive the degradation compensation gain value (DCG) having a real number which is more than '1' in accordance with the accumulated data.

[0046] An example method for calculating the degradation compensation gain value (DCG) by the aforementioned degradation compensation gain value calculator 211 will be described as follows.

[0047] First, the degradation compensation gain value calculator 211 may compare the accumulated data of the sub-pixel (SP) with the first compensation point accumulated data (Refl). Based on the comparison result, if the accumulated data of the sub-pixel (SP) is smaller than the first compensation point accumulated data (Refl), the first degradation compensation gain value (DCG) having the value of '1' may be generated. Meanwhile, if the accumulated data of the sub-pixel (SP) is the same as or larger than the first compensation point accumulated data (Refl), the first degradation compensation gain value (DCG) having the real number which is more than '1' may be generated, and simultaneously a first compensation flag may also be generated and stored. In this case, the first compensation flag may correspond to a signal indicating that the first degradation compensation for each sub-pixel (SP) is performed.

[0048] The degradation compensation gain value calculator 211 may compare the accumulated data of the sub-pixel (SP), which is continuously accumulated in accordance with the driving of each sub-pixel (SP), with the second compensation point accumulated data (Ref2) on the basis of the first compensation flag. According to the comparison result, the second degradation compensation gain value (DCG) having the real number which is more than '1' may be generated, and simultaneously a second compensation flag may be generated and stored.

[0049] As a result, the degradation compensation gain value calculator 211 may repeatedly perform the aforementioned process so as to increase the luminance of each sub-pixel (SP) to the initial luminance by generating the degradation compensation gain value (DCG) having the real number which is more than '1' whenever the accumulated data of each sub-pixel (SP) is the same as or larger than the compensation point accumulated data (Ref1, Ref2, Ref3).

[0050] The data modulator 213 may generate the modulated data (Mdata) by modulating the input data (Idata) of each sub-pixel (SP), which may be input from the external system body (not shown) or graphics card (not shown), based on the degradation compensation gain value (DCG) of each sub-pixel (SP) supplied from the degradation compensation gain value calculator 211. For example, the data modulator 213 may generate the modulated data (Mdata) by multiplying the input data (Idata) and the corresponding degradation compensation gain value (DCG), but examples are not limited to this method. The modulated data (Mdata) may, for example, be generated by any one of the four fundamental arithmetic operations of addition, subtraction, multiplication, and division.

[0051] The data accumulator 215 may read the accumulated data of each sub-pixel (SP) stored in the memory 300, accumulate the modulated data (Mdata) of the corresponding sub-pixel (SP) outputted from the data modulator 213 when reading accumulated data of the sub-pixel (SP); and again store the accumulated data (Adata) of each sub-pixel (SP) accumulated until to the current frame in the memory 300. In this case, the data accumulator 215 may accumulate the modulated data (Mdata) of each sub-pixel (SP) at every frame or every predetermined number of plural frames. Accordingly, the accumulated data (Adata) of each sub-pixel (SP) stored in the memory 300 may be used as reference data for modulating each sub-pixel (SP) of the next frame. Also, the accumulated data (Adata) of each sub-pixel (SP) stored in the memory 300 may not be initialized-that is, it may be continuously accumulated while the organic light emitting display device is driven.

[0052] With reference to FIG. 5, the 'A' plot shows luminance change in accordance with the driving time of the sub-pixel in the first comparative example to which the aforementioned degradation compensation gain value (DCG) is not applied, and the 'B' plot shows luminance change in accordance with the driving time of the sub-pixel in the example of FIG. 4 to which the aforementioned degradation compensation gain value (DCG) is applied.

[0053] As shown in plot 'A', in the first comparative example, as the organic light emitting diode is degraded in accordance with the driving time, the luminance may gradually decrease from the initial luminance in accordance with the increase of driving time.

[0054] Meanwhile, as shown in plot 'B', in the example, whenever the accumulated data of each sub-pixel (SP) is the same as or larger than the compensation point accumulated data (Ref1, Ref2, Ref3), the degradation compensation gain value (DCG) may be applied so that the luminance of the sub-pixel (SP) may be increased to the initial luminance (Yint).

[0055] The organic light emitting display device including the degradation compensator 210 according to the example may compensate the luminance of each sub-pixel (SP) to the initial luminance by applying the degradation compensation gain value (DCG), thereby displaying high-luminance images for a long time.

[0056] FIG. 6 is a block diagram illustrating the degradation compensator, shown in FIG. 3, according to a first embodiment.

[0057] With reference to FIG. 6, the degradation compensator 210 according to the first embodiment may include a degradation compensation gain value calculator 211, a data modulator 213, a degradation weight reflector 214, and a data accumulator 215. Except for the degradation weight reflector 214, the degradation compensator 210 according to the first embodiment may be identical or similar in structure to the degradation compensator of FIGs. 4 and 5, and a detailed explanation for the same or similar parts is therefore omitted.

[0058] The degradation weight reflector 214 may calculate a degradation weight by analyzing a grayscale value of modulated data (Mdata) of each sub-pixel (SP) outputted from the data modulator 213, reflect the calculated degradation weight in the modulated data (Mdata) of the corresponding sub-pixel (SP) so as to correct the modulated data, and supply the corrected modulated data (Mdata') to the data accumulator 215. In this case, the degradation weight of each sub-pixel (SP) may be set to make the same degradation level (or degradation characteristics) in the organic light emitting diodes (OLED) having the same accumulated data on the basis of the degradation characteristics of the organic light emitting diode (OLED), that is, the non-linear degradation characteristics of the organic light emitting diode (OLED) by the electrical stress.

[0059] For example, the organic light emitting diode (OLED) may be degraded by the electrical stress, wherein the electrical stress may be proportional to the size of input data. However, the degradation of the organic light emitting diode (OLED) according to the accumulated data may have non-linear characteristics.

[0060] In other words, if applying different data to the organic light emitting diodes (OLED) for a preset time period under the condition that an integral value (or accumulated data value) for the time of data applied to the organic light emitting diode (OLED) for a preset time period is identically applied, the degradation of the organic light emitting diode (OLED) may vary. For example, as shown in FIG. 7, suppose that the stress of '100' is applied to the first organic light emitting diode (OLED1) for 5 hours, and the stress of '50' is applied to the second light emitting diode (OLED2) for 10 hours. Even though the first and second organic light emitting diodes (OLED1, OLED2) have the same accumulated stress value, a degradation level of the first organic light emitting diode (OLED1) may be larger than a degradation level of the second organic light emitting diode (OLED2). Accordingly, as shown in FIG. 8, when the same current is applied to each of the first and second organic light emitting diodes (OLED1, OLED2), a luminance of the first organic light emitting diode (OLED1) may be lower than a luminance of the second light emitting diode (OLED2). Thus, in order to realize uniform luminance in the first and second organic light emitting diodes (OLED1, OLED2), the degradation weight reflector 214 may calculate the different degradation weights in accordance to a grayscale value of data to be applied to the first organic light emitting diode (OLED1) and a grayscale value of data to be applied to the second organic light emitting diode (OLED2), and may reflect the calculated degradation weights in the input data.

[0061] Eventually, the degradation weight reflector 214 may generate the degradation weight having a real number between '0' and '1' in accordance with the grayscale value of the input data. That is, the degradation weight reflector 214 may calculate the degradation weight having the value of '1' when the input data is 8 bits and the grayscale value of the input data is '255'. As the grayscale value of the input data becomes smaller, the calculated degradation weight becomes smaller.

[0062] The degradation weight reflector 214 may include a Look-Up Table (not shown) obtained by mapping the degradation weight in accordance with the grayscale value of the data through a pretest based on the luminance characteristics for the current of the organic light emitting diode (OLED), or operation logic (not shown) to derive the degradation weight in accordance with the grayscale value of the data; and a data corrector (not shown) for reflecting the degradation weight in the modulated data (Mdata) so as to correct the modulated data (Mdata).

[0063] With reference once again to FIG. 6, the data accumulator 215 may read the accumulated data of the sub-pixel (SP) stored in the memory 300; accumulate the corrected modulated data (Mdata') supplied from the degradation weight reflector 214 when reading the accumulated data of the sub-pixel (SP), and again may store the accumulated data (Adata) of each sub-pixel (SP) accumulated until the current frame in the memory 300. In this case, the data accumulator 215 may accumulate the corrected modulated data (Mdata') of each sub-pixel (SP) every frame or every predetermined number of plural frames. Accordingly, the accumulated data (Adata) of each sub-pixel (SP) stored in the memory 300 may be used as reference data for modulating each sub-pixel (SP) of the next frame.

[0064] The organic light emitting display device including the degradation compensator 210 according to the first embodiment may compensate the luminance of each sub-pixel (SP) to the initial luminance by reflecting the degradation weight based on the non-linear degradation characteristics of the organic light emitting diode (OLED) in the accumulated data, to thereby display high-luminance images for a long time, and to improve precision in compensating the degradation of the organic light emitting diode (OLED).

[0065] FIG. 9 is a block diagram illustrating the degradation compensator, shown in FIG. 3, according to a second embodiment. FIG. 10 is a graph illustrating luminance changes in accordance with the driving time of sub-pixel (SP) in the organic light emitting display device of the embodiment.

[0066] With reference to FIGs. 9 and 10, the degradation compensator 210 according to the second embodiment may include a degradation compensation gain value calculator 3211, a data modulator 3213, and a data accumulator 3215.

[0067] The degradation compensation gain value calculator 3211 may calculate the degradation compensation gain value (DCG) of each sub-pixel (SP) on the basis of accumulated data of the respective sub-pixels (SP) stored in the memory 300. In this case, the degradation compensation gain value calculator 3211 may calculate the degradation compensation gain value (DCG) for decreasing a luminance of each sub-pixel (SP) to a luminance of the sub-pixel (SP) having the organic light emitting diode (OLED) that is most degraded.

[0068] For example, the degradation compensation gain value calculator 3211 may extract the maximum accumulated data with the maximum value from the accumulated data of all the sub-pixels (SP) stored in the memory 300, compare the extracted maximum accumulated data with the compensation point accumulated data (Ref1, Ref2, Ref3), and accumulate the degradation compensation gain value (DCG) of each sub-pixel (SP) on the basis of the difference value between the maximum accumulated data and the accumulated data of each sub-pixel (SP) if the maximum accumulated data is the same as or larger than the compensation point accumulated data (Ref1, Ref2, Ref3).

[0069] According to another example, the degradation compensation gain value calculator 3211 may compare the accumulated data of the corresponding sub-pixel (SP) with the compensation point accumulated data (Ref1, Ref2, Ref3), and may calculate the degradation compensation gain value (DCG) of each sub-pixel (SP) on the basis of the difference value between the maximum accumulated data and the accumulated data of each sub-pixel (SP) if the accumulated data of the corresponding sub-pixel (SP) is the same as or larger than the compensation point accumulated data (Ref1, Ref2, Ref3).

[0070] The compensation point accumulated data (Ref1, Ref2, Ref3) may correspond to prediction accumulated data that corresponds to luminance lowering points (t1, t2, t3) with respect to the initial luminance of the organic light emitting diode (OLED), where the luminance lowering points may be set as a Look-Up Table or as relations to derive the prediction accumulated data for the luminance lowering point with respect to the initial luminance of the organic light emitting diode (OLED). The degradation compensation gain value calculator 3211 may include a Look-Up Table obtained by mapping the degradation compensation gain value (DCG) having a real number which is less than '1' in accordance with the difference value between the maximum accumulated data and the accumulated data, or a logic operation for performing operations to derive the degradation compensation gain value (DCG) having a real number which is less than '1' in accordance with the difference value between the accumulated data and the maximum accumulated data.

[0071] An example method for calculating the degradation compensation gain value (DCG) by the aforementioned degradation compensation gain value calculator

3211 will be described as follows.

[0072] First, the degradation compensation gain value calculator 3211 may extract the maximum accumulated data with the maximum value from the accumulated data of all the sub-pixels (SP) stored in the memory 300, and may set the degradation compensation reference data by the use of extracted maximum accumulated data.

[0073] Then, the degradation compensation reference data may be compared with the first compensation point accumulated data (Ref1). Based on the comparison result, if the degradation compensation reference data is smaller than the first compensation point accumulated data (Refl), the first degradation compensation gain value (DCG) having the value of '1' may be generated. Meanwhile, if the degradation compensation reference data is the same as or larger than the first compensation point accumulated data (Ref1), the degradation compensation gain value calculator 3211 may generate the first degradation compensation gain value (DCG) having the real number which is less than '1' in accordance with the difference value between the degradation compensation reference data and the accumulated data of the sub-pixel (SP), and simultaneously generate a first compensation flag. In this case, the degradation compensation gain value calculator 3211 may generate the first degradation compensation gain value (DCG) with the value of '1' for the sub-pixel (SP) which has the same accumulated data as the degradation compensation reference data.

[0074] Then, the degradation compensation gain value calculator 3211 may reset the aforementioned degradation compensation reference data from the accumulated data of the sub-pixel (SP) which is continuously accumulated in accordance with the driving of each sub-pixel (SP) on the basis of the first compensation flag, compare the reset degradation compensation reference data with the second compensation point accumulated data (Ref2), and generate the second degradation compensation gain value (DCG) of each sub-pixel (SP) having the real number which is less than '1' based on the comparison result, and simultaneously generate a second compensation flag.

[0075] Eventually, the degradation compensation gain value calculator 3211 may repeatedly perform the aforementioned process so as to make the luminance (D) of each sub-pixel (SP) be equal to the luminance (C) of the sub-pixel (SP) having the degradation compensation reference data by generating the degradation compensation gain value (DCG) of each sub-pixel (SP) having the real number which is less than '1' in accordance with the difference value between the degradation compensation reference data and the accumulated data of the sub-pixel (SP) whenever the degradation compensation reference data is the same as or larger than the compensation point accumulated data (Ref1, Ref2, Ref3).

[0076] The data modulator 3213 may generate the modulated data (Mdata) by modulating the input data (Idata) of each sub-pixel (SP), which may be input from the external system body (not shown) or graphics card (not shown), based on the degradation compensation gain value (DCG) of each sub-pixel (SP) supplied from the degradation compensation gain value calculator 211. For example, the data modulator 3213 may generate the modulated data (Mdata) by multiplying the input data (Idata) and the corresponding degradation compensation gain value (DCG), but not limited to this method. That is, the modulated data (Mdata) may be generated by, for example, any one of the four fundamental arithmetic operations of addition, subtraction, multiplication, and division.

[0077] The data accumulator 3215 may read the accumulated data of each sub-pixel (SP) stored in the memory 300, accumulate the modulated data (Mdata) of the corresponding sub-pixel (SP) outputted from the data modulator 3213 when reading accumulated data of the sub-pixel (SP), and again store the accumulated data (Adata) of each sub-pixel (SP) accumulated until the current frame in the memory 300. In this case, the data accumulator 3215 may accumulate the modulated data (Mdata) of each sub-pixel (SP) at every frame or every predetermined number of plural frames. Accordingly, the accumulated data (Adata) of each sub-pixel (SP) stored in the memory 300 may be used as reference data for modulating each sub-pixel (SP) of the next frame.

[0078] In FIG. 10, the 'C' plot shows a luminance change in accordance with the driving time of the reference sub-pixel having the maximum accumulated data, and the 'D' plot shows the luminance change in accordance with the driving time of the remaining sub-pixels except for the reference sub-pixel.

[0079] As shown in FIG. 10, the aforementioned degradation compensation gain value (DCG) may be calculated based on the difference value of accumulated data between the reference sub-pixel having the maximum accumulated data and the sub-pixel having the other accumulated data at every predetermined luminance lowering point (t1, t2, t3) of each sub-pixel, whereby the luminance (D) of each sub-pixel (SP) may be adjusted to be identical to the luminance (C) of the reference sub-pixel having the maximum accumulated data.

[0080] The organic light emitting display device including the degradation compensator 210 according to the second embodiment may lower the luminance of each sub-pixel (SP) by applying the degradation compensation gain value (DCG), so that it may be possible to decrease the electrical stress applied to the organic light emitting diode (OLED) of each sub-pixel (SP), to thereby delay the degradation of the organic light emitting diode (OLED), and increase the lifespan of the organic light emitting diode (OLED).

[0081] Meanwhile, the degradation compensator 210 according to the second embodiment may further include the degradation weight reflector 214 shown in FIG. 6. In this case, the degradation weight reflector 214 may reflect the corresponding degradation weight in the modulated data (Mdata) of each sub-pixel (SP) outputted from the data modulator 3213, and the data accumulator 3215 may accumulate (a) the modulated data (Mdata') in which the degradation weight is reflected, and (b) the corresponding accumulated data, and then may store the accumulated data in the memory 300.

[0082] FIG. 11 is a block diagram illustrating the degradation compensator, shown in FIG. 3, according to a third embodiment. FIG. 12 is a graph illustrating luminance changes of sub-pixels in accordance with the driving time (hours).

[0083] With reference to FIGs. 11 and 12, the degradation compensator 210 according to the third embodiment may include a degradation compensation gain value calculator 4211, a data modulator 4213, and a data accumulator 4215.

[0084] The degradation compensation gain value calculator 4211 may calculate the degradation compensation gain value (DCG) of each sub-pixel (SP) on the basis of accumulated data of the respective sub-pixels (SP) stored in the memory 300. In this case, the degradation compensation gain value calculator 4211 may calculate the degradation compensation gain value (DCG) for adjusting a luminance of each sub-pixel (SP) to a luminance of the sub-pixel (SP) having the organic light emitting diode (OLED) which is degraded at a mean (average) level among all the sub-pixel (SP). For example, the degradation compensation gain value calculator 4211 may calculate mean accumulated data between the maximum accumulated data having the maximum value and the minimum accumulated data having the minimum value from the accumulated data of the sub-pixels (SP) stored in the memory 300, or the average accumulated data for the accumulated data of all the sub-pixels (SP); may set degradation compensation reference data by the use of mean accumulated data or average accumulated data; may compare the degradation compensation reference data with the plurality of compensation point accumulated data (Ref1, Ref2, Ref3); and may calculate the degradation compensation gain value (DCG) of each sub-pixel on the basis of the difference value between the degradation compensation reference data and the accumulated data of each sub-pixel (SP) if the degradation compensation reference data is the same as or larger than the compensation point accumulated data (Ref1, Ref2, Ref3).

[0085] The compensation point accumulated data (Ref1, Ref2, Ref3) may correspond to prediction accumulated data that corresponds to luminance lowering points (t1, t2, t3) with respect to the initial luminance of the organic light emitting diode (OLED), which may be provided as a Look-Up Table or as relations to derive the prediction accumulated data for the luminance lowering point with respect to the initial luminance of the organic light emitting diode (OLED). The degradation compensation gain value calculator 4211 may include a Look-Up Table obtained by mapping the degradation compensation gain value (DCG) having a real number which is less or more than '1' in accordance with the difference value between the degradation compensation reference data and the accumulated data, or by a logic operation for performing operations to derive the degradation compensation gain value (DCG) having a real number which is less or more than '1' in accordance with the difference value between the degradation compensation reference data and the accumulated data.

[0086] An example method for calculating the degradation compensation gain value (DCG) by the aforementioned degradation compensation gain value calculator 4211 will be described as follows.

[0087] First, the degradation compensation gain value calculator 4211 may set the degradation compensation reference data by the use of mean accumulated data between the maximum accumulated data having the maximum value and the minimum accumulated data having the minimum value from the accumulated data of the sub-pixels (SP) stored in the memory 300, or by the use of average accumulated data for the accumulated data of all the sub-pixels (SP).

[0088] Then, the degradation compensation gain value calculator 4211 may compare the degradation compensation reference data with the compensation point accumulated data (Refl, Ref2, Ref3), and may generate the first degradation compensation gain value (DCG) having the value of '1' if the degradation compensation reference data is smaller than the first compensation point accumulated data (Ref1).

[0089] Meanwhile, the degradation compensation gain value calculator 4211 may generate the first degradation compensation gain value (DCG) having the real number which is less or more than '1' on the basis of the difference value between the degradation compensation reference data and the accumulated data of each sub-pixel (SP), and may simultaneously generate and store a first compensation flag if the degradation compensation reference data is the same as or larger than the first compensation point accumulated data (Ref1). In this case, the degradation compensation gain value calculator 4211 may generate the first degradation compensation gain value (DCG) having a real number which is less than '1' for the sub-pixel (SP) having the accumulated data which is smaller than the degradation compensation reference data, and may generate the first degradation compensation gain value (DCG) having a real number which is more than '1' for the sub-pixel (SP) having the accumulated data which is larger than the degradation compensation reference data. The degradation compensation gain value calculator 4211 may generate the first degradation compensation gain value (DCG) having the value of '1' for the sub-pixel (SP) having the accumulated data which is the same as the degradation compensation reference data.

[0090] Then, the degradation compensation gain value calculator 4211 resets the aforementioned degradation compensation reference data from the accumulated data of the sub-pixel (SP) which may be continuously accumulated by the driving of each sub-pixel (SP) on the basis of the first compensation flag, and may compare the reset degradation compensation reference data with the second compensation point accumulated data (Ref2). Based on the comparison result, the degradation compensation gain value calculator 4211 may generate the second compensation gain value (DCG) of each sub-pixel (SP) having a real number which is less or more than ’1’, and may simultaneously generate and store a second compensation flag.

[0091] Eventually, the degradation compensation gain value calculator 4211 may repeatedly perform the aforementioned process so as to make the luminance (F, G) of each sub-pixel (SP) identical to the luminance (E) of the reference sub-pixel (SP) having the degradation compensation reference data, by way of generating the degradation compensation gain value (DCG) of each sub-pixel (SP) having a real number which is less or more than ’1’ in accordance with the difference value between the degradation compensation reference data and the accumulated data of each sub-pixel (SP) whenever the degradation compensation reference data is the same as or larger than the compensation point accumulated data (Ref1, Ref2, Ref3).

[0092] The data modulator 4213 may generate the modulated data (Mdata) by modulating the input data (Idata) of each sub-pixel (SP), which may be input from the external system body (not shown) or graphics card (not shown), based on the degradation compensation gain value (DCG) of each sub-pixel (SP) supplied from the degradation compensation gain value calculator 4211. For example, the data modulator 4213 may generate the modulated data (Mdata) by multiplying the input data (Idata) and the corresponding degradation compensation gain value (DCG), but embodiments are not limited to this method. The modulated data (Mdata) may be generated by, for example, any one of the four fundamental arithmetic operations of as addition, subtraction, multiplication, and division.

[0093] The data accumulator 4215 may read the accumulated data of the sub-pixel (SP) stored in the memory 300, accumulate the modulated data (Mdata) of the corresponding sub-pixel (SP) outputted from the data modulator 4213 when reading accumulated data of the sub-pixel (SP), and again store the accumulated data (Adata) of each sub-pixel (SP) accumulated until the current frame in the memory 300. In this case, the data accumulator 4215 may accumulate the modulated data (Mdata) of each sub-pixel (SP) at every frame or at every predetermined number of plural frames. Accordingly, the accumulated data (Adata) of each sub-pixel (SP) stored in the memory 300 may be used as reference data for modulating each sub-pixel (SP) of the next frame.

[0094] In FIG. 12, the ’E’ plot shows luminance change in accordance with the driving time of the reference sub-pixel having the aforementioned degradation compensation reference data; the ’F’ plot shows luminance change in accordance with the driving time of the sub-pixel having the accumulated data which is smaller than the degradation compensation reference data, and the ’G’ plot shows luminance change in accordance with the driving time of the sub-pixel having the accumulated data which is larger than the degradation compensation reference data.

[0095] As shown in FIG. 12, the aforementioned degradation compensation gain value (DCG) may be calculated based on the difference value of accumulated data between the reference sub-pixel having the degradation compensation reference data and the other sub-pixel having the other accumulated data at every predetermined luminance lowering point (t1, t2, t3) of each sub-pixel, whereby the luminance (F, G) of each sub-pixel (SP) may be adjusted to be identical to the luminance (E) of the reference sub-pixel having the degradation compensation reference data. That is, the luminance may be adjusted in such a way that the luminance (F) of the sub-pixel (SP) having the accumulated data which is smaller than the degradation compensation reference data is decreased to be identical to the luminance (E) of the reference sub-pixel having the degradation compensation reference data, and the luminance (G) of the sub-pixel (SP) having the accumulated data which is larger than the degradation compensation reference data is increased to be identical to the luminance (E) of the reference sub-pixel having the degradation compensation reference data.

[0096] The organic light emitting display device including the degradation compensator 210 according to the third embodiment may enable the luminance of each sub-pixel (SP) to be identical to the mean (or average) luminance of the all sub-pixels (SP) by applying the degradation compensation gain value (DCG), so that it may be possible to decrease the electrical stress applied to the organic light emitting diode (OLED) of each sub-pixel (SP), thereby delaying the degradation of the organic light emitting diode (OLED) and increasing the lifespan of the organic light emitting diode (OLED).

[0097] The degradation compensator 210 according to the third embodiment may further include the aforementioned degradation weight reflector 214 shown in FIG. 6. In this case, the degradation weight reflector 214 may reflect the corresponding degradation weight in the modulated data (Mdata) of each sub-pixel (SP) outputted from the data modulator 4213, and the data accumulator 4215 may accumulate the modulated data (Mdata’) in which the degradation weight is reflected and the corresponding accumulated data, and then store the accumulated data in the memory 300.

[0098] According to the embodiments, the organic light emitting display device and the method for driving the same may modulate the data to be supplied to each sub-pixel (SP) based on the accumulated data of each sub-pixel (SP), thereby decreasing the lowering of luminance and the luminance deviation caused by the degradation of the organic light emitting diode (OLED) of each sub-pixel (SP). This thereby decreases the residual image caused by the luminance deviation and increases the lifespan of the organic light emitting diode (OLED).

[0099] It will be apparent to those skilled in the art that various modifications and variations can be made in the present embodiments without departing from the scope of the inventions. Thus, it is intended that the present invention covers the modifications and variations of the embodiments provided they come within the scope of the appended claims.

Claims

1. An organic light emitting display device comprising:

   a display panel (100) configured to include a plurality of sub-pixels (SP), each sub-pixel including an organic light emitting diode (OLED) configured to emit light according to a data current (Ioled) based on a data voltage (Vdata);
   a memory (300) configured to accumulate and store data (Adata) displayed by each of the plurality of sub-pixels (SP) as accumulated data (Adata); and
   a panel driver (200) comprising:

      a degradation compensation gain value calculator (211) configured to calculate a degradation compensation gain value (DCG) for increasing or decreasing a luminance of each sub-pixel (SP) at every degradation compensation point of a plurality of degradation compensation points, based on an accumulated data reference value (Ref1, Ref2, Ref3) of each degradation compensation point and the accumulated data (Adata) of each sub-pixel (SP) stored in the memory (300),
      a data modulator (213) configured to generate modulated data (Mdata) of each sub-pixel (SP) by modulating input data (Idata) of each sub-pixel in accordance with the degradation compensation gain value (DCG) of each sub-pixel (SP),
      a data accumulator (215), and
      a data driving circuit configured to convert the modulated data (Mdata) into the data voltage (Vdata),

   characterized in that the panel driver further comprises:

      a degradation weight reflector (214) configured to calculate a degradation weight, based on a grayscale value of the modulated data (Mdata) of each sub-pixel (SP), and reflect the degradation weight in corrected modulated data (Mdata') of a corresponding sub-pixel to correct the modulated data (Mdata),
      wherein the degradation weight reflector (214) is configured to differently set the degradation weight according to the grayscale value of the modulated data so that degradation characteristics of sub-pixels having the same accumulated data are the same,
      wherein the data accumulator (215) is configured to accumulate the corrected modulated data (Mdata') of the corresponding sub-pixel (SP) and store the corrected modulated data (Mdata') obtained by accumulation in the memory (300) as the accumulated data (Adata).

2. The organic light emitting display device of claim 1, wherein the degradation compensation gain value calculator (211) is configured to calculate the degradation compensation gain value (DCG) for increasing a luminance of each sub-pixel (SP) to an initial luminance (Yint) at every degradation compensation point.

3. The organic light emitting display device of claim 1, wherein the degradation compensation gain value calculator (211) is configured to:

   compare the accumulated data (Adata) of each sub-pixel with the accumulated data reference value (Ref1, Ref2, Ref3); and
   calculate the degradation compensation gain value (DCG) of a corresponding sub-pixel (SP) to increase the luminance of the corresponding sub-pixel (SP) to a preset initial luminance, when the accumulated data (Adata) of the sub-pixel (SP) is equal to or greater than the accumulated data reference value (Ref1, Ref2, Ref3).

4. The organic light emitting display device of claim 1, wherein the degradation compensation gain value calculator (211) is configured to select a maximum value from among the accumulated data of all the plurality of sub-pixels (SP) stored in the memory (300), and to calculate a degradation compensation gain value (DCG) for decreasing a luminance of each sub-pixel (SP) to a luminance of a sub-pixel having the maximum value, at every degradation compensation point.

5. The organic light emitting display device of claim 4, wherein the degradation compensation gain value calculator (211) is configured to: compare the maximum value with the accumulated data reference value (Ref1); and, when the maximum value is equal to or greater than the accumulated data reference value (Ref1) calculate the degradation compensation gain value (DCG) of each sub-pixel (SP), based on a difference value between the maximum value and the accumulated data (Adata) of each sub-pixel

(SP).

6. The organic light emitting display device of claim 1, wherein the degradation compensation gain value calculator (211) is configured to set degradation compensation reference data by using the accumulated data (Adata) of each sub-pixel (SP) stored in the memory (300), and to calculate the degradation compensation gain value (DCG) of each sub-pixel (SP) for increasing or decreasing a luminance of each sub-pixel (SP) to a luminance of the sub-pixel having the degradation compensation reference data, at every degradation compensation point.

7. The organic light emitting display device of claim 6, wherein the degradation compensation gain value calculator (211) calculates, as the degradation compensation reference data, a mean value of a maximum value and a minimum value among the accumulated data (Adata) of all the plurality of sub-pixels (SP) or an average value of the accumulated data (Adata) of all the plurality of sub-pixels (SP), and, when the degradation compensation reference data is equal to or greater than the accumulated data reference value (Ref1), the degradation compensation gain value calculator (211) calculates a degradation compensation gain value (DCG) of each sub-pixel (SP), based on a difference value between the degradation compensation reference data and the accumulated data (Adata) of each sub-pixel (SP).

8. A method of driving an organic light emitting display device according to any one of claims 1 to 7, the method comprising:

   calculating a degradation compensation gain value (DCG) for increasing or decreasing a luminance of each sub-pixel (SP) at every degradation compensation point of a plurality of degradation compensation points, based on an accumulated data reference value (Ref1, Ref2, Ref3) of each degradation compensation point and accumulated data (Adata) of each sub-pixel (SP) stored in a memory (300);
   generating modulated data (Mdata) of each sub-pixel (SP) by modulating input data (Idata) of each sub-pixel (SP) in accordance with the calculated degradation compensation gain value (DCG) of each sub-pixel (SP);
   converting the modulated data (Mdata) of each sub-pixel (SP) into data voltage (Vdata) to supply the data voltage (Vdata) to each sub-pixel (SP);
   calculating a degradation weight, based on a grayscale value of the modulated data (Mdata) of each sub-pixel (SP),
   reflecting the calculated degradation weight in corrected modulated data (Mdata') of a corresponding sub-pixel to correct the modulated data (Mdata) by differently setting the degradation weight according to the grayscale value of the modulated data so that degradation characteristics of sub-pixels having the same accumulated data are the same,
   accumulating the corrected modulated data (Mdata') of each sub-pixel (SP), and
   storing the corrected modulated data (Mdata') obtained by accumulation in the memory (300) as the accumulated data (Adata).

9. The method of claim 8, wherein the calculating of the degradation compensation gain value (DCG) comprises calculating the degradation compensation gain value (DCG) for increasing a luminance of each sub-pixel (SP) to initial luminance (Yint) at every degradation compensation point.

10. The method of claim 8, wherein the calculating of the degradation compensation gain value (DCG) comprises:

   selecting a maximum value from among the accumulated data of all the plurality of sub-pixels (SP) stored in the memory (300) at every degradation compensation point; and
   calculating a degradation compensation gain value (DCG) for decreasing a luminance of each sub-pixel (SP) to a luminance of a sub-pixel having the maximum value.

11. The method of claim 10, wherein the calculating of the degradation compensation gain value (DCG) comprises: comparing the maximum value with the accumulated data reference value (Ref1); and, when the maximum value is equal to or greater than the accumulated data reference value (Ref1), calculating the degradation compensation gain value (DCG) of each sub-pixel (SP), based on a difference value between the maximum value and the accumulated data (Adata) of each sub-pixel (SP).

12. The method of claim 8, wherein the calculating of the degradation compensation gain value (DCG) comprises:

   setting degradation compensation reference data by using the accumulated data (Adata) of each sub-pixel (SP) stored in the memory (300) at every degradation compensation point; and
   calculating the degradation compensation gain value (DCG) of each sub-pixel (SP) for increasing or decreasing a luminance of each sub-pixel (SP) to a luminance of a sub-pixel having the degradation compensation reference data.

13. The method of claim 12, wherein the calculating of

the degradation compensation gain value (DCG) comprises:

calculating, as the degradation compensation reference data, a mean value of a maximum value and a minimum value among the accumulated data (Adata) of all the plurality of sub-pixels (SP) or an average value of the accumulated data (Adata) of all the plurality of sub-pixels (SP); and
when the degradation compensation reference data is equal to or greater than the accumulated data reference value (Ref1), calculating a degradation compensation gain value (DCG) of each sub-pixel (SP), based on a difference value between the degradation compensation reference data and the accumulated data (Adata) of each sub-pixel (SP).

Patentansprüche

1. Organische lichtemittierende Anzeigevorrichtung, die Folgendes umfasst:

   eine Anzeigetafel (100), die konfiguriert ist, mehrere Unterpixel (SP) zu enthalten, wobei jedes Unterpixel eine organische Leuchtdiode (OLED) enthält, die konfiguriert ist, gemäß einem Datenstrom (Ioled) auf der Grundlage einer Datenspannung (Vdata) Licht zu emittieren;
   einen Speicher (300), der konfiguriert ist, die Daten (Adata), die durch jedes der mehreren Unterpixel (SP) angezeigt werden, als gesammelte Daten (Adata) zu sammeln und zu speichern; und
   eine Tafelansteuereinrichtung (200), die Folgendes umfasst:

   eine Einrichtung (211) zum Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes, die konfiguriert ist, an jedem Verschlechterungsausgleichspunkt von mehreren Verschlechterungsausgleichspunkten auf der Grundlage eines Referenzwertes (Ref1, Ref2, Ref3) der gesammelten Daten von jedem Verschlechterungsausgleichspunkt und der gesammelten Daten (Adata) jedes Unterpixels (SP), die im Speicher (300) gespeichert sind, einen Verschlechterungsausgleichs-Verstärkungswert (DCG) zum Erhöhen oder Erniedrigen einer Leuchtdichte jedes Unterpixels (SP) zu berechnen,
   einen Datenmodulator (213), der konfiguriert ist, modulierte Daten (Mdata) von jedem Unterpixel (SP) zu erzeugen, indem die Eingangsdaten (Idata) jedes Unterpixels in Übereinstimmung mit dem Verschlechterungsausgleichs-Verstärkungswert (DCG) jedes Unterpixels (SP) moduliert werden,
   eine Datensammeleinrichtung (215), und
   eine Datenansteuerschaltung, die konfiguriert ist, die modulierten Daten (Mdata) in die Datenspannung (Vdata) umzusetzen,

   dadurch gekennzeichnet, dass die Tafelansteuereinrichtung ferner Folgendes umfasst:

   einen Verschlechterungsgewichtungsreflektor (214), der konfiguriert ist, auf der Grundlage eines Graustufenwertes der modulierten Daten (Mdata) jedes Unterpixels (SP) eine Verschlechterungsgewichtung zu berechnen und die Verschlechterungsgewichtung in korrigierte, modulierte Daten (Mdata') eines entsprechenden Unterpixels zu reflektieren, um die modulierten Daten (Mdata) zu korrigieren,
   wobei der Verschlechterungsgewichtungsreflektor (214) konfiguriert ist, die Verschlechterungsgewichtung gemäß dem Graustufenwert der modulierten Daten unterschiedlich einzustellen, derart, dass die Verschlechterungseigenschaften von Unterpixeln, die dieselben gesammelten Daten aufweisen, dieselben sind,
   wobei die Datensammeleinrichtung (215) konfiguriert ist, die korrigierten, modulierten Daten (Mdata') des entsprechenden Unterpixels (SP) zu sammeln und die korrigierten, modulierten Daten (Mdata'), die durch das Sammeln erhalten werden, als die gesammelten Daten (Adata) im Speicher (300) zu speichern.

2. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 1, wobei die Einrichtung (211) zum Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes konfiguriert ist, den Verschlechterungsausgleichs-Verstärkungswert (DCG) zum Erhöhen einer Leuchtdichte jedes Unterpixels (SP) auf eine Anfangsleuchtdichte (Yint) an jedem Verschlechterungsausgleichspunkt zu berechnen.

3. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 1, wobei die Einrichtung (211) zum Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes konfiguriert ist:

   die gesammelten Daten (Adata) jedes Unterpixels mit dem Referenzwert (Ref1, Ref2, Ref3) der gesammelten Daten zu vergleichen; und
   den Verschlechterungsausgleichs-Verstär-

kungswert (DCG) eines entsprechenden Unterpixels (SP) derart zu berechnen, dass die Leuchtdichte des entsprechenden Unterpixels (SP) auf eine vorgegebene Anfangsleuchtdichte erhöht wird, wenn die gesammelten Daten (Adata) des Unterpixels (SP) größer oder gleich dem Referenzwert (Ref1, Ref2, Ref3) der gesammelten Daten sind.

4. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 1, wobei die Einrichtung (211) zum Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes konfiguriert ist, aus den gesammelten Daten von allen der mehreren Unterpixel (SP), die im Speicher (300) gespeichert sind, einen Maximalwert auszuwählen und an jedem Verschlechterungsausgleichspunkt einen Verschlechterungsausgleichs-Verstärkungswert (DCG) zum Erniedrigen einer Leuchtdichte jedes Unterpixels (SP) auf eine Leuchtdichte eines Unterpixels, das den Maximalwert aufweist, zu berechnen.

5. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 4, wobei die Einrichtung (211) zum Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes konfiguriert ist: den Maximalwert mit dem Referenzwert (Ref1) der gesammelten Daten zu vergleichen und dann, wenn der Maximalwert größer oder gleich dem Referenzwert (Refl) der gesammelten Daten ist, den Verschlechterungsausgleichs-Verstärkungswert (DCG) jedes Unterpixels (SP) auf der Grundlage eines Differenzwertes zwischen dem Maximalwert und den gesammelten Daten (Adata) jedes Unterpixels (SP) zu berechnen.

6. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 1, wobei die Einrichtung (211) zum Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes konfiguriert ist, unter Verwendung der gesammelten Daten (Adata) jedes Unterpixels (SP), die im Speicher (300) gespeichert sind, Verschlechterungsausgleichs-Referenzdaten einzustellen und den Verschlechterungsausgleichs-Verstärkungswert (DCG) jedes Unterpixels (SP) zum Erhöhen oder Erniedrigen einer Leuchtdichte jedes Unterpixels (SP) auf eine Leuchtdichte des Unterpixels, das die Verschlechterungsausgleichs-Referenzdaten aufweist, an jedem Verschlechterungsausgleichspunkt zu berechnen.

7. Organische lichtemittierende Anzeigevorrichtung nach Anspruch 6, wobei die Einrichtung (211) zum Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes einen Mittelwert aus einem Maximalwert und einem Minimalwert aus den gesammelten Daten (Adata) von allen der mehreren Unterpixel (SP) oder einen Durchschnittswert der gesammelten Daten (Adata) von allen der mehreren Unterpixel (SP) als die Verschlechterungsausgleichs-Referenzdaten berechnet, und
dann, wenn die Verschlechterungsausgleichs-Referenzdaten größer oder gleich dem Referenzwert (Ref1) der gesammelten Daten sind, die Einrichtung (211) zum Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes einen Verschlechterungsausgleichs-Verstärkungswert (DCG) jedes Unterpixels (SP) auf der Grundlage eines Differenzwertes zwischen den Verschlechterungsausgleichs-Referenzdaten und den gesammelten Daten (Adata) jedes Unterpixels (SP) berechnet.

8. Verfahren zum Ansteuern einer organischen, lichtemittierenden Anzeigevorrichtung nach einem der Ansprüche 1 bis 7, wobei das Verfahren Folgendes umfasst:

Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes (DCG) zum Erhöhen oder Erniedrigen einer Leuchtdichte jedes Unterpixels (SP) an jedem Verschlechterungsausgleichspunkt von mehreren Verschlechterungsausgleichspunkten auf der Grundlage eines Referenzwertes (Ref1, Ref2, Ref3) der gesammelten Daten jedes Verschlechterungsausgleichspunktes und der gesammelten Daten (Adata) jedes Unterpixels (SP), die in einem Speicher (300) gespeichert sind;
Erzeugen von modulierten Daten (Mdata) jedes Unterpixels (SP) durch Modulieren der Eingangsdaten (Idata) jedes Unterpixels (SP) in Übereinstimmung mit dem berechneten Verschlechterungsausgleichs-Verstärkungswert (DCG) jedes Unterpixels (SP);
Umsetzen der modulierten Daten (Mdata) jedes Unterpixels (SP) in eine Datenspannung (Vdata), um die Datenspannung (Vdata) jedem Unterpixel (SP) zuzuführen;
Berechnen einer Verschlechterungsgewichtung auf der Grundlage eines Graustufenwertes der modulierten Daten (Mdata) jedes Unterpixels (SP);
Reflektieren der berechneten Verschlechterungsgewichtung in korrigierte, modulierte Daten (Mdata') eines entsprechenden Unterpixels, um die modulierten Daten (Mdata) zu korrigieren, indem die Verschlechterungsgewichtung gemäß dem Graustufenwert der modulierten Daten unterschiedlich eingestellt wird, derart, dass die Verschlechterungseigenschaften von Unterpixeln, die dieselben gesammelten Daten aufweisen, dieselben sind;
Sammeln der korrigierten, modulierten Daten (Mdata') jedes Unterpixels (SP); und
Speichern der korrigierten, modulierten Daten (Mdata'), die durch das Sammeln erhalten werden, im Speicher (300) als die gesammelten Da-

ten (Adata).

9. Verfahren nach Anspruch 8, wobei das Berechnen des Verschlechterungsausgleichs-Verstärkungswertes (DCG) das Berechnen des Verschlechterungsausgleichs-Verstärkungswertes (DCG) zum Erhöhen einer Leuchtdichte jedes Unterpixels (SP) auf eine Anfangsleuchtdichte (Yint) an jedem Verschlechterungsausgleichspunkt umfasst.

10. Verfahren nach Anspruch 8, wobei das Berechnen des Verschlechterungsausgleichs-Verstärkungswertes (DCG) Folgendes umfasst:

Auswählen eines Maximalwertes aus den gesammelten Daten von allen der mehreren Unterpixel (SP), die im Speicher (300) gespeichert sind, an jedem Verschlechterungsausgleichspunkt; und
Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes (DCG) zum Erniedrigen einer Leuchtdichte jedes Unterpixels (SP) auf eine Leuchtdichte eines Unterpixels, das den Maximalwert aufweist.

11. Verfahren nach Anspruch 10, wobei das Berechnen des Verschlechterungsausgleichs-Verstärkungswertes (DCG) Folgendes umfasst: Vergleichen des Maximalwertes mit dem Referenzwert (Ref1) der gesammelten Daten und dann, wenn der Maximalwert größer oder gleich dem Referenzwert (Ref1) der gesammelten Daten ist, Berechnen des Verschlechterungsausgleichs-Verstärkungswertes (DCG) jedes Unterpixels (SP) auf der Grundlage eines Differenzwertes zwischen dem Maximalwert und den gesammelten Daten (Adata) jedes Unterpixels (SP).

12. Verfahren nach Anspruch 8, wobei das Berechnen des Verschlechterungsausgleichs-Verstärkungswertes (DCG) Folgendes umfasst:

Einstellen von Verschlechterungsausgleichs-Referenzdaten unter Verwendung der gesammelten Daten (Adata) jedes Unterpixels (SP), die im Speicher (300) gespeichert sind, an jedem Verschlechterungsausgleichspunkt; und
Berechnen des Verschlechterungsausgleichs-Verstärkungswertes (DCG) jedes Unterpixels (SP) zum Erhöhen oder Erniedrigen einer Leuchtdichte jedes Unterpixels (SP) auf eine Leuchtdichte eines Unterpixels, das die Verschlechterungsausgleichs-Referenzdaten aufweist.

13. Verfahren nach Anspruch 12, wobei das Berechnen des Verschlechterungsausgleichs-Verstärkungswertes (DCG) Folgendes umfasst:

Berechnen eines Mittelwertes aus einem Maximalwert und einem Minimalwert aus den gesammelten Daten (Adata) von allen der mehreren Unterpixel (SP) oder eines Durchschnittswertes der gesammelten Daten (Adata) von allen der mehreren Unterpixel (SP) als die Verschlechterungsausgleichs-Referenzdaten; und dann, wenn die Verschlechterungsausgleichs-Referenzdaten größer oder gleich dem Referenzwert (Refl) der gesammelten Daten sind, Berechnen eines Verschlechterungsausgleichs-Verstärkungswertes (DCG) jedes Unterpixels (SP) auf der Grundlage eines Differenzwertes zwischen den Verschlechterungsausgleichs-Referenzdaten und den gesammelten Daten (Adata) jedes Unterpixels (SP).

Revendications

1. Dispositif d'affichage électroluminescent organique comprenant :

un panneau d'affichage (100) configuré pour inclure une pluralité de sous-pixels (SP), chaque sous-pixel comprenant une diode électroluminescente organique (OLED) configurée pour émettre une lumière en fonction d'un courant de données (Ioled) sur la base d'une tension de données (Vdata) ;
une mémoire (300) configurée pour cumuler et mémoriser des données (Adata) affichées par chacun de la pluralité de sous-pixels (SP) en tant que données cumulées (Adata) ; et
un organe de commande de panneau (200) comprenant :

un calculateur de valeur (211) de gain de compensation de dégradation configuré pour calculer une valeur de gain de compensation de dégradation (DCG) pour augmenter ou diminuer une luminance de chaque sous-pixel (SP) à chaque point de compensation de dégradation d'une pluralité de points de compensation de dégradation, sur la base d'une valeur de référence de données cumulées (Ref1, Ref2, Ref3) de chaque point de compensation de dégradation et des données cumulées (Adata) de chaque sous-pixel (SP) mémorisées dans la mémoire (300),
un modulateur de données (213) configuré pour générer des données modulées (Mdata) de chaque sous-pixel (SP) par la modulation de données d'entrée (Idata) de chaque sous-pixel en fonction de la valeur de gain de compensation de dégradation (DCG) de chaque sous-pixel (SP),

un cumulateur de données (215), et
un circuit d'attaque de données configuré pour convertir les données modulées (Mdata) en la tension de données (Vdata),

caractérisé en ce que l'organe de commande de panneau comprend en outre :

un réflecteur de poids de dégradation (214) configuré pour calculer un poids de dégradation sur la base d'une valeur d'échelle de gris des données modulées (Mdata) de chaque sous-pixel (SP), et refléter le poids de dégradation dans des données modulées corrigées (Mdata') d'un sous-pixel correspondant pour corriger les données modulées (Mdata),
dans lequel le réflecteur de poids de dégradation (214) est configuré pour régler différemment le poids de dégradation en fonction de la valeur d'échelle de gris des données modulées de sorte que des caractéristiques de dégradation de sous-pixels ayant les mêmes données cumulées soient identiques,
dans lequel le cumulateur de données (215) est configuré pour cumuler les données modulées corrigées (Mdata') du sous-pixel (SP) correspondant et mémoriser les données modulées corrigées (Mdata') obtenues par le cumul dans la mémoire (300) en tant que les données cumulées (Adata).

2. Dispositif d'affichage électroluminescent organique selon la revendication 1, dans lequel le calculateur de valeur de gain de compensation de dégradation (211) est configuré pour calculer la valeur de gain de compensation de dégradation (DCG) pour augmenter une luminance de chaque sous-pixel (SP) à une luminance initiale (Yint) à chaque point de compensation de dégradation.

3. Dispositif d'affichage électroluminescent organique selon la revendication 1, dans lequel le calculateur de valeur de gain de compensation de dégradation (211) est configuré pour :

comparer les données cumulées (Adata) de chaque sous-pixel à la valeur de référence de données cumulées (Ref1, Ref2, Ref3) ; et
calculer la valeur de gain de compensation de dégradation (DCG) d'un sous-pixel (SP) correspondant pour augmenter la luminance du sous-pixel (SP) correspondant à une luminance initiale préréglée, lorsque les données cumulées (Adata) du sous-pixel (SP) sont supérieures ou égales à la valeur de référence de données cumulées (Ref1, Ref2, Ref3).

4. Dispositif d'affichage électroluminescent organique selon la revendication 1, dans lequel le calculateur de valeur de gain de compensation de dégradation (211) est configuré pour sélectionner une valeur maximale parmi les données cumulées de toute la pluralité de sous-pixels (SP) mémorisées dans la mémoire (300), et calculer une valeur de gain de compensation de dégradation (DCG) pour diminuer une luminance de chaque sous-pixel (SP) à une luminance d'un sous-pixel ayant la valeur maximale, à chaque point de compensation de dégradation.

5. Dispositif d'affichage électroluminescent organique selon la revendication 4, dans lequel le calculateur de valeur de gain de compensation de dégradation (211) est configuré pour : comparer la valeur maximale à la valeur de référence de données cumulées (Ref1) ; et, lorsque la valeur maximale est supérieure ou égale à la valeur de référence de données cumulées (Ref1), calculer la valeur de gain de compensation de dégradation (DCG) de chaque sous-pixel (SP), sur la base d'une valeur de différence entre la valeur maximale et les données cumulées (Adata) de chaque sous-pixel (SP).

6. Dispositif d'affichage électroluminescent organique selon la revendication 1, dans lequel le calculateur de valeur de gain de compensation de dégradation (211) est configuré pour régler des données de référence de compensation de dégradation par l'utilisation des données cumulées (Adata) de chaque sous-pixel (SP) mémorisées dans la mémoire (300), et calculer la valeur de gain de compensation de dégradation (DCG) de chaque sous-pixel (SP) pour augmenter ou diminuer une luminance de chaque sous-pixel (SP) à une luminance du sous-pixel ayant les données de référence de compensation de dégradation, à chaque point de compensation de dégradation.

7. Dispositif d'affichage électroluminescent organique selon la revendication 6, dans lequel le calculateur de valeur de gain de compensation de dégradation (211) calcule, en tant que les données de référence de compensation de dégradation, une valeur médiane d'une valeur maximale et d'une valeur minimale parmi les données cumulées (Adata) de toute la pluralité de sous-pixels (SP) ou une valeur moyenne des données cumulées (Adata) de toute la pluralité de sous-pixels (SP), et
lorsque les données de référence de compensation de dégradation sont supérieures ou égales à la valeur de référence de données cumulées (Ref1), le calculateur de valeur de gain de compensation de dégradation (211) calcule une valeur de gain de compensation de dégradation (DCG) de chaque sous-pixel (SP), sur la base d'une valeur de différence entre les données de référence de compen-

sation de dégradation et les données cumulées (Adata) de chaque sous-pixel (SP).

8. Procédé de commande d'un dispositif d'affichage électroluminescent organique selon l'une quelconque des revendications 1 à 7, le procédé comprenant :

le calcul d'une valeur de gain de compensation de dégradation (DCG) pour augmenter ou diminuer une luminance de chaque sous-pixel (SP) à chaque point de compensation de dégradation d'une pluralité de points de compensation de dégradation, sur la base d'une valeur de référence de données cumulées (Ref1, Ref2, Ref3) de chaque point de compensation de dégradation et des données cumulées (Adata) de chaque sous-pixel (SP) mémorisées dans une mémoire (300),
la génération de données modulées (Mdata) de chaque sous-pixel (SP) par la modulation de données d'entrée (Idata) de chaque sous-pixel (SP) en fonction de la valeur de gain de compensation de dégradation (DCG) calculée de chaque sous-pixel (SP) ;
la conversion des données modulées (Mdata) de chaque sous-pixel (SP) en tension de données (Vdata) pour fournir la tension de données (Vdata) à chaque sous-pixel (SP) ;
le calcul d'un poids de dégradation sur la base d'une valeur d'échelle de gris des données modulées (Mdata) de chaque sous-pixel (SP),
le reflet du poids de dégradation calculé dans des données modulées corrigées (Mdata') d'un sous-pixel correspondant pour corriger les données modulées (Mdata) en réglant différemment le poids de dégradation en fonction de la valeur d'échelle de gris des données modulées de sorte que des caractéristiques de dégradation de sous-pixels ayant les mêmes données cumulées soient identiques,
le cumul des données modulées corrigées (Mdata') de chaque sous-pixel (SP), et
la mémorisation des données modulées corrigées (Mdata') obtenues par le cumul dans la mémoire (300) en tant que les données cumulées (Adata).

9. Procédé selon la revendication 8, dans lequel le calcul de la valeur de gain de compensation de dégradation (DCG) comprend le calcul de la valeur de gain de compensation de dégradation (DCG) pour augmenter une luminance de chaque sous-pixel (SP) à une luminance initiale (Yint) à chaque point de compensation de dégradation.

10. Procédé selon la revendication 8, dans lequel le calcul de la valeur de gain de compensation de dégradation (DCG) comprend :

la sélection d'une valeur maximale parmi les données cumulées de toute la pluralité de sous-pixels (SP) mémorisées dans la mémoire (300) à chaque point de compensation de dégradation ; et
le calcul d'une valeur de gain de compensation de dégradation (DCG) pour diminuer une luminance de chaque sous-pixel (SP) à une luminance de chaque sous-pixel ayant la valeur maximale.

11. Procédé selon la revendication 10, dans lequel le calcul de la valeur de gain de compensation de dégradation (DCG) comprend : la comparaison de la valeur maximale à la valeur de référence de données cumulées (Ref1) ; et, lorsque la valeur maximale est supérieure ou égale à la valeur de référence de données cumulées (Ref1), le calcul de la valeur de gain de compensation de dégradation (DCG) de chaque sous-pixel (SP), sur la base d'une valeur de différence entre la valeur maximale et les données cumulées (Adata) de chaque sous-pixel (SP).

12. Procédé selon la revendication 8, dans lequel le calcul de la valeur de gain de compensation de dégradation (DCG) comprend :

le réglage de données de référence de compensation de dégradation par l'utilisation des données cumulées (Adata) de chaque sous-pixel (SP) mémorisées dans la mémoire (300) à chaque point de compensation de dégradation ; et
le calcul de la valeur de gain de compensation de dégradation (DCG) de chaque sous-pixel (SP) pour augmenter ou diminuer une luminance de chaque sous-pixel (SP) à une luminance d'un sous-pixel ayant les données de référence de compensation de dégradation.

13. Procédé selon la revendication 12, dans lequel le calcul de la valeur de gain de compensation de dégradation (DCG) comprend :

le calcul, en tant que les données de référence de compensation de dégradation, d'une valeur médiane d'une valeur maximale et d'une valeur minimale parmi les données cumulées (Adata) de toute la pluralité de sous-pixels (SP) ou d'une valeur moyenne des données cumulées (Adata) de toute la pluralité de sous-pixels (SP) ; et
lorsque les données de référence de compensation de dégradation sont supérieures ou égales à la valeur de référence de données cumulées (Ref1), le calcul d'une valeur de gain de compensation de dégradation (DCG) de chaque sous-pixel (SP), sur la base d'une valeur de dif-

férence entre les données de référence de compensation de dégradation et les données cumulées (Adata) de chaque sous-pixel (SP).

FIG. 1
Related Art

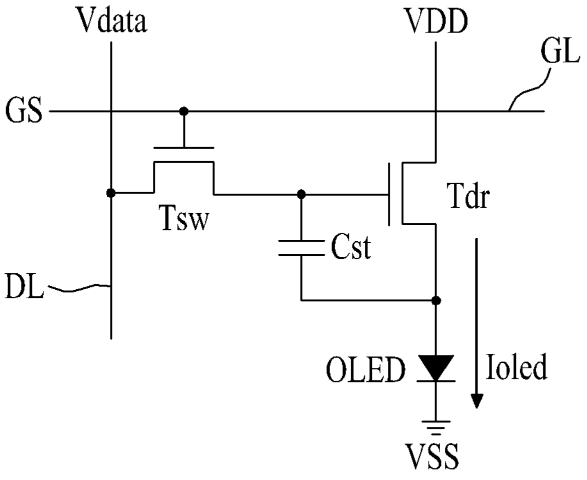


FIG. 2
Related Art

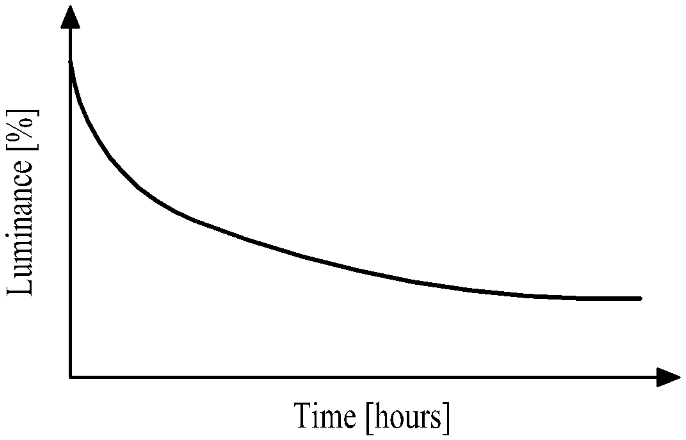


FIG. 3

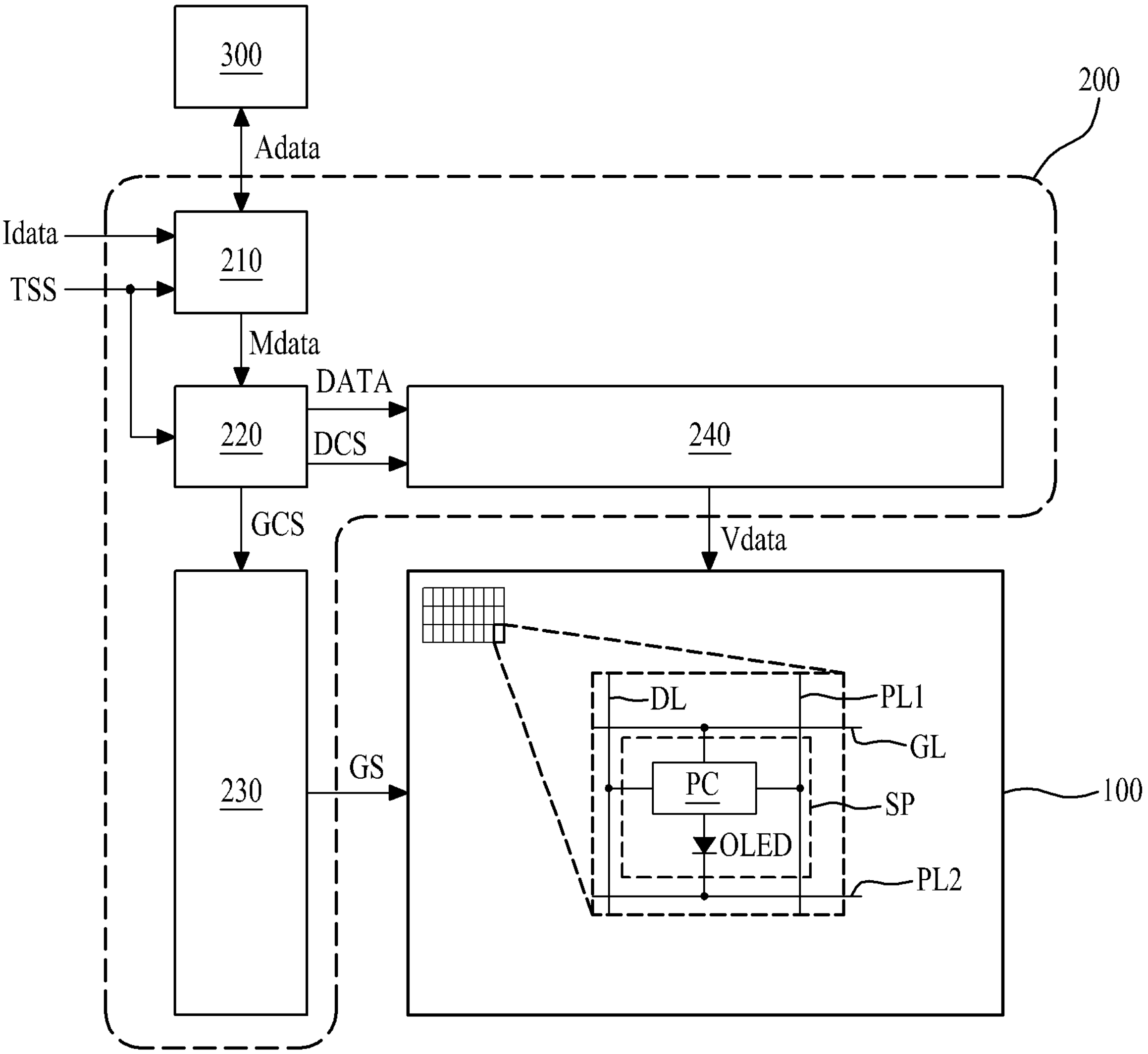

300
Adata
200
Idata
TSS
210
Mdata
DATA
220
DCS
240
GCS
Vdata
230
GS
DL
PL1
GL
PC
SP
100
OLED
PL2

FIG. 4

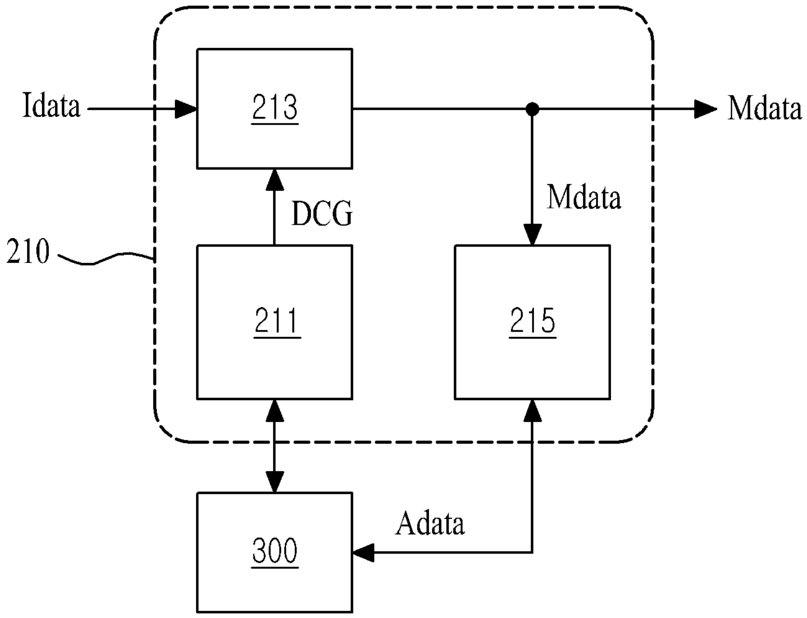

Idata
213
Mdata
DCG
Mdata
210
211
215
Adata
300

FIG. 5

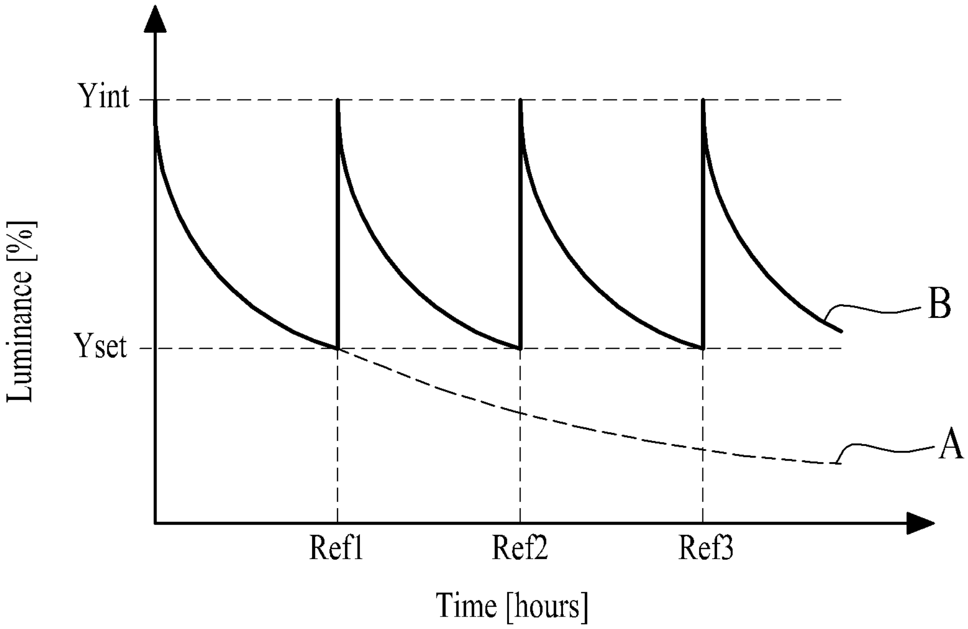

Yint
Luminance [%]
B
Yset
A
Ref1
Ref2
Ref3
Time [hours]

FIG. 6

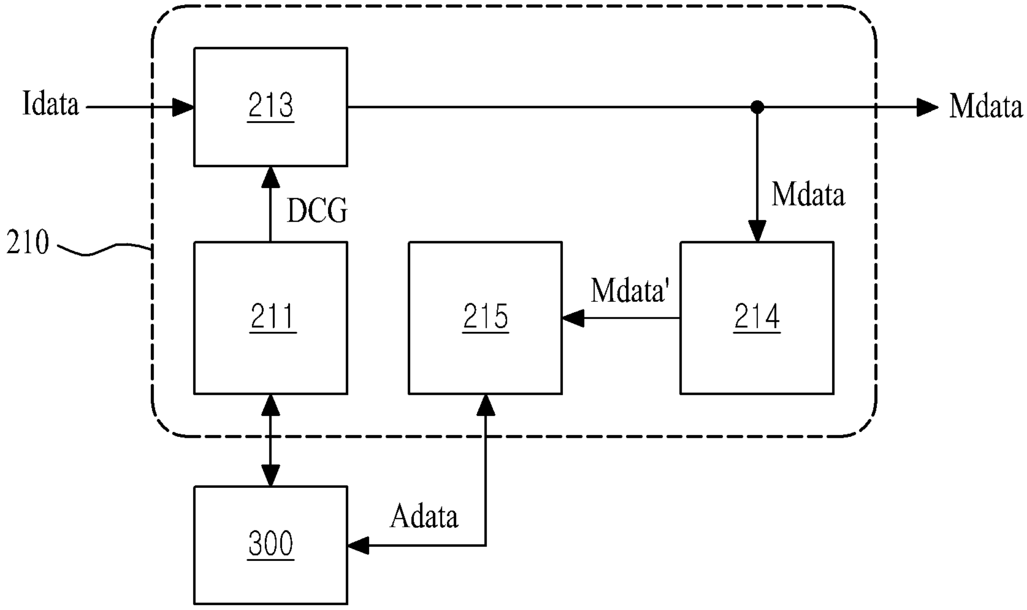

Idata
213
Mdata
DCG
Mdata
210
211
215
Mdata'
214
300
Adata

FIG. 7

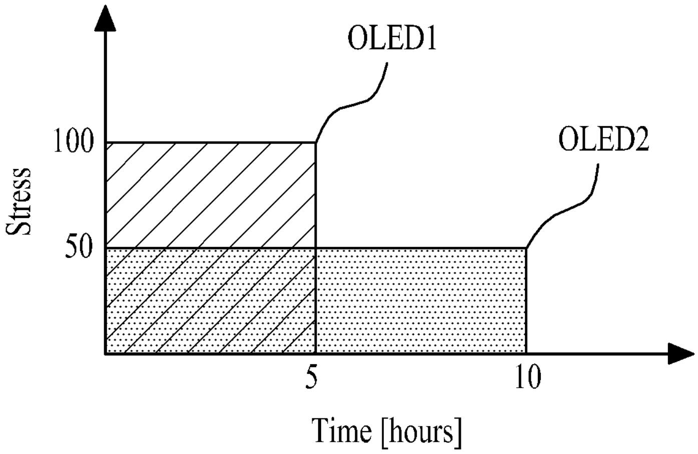

OLED1
100
OLED2
Stress
50
5
10
Time [hours]

FIG. 8

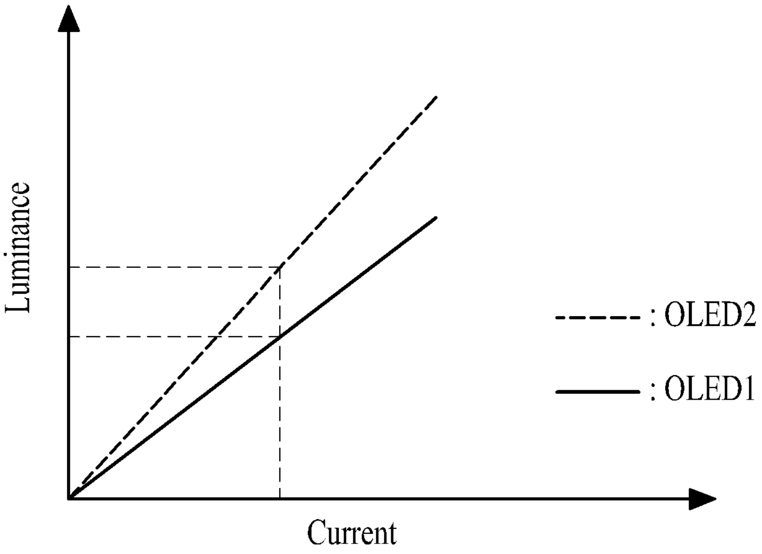

Luminance
Current
: OLED2
: OLED1

FIG. 9

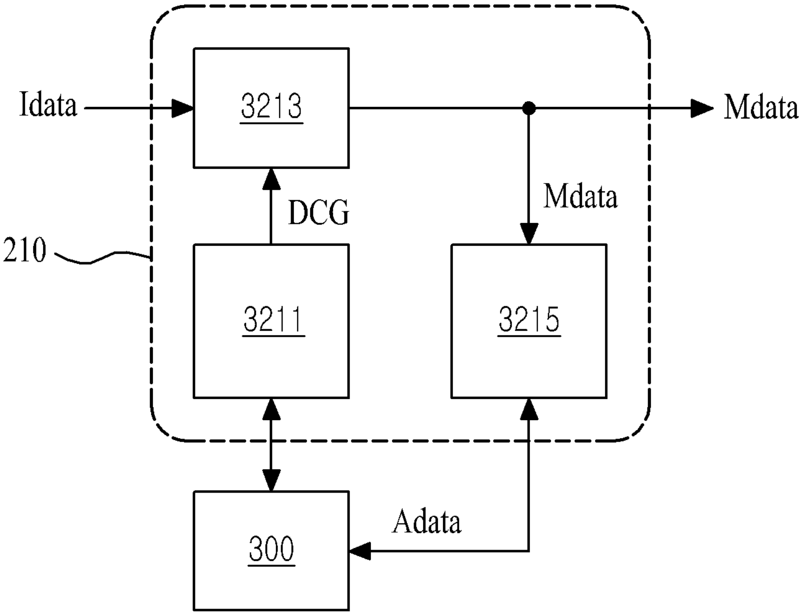

Idata
3213
Mdata
Mdata
DCG
210
3211
3215
300
Adata

FIG. 10

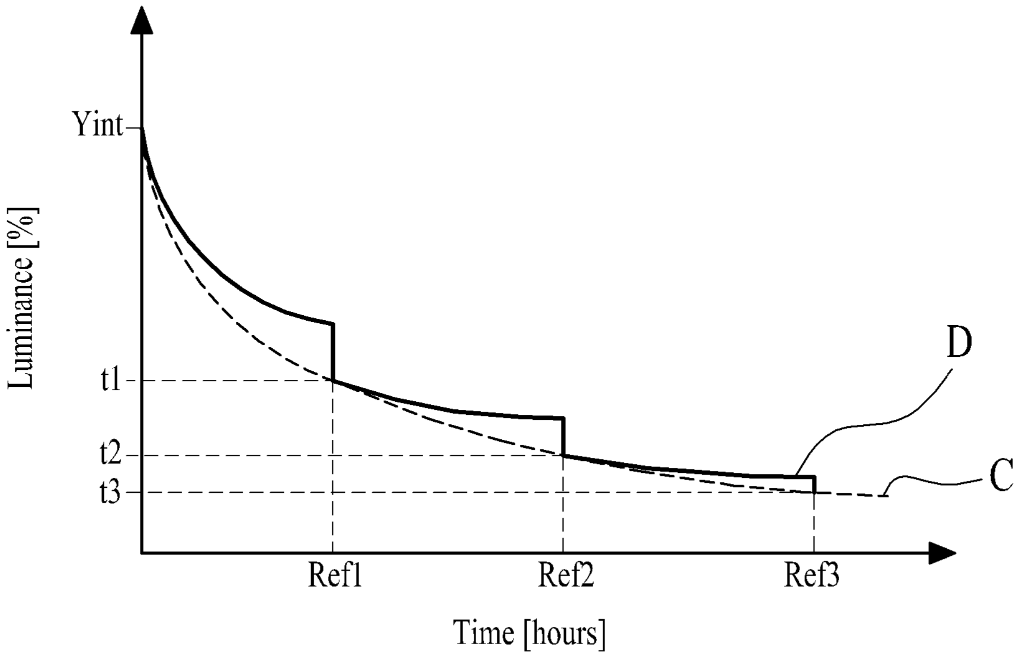

Yint
Luminance [%]
t1
t2
t3
D
C
Ref1
Ref2
Ref3
Time [hours]

FIG. 11

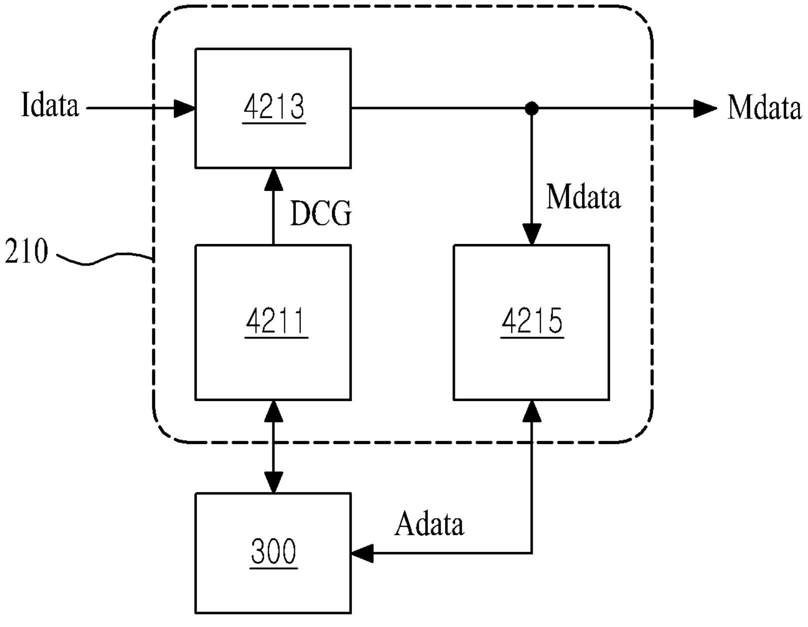
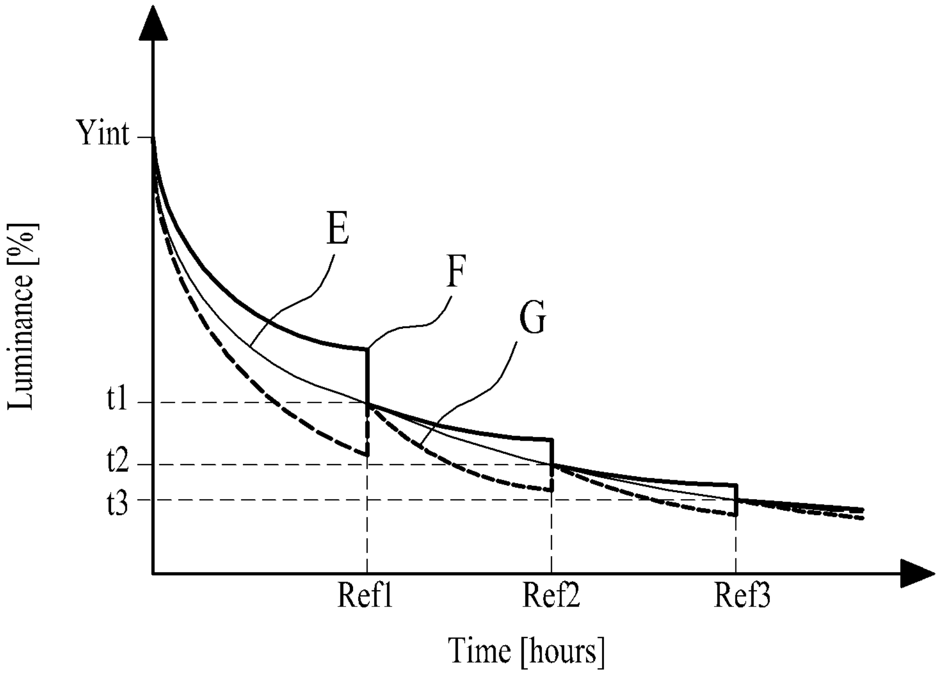

Idata
4213
Mdata
Mdata
DCG
210
4211
4215
300
Adata

FIG. 12



REFERENCES CITED IN THE DESCRIPTION

Patent documents cited in the description

- US 2003063053 A1 **[0012]**
- EP 2068299 A2 **[0013]**
- US 2005110728 A1 **[0014]**

专利名称(译)	有机发光显示装置及其驱动方法		
公开(公告)号	EP2743908B1	公开(公告)日	2018-10-17
申请号	EP2013193422	申请日	2013-11-19
[标]申请(专利权)人(译)	乐金显示有限公司		
申请(专利权)人(译)	LG DISPLAY CO. , LTD.		
当前申请(专利权)人(译)	LG DISPLAY CO. , LTD.		
[标]发明人	KIM HYUNG RAE BYUN SEUNG CHAN YI JUNG YOON CHOI KYOUNG SIK PARK DAE HYEON JEONG UI TAEK BYEON BOEON		
发明人	KIM, HYUNG RAE BYUN, SEUNG CHAN YI, JUNG YOON CHOI, KYOUNG SIK PARK, DAE HYEON JEONG, UI TAEK BYEON, BOEON		
IPC分类号	G09G3/3233 G09G3/3275		
优先权	1020120147930 2012-12-17 KR		
其他公开文献	EP2743908A1		
外部链接	Espacenet		

摘要(译)

一种有机发光显示装置，包括具有多个子像素的显示面板（100）;存储器（300），用于累积和存储每个子像素显示的数据;面板驱动器（200），被配置为：基于存储在存储器（300）中的每个子像素的累积数据，计算用于增大或减小每个子像素的亮度的劣化补偿增益值，生成每个子像素的调制数据像素通过根据计算的劣化补偿增益值将输入数据调制到每个子像素，将调制数据转换为数据电压，并从相应子像素的累积数据累加调制数据，然后将数据存储在存储器（300）。

FIG. 1
Related Art

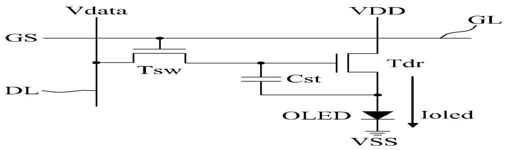


FIG. 2
Related Art