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(54) **Organic material and organic light emitting diode display using same**

Organisches Material und dessen Verwendung in einer Leuchtdiode

Materiau organique et son utilisation dans un dispositif luminescent

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WO-A1-2005/000787
WO-A2-2010/071362
WO-A2-2010/099534
US-A1- 2006 115 678

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Description

[0001] The present invention relates to an organic material for an organic light emitting diode (OLED) display, and an OLED display using the same.

[0002] An OLED display includes two electrodes facing each other and an organic layer interposed between the two electrodes. In the OLED display, holes injected from one electrode and electrons injected from the other electrode are combined in the organic layer to form excitons, and as the excitons generate energy, light is emitted. The OLED display may be applicable to various fields including a display device and an illumination system.

[0003] The OLED display may be driven by using self-emission characteristics of an organic light emission layer, so it does not necessarily require an auxiliary light source. Thus, less power is consumed for driving the OLED display. In addition, because the OLED display has a wide viewing angle and a fast response speed, it is receiving much attention as a next-generation display device.

[0004] The OLED display includes several organic layers including an organic light emission layer. However, an organic material of the organic layer is generally weak to heat, so it is easily degraded according to a change in temperature.

[0005] EP 2 031 037 A1 describes an organic electroluminescence device capable of converting electric energy to light and thereby emitting light.

[0006] US 2006/115678 A1 describes an aminoanthryl derivative-substituted pyrene compound useful as a compound for an organic light-emitting device.

[0007] WO 2005/000787 A1 describes an aminoanthryl derivative substitution compound that can provide an organic electroluminescence device.

[0008] WO 2010/071362 A2 describes a deuterated anthracene derivative and an organic light-emitting device using the same.

[0009] WO 2010/099534 describes deuterated aryl-anthracene compounds that are useful in electronic applications and electronic devices in which the active layer includes such a deuterated compound.

[0010] The present invention provides an organic material having improved heat resistance. The present invention also provides an organic light emitting diode (OLED) display including the organic material.

[0011] In a first aspect of the present invention, there is provided an organic material for an organic light emitting diode (OLED) display including an anthracene derivative of which at least one constituent is substituted with deuterium, wherein the anthracene derivative is selected from compounds according to claim 1.

[0012] In a second aspect of the present invention, there is provided an OLED display including first and second electrodes that face each other, and an organic layer interposed between the first and second electrodes, wherein the organic layer includes an organic material according to the present invention in its first aspect.

[0013] In a third aspect of the present invention, there is provided the use of an organic material according to the present invention in its first aspect in an organic light emitting diode (OLED) display.

[0014] The organic layer according to the present invention in its second aspect may be an organic light emission layer. The organic layer or the organic material according to the present invention in any of its aspects may further include a dopant material.

[0015] The dopant material may include a substituted or unsubstituted styrene, a substituted or unsubstituted perylene, a substituted or unsubstituted pyrene, a substituted or unsubstituted arylethylbenzene, a substituted or unsubstituted paraphenylene, a substituted or unsubstituted thiophene, a chelate metal complex, or combinations thereof.

[0016] The dopant material may include a compound of which a constituent is substituted with deuterium.

[0017] The dopant material may include an anthracene derivative of which at least one constituent is substituted with deuterium.

[0018] An organic material having improved heat resistance may be provided. An OLED display having improved reliability and a lengthened life span by the organic material may be implemented.

[0019] Further embodiments of the present invention in any of its various aspects are as described below or as defined in the sub-claims.

[0020] A more complete appreciation of the present invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings, wherein:

Figure 1 is a view for explaining an organic light emitting diode (OLED) display according to an embodiment of the present invention.

Figure 2 is a view for explaining an organic light emitting diode (OLED) display according to another embodiment of the present invention.

Figure 3 is a graph showing change in luminance of the OLED displays according to the embodiments of the present

invention described in Examples 1 to 3 and the Comparative Example over time.

[0021] An organic material and an organic light emitting diode (OLED) display using the same according to exemplary embodiments of the present invention will now be described. The exemplary embodiments described herein are provided to allow a skilled person in the art to easily understand the idea of the present invention, and the present invention is not meant to be limited thereto. The exemplary embodiments described herein may be modified within the technical idea and scope of the present invention.

[0022] In the present exemplary embodiments, unless otherwise specified, "substituted" refers to a hydrogen atom of a compound substituted with a substituent selected from among halogen atoms (F, Br, Cl, or I), a hydroxyl group, an alkoxy group, a nitro group, a cyano group, an amino group, an azido group, an amidino group, a hydrazino group, a hydrazono group, a carbonyl group, a carbamyl group, a thiol group, an ester group, a carboxyl group or its salt, a sulfonic acid group or its salt, a phosphoric acid or its salt, an alkyl group, a C_2-C_{16} alkenyl group, a C_2-C_{16} alkynyl group, an aryl group, a C_7-C_{13} arylakyl group, a C_1-C_4 oxyalkyl group, a C_1-C_{20} heteroalkyl group, a C_3-C_{20} heteroaryl alkyl group, a cycloalkyl group, a C_3-C_{15} cycloalkenyl group, a C_6-C_{15} cycloalkynyl group, a heterocycloalkyl group, and combinations thereof.

[0023] Also, unless otherwise specified, "hetero" refers to containing one to three hetero atoms selected from among N, O, S, or P.

[0024] In the present exemplary embodiments, "and/or" is used to include at least one among constituent elements arranged before and after. In the present exemplary embodiments, each element and/or parts are designated by using expressions such as "first", "second", etc., but these are used for clarification and the present invention is not limited thereto.

[0025] In the present exemplary embodiments, it will be understood that when an element is referred to as being "on" another element, it can be directly on the other element or intervening elements may also be present.

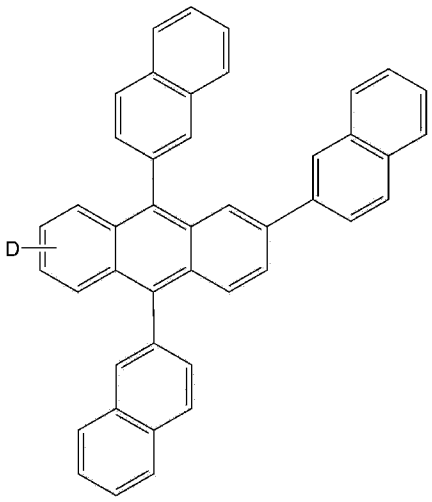
[0026] In the drawings, the thickness and/or relative thickness of the elements may be exaggerated in order to clarify embodiments of the present invention. Also, the expressions related to positions such as "upper part", "lower part", or the like are relatively used for clarification, without limiting absolute positions among the elements.

[0027] An organic material for an OLED display according to the present invention in its first aspect will now be described.

[0028] The organic material may be used to form an organic light emission layer or an auxiliary layer within the OLED display. Here, the auxiliary layer may be one of a hole injection layer, a hole transport layer, an electron injection layer, and an electron transport layer.

[0029] The organic material includes an anthracene derivative of which at least one constituent is substituted with deuterium, wherein the anthracene derivative is selected from compounds represented by one of Formula 2 to Formula 14.

[Formula 2]



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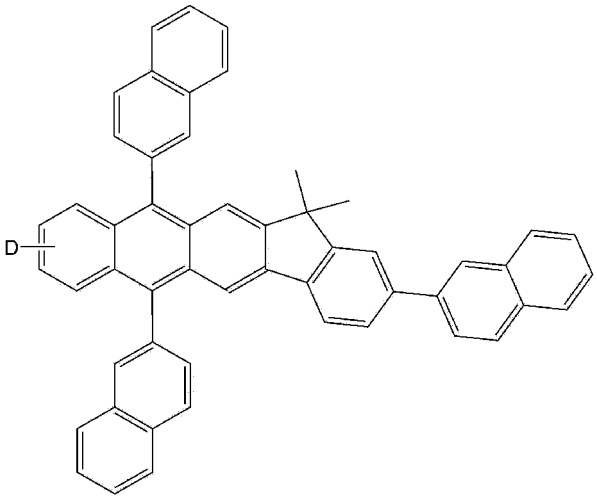

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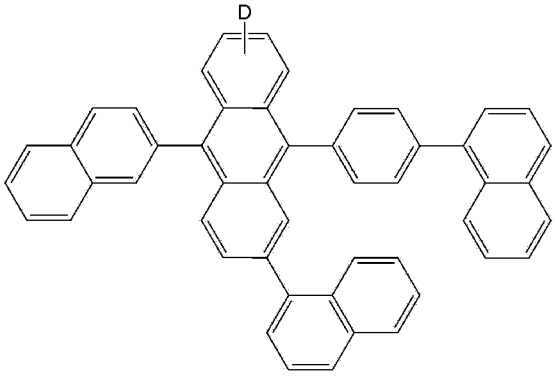

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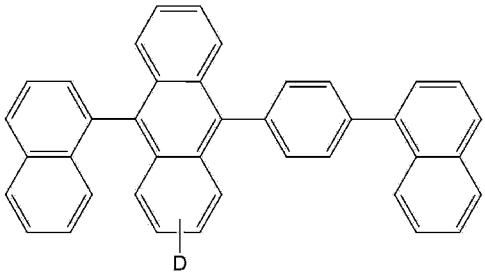

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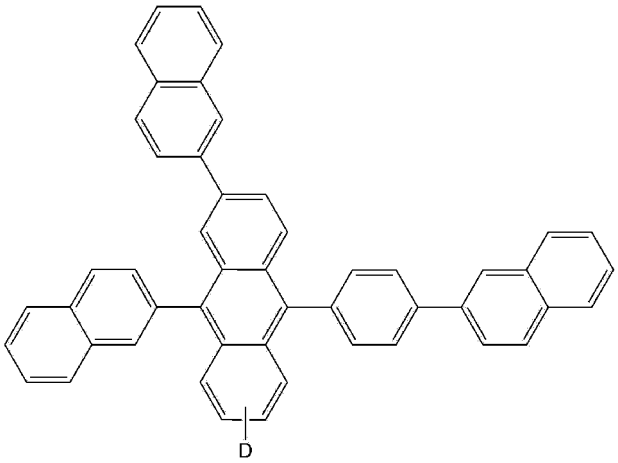

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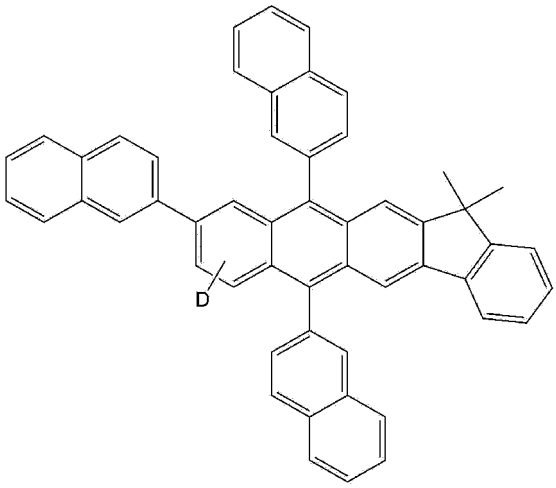

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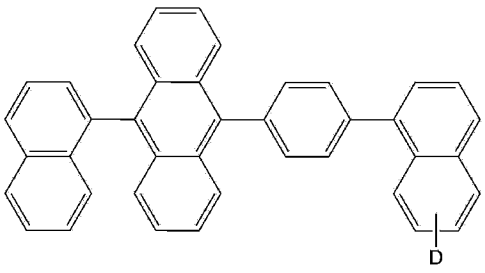

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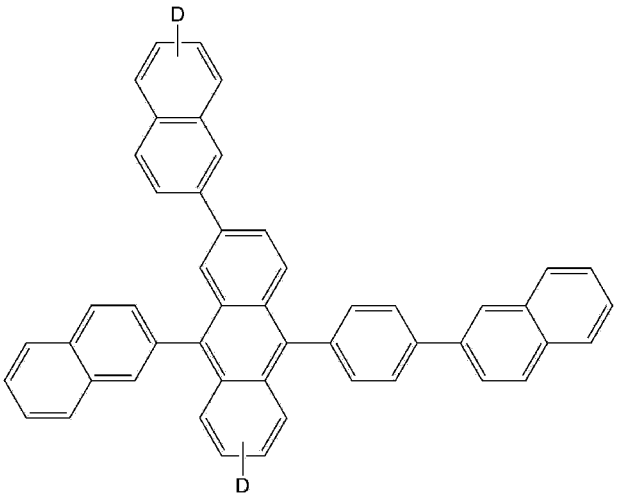

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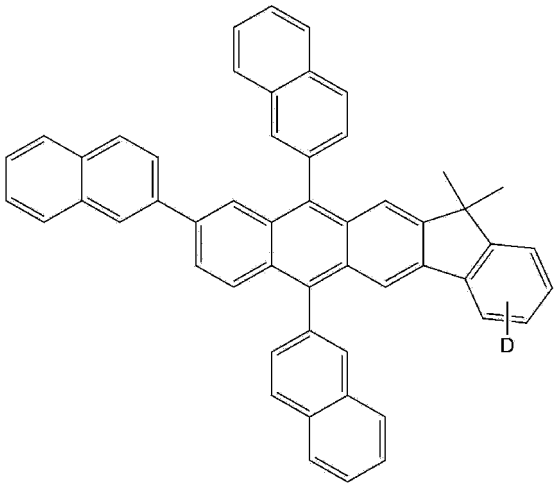

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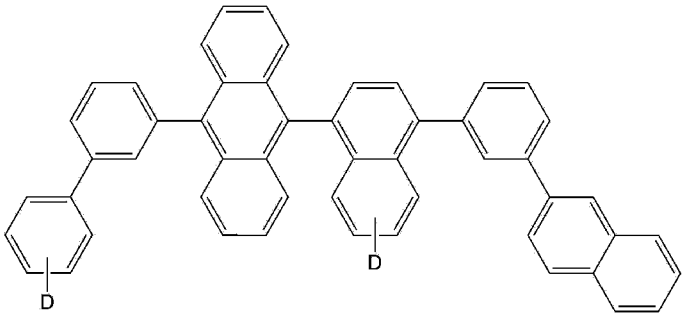

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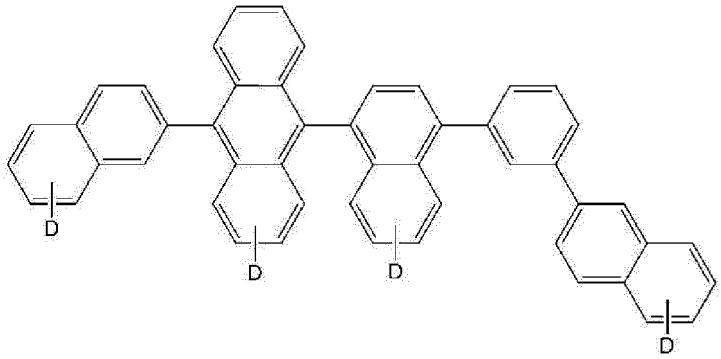

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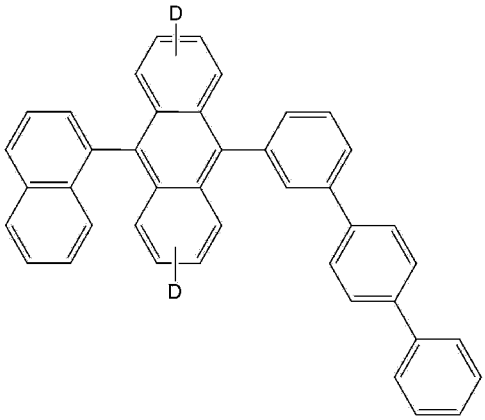

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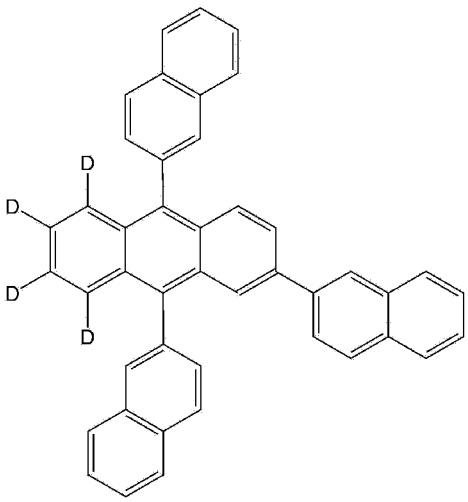


[0030] In Formula 2 to Formula 14, D is deuterium.

[0031] In Formula 2 to Formula 14, the deuterium may be included on an anthracenyl group and/or on other functional groups. For example, in Formula 2, at least one hydrogen of the anthracenyl group and/or naphthyl group may be substituted with a deuterium atom. In an exemplary embodiment, a plurality of hydrogen atoms of the organic compound may be substituted with deuterium atoms.

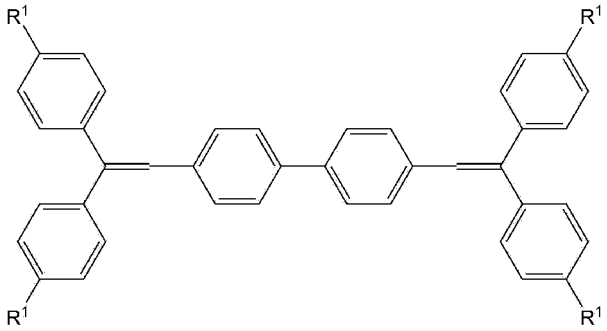
[0032] Because the organic compound includes deuterium, it may have a relatively high molecular weight. Accordingly, the glass transition temperature, the melting point, or the like, that are affected by the molecular weight, may be increased. Thus, heat resistance of the organic material including the organic compound may be improved.

[0033] The organic material may include a dopant material. For example, when the organic material is used as a

material of an organic light emission layer, the dopant material may include substituted or unsubstituted styrene, a substituted or unsubstituted perylene, a substituted or unsubstituted pyrene, a substituted or unsubstituted arylethylbenzene, a substituted or unsubstituted paraphenylene, a substituted or unsubstituted thiophene, a chelate metal complex, or combinations thereof.

[0034] For example, the dopant material may include at least one selected from among compounds represented by Formula 15 to Formula 22 and Formula 14.

[Formula 15]



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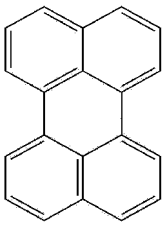

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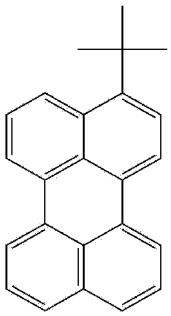

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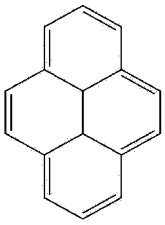

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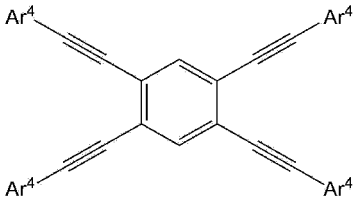

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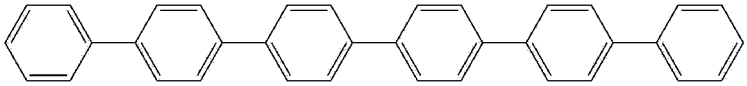

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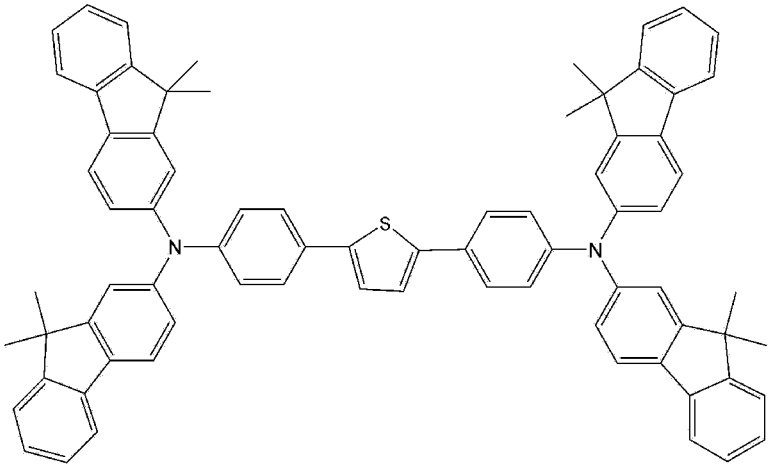

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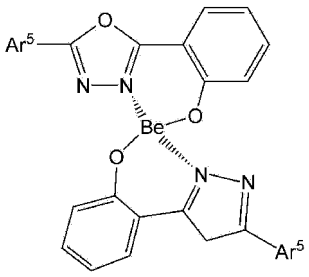

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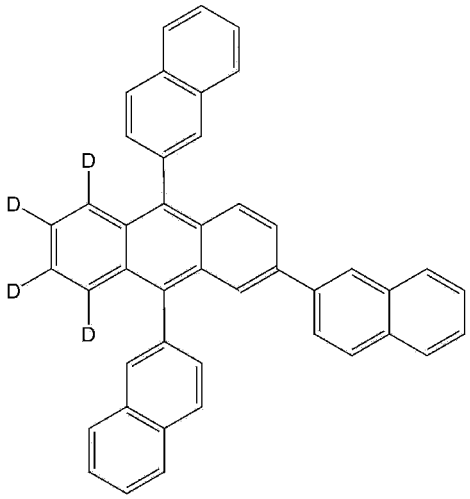
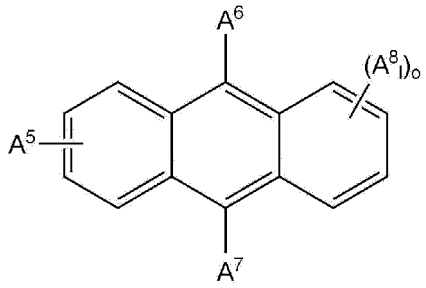


[0035] In Formula 15, R^1 may be selected from the group consisting of a hydrogen atom, a methyl group, and a t-butyl group. In Formula 19, Ar^4 may be selected from a C_6-C_{20} aryl group. In Formula 22, Ar^5 may be selected from a C_6-C_{14} aryl group.

[0036] In an exemplary embodiment, at least one of hydrogen atoms of the compound constituting the dopant material may be substituted with deuterium. For example, the dopant material may include a compound represented by Formula 24 shown below.

[Formula 24]



[0037] In Formula 24, A^5 to A^8 are independently selected from the group consisting of hydrogen, a C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a C_6-C_{18} aryloxy group, a C_6-C_{20} aryl group, an amino group, an alkylamino group, an arylamino group, a cyano group, a nitro group, a hydroxyl group, and a halogen atom, 1 is an integer of 0 to 4, o is an integer of 0 to 4, and at least one of A^5 to A^8 is deuterium or a substituent including deuterium. The compound represented by Formula 24 may be a compound having different substituents from those of the compounds represented by Formulae 2 to 14 above.

[0038] The C_1-C_6 alkyl group includes a methyl group, an ethyl group, an n-propyl group, an i-propyl group, an n-butyl group, an i-butyl group, a sec-butyl group, a t-butyl group, an i-pentyl group, a t-pentyl group, a neopentyl group, an n-hexyl group, and an i-hexyl group.

[0039] The C_1-C_6 alkoxy group includes a methoxy group, an ethoxy group, an n-propoxy group, an i-propoxy group, an n-butyloxy group, an i-butyloxy group, a sec-butyloxy group, an i-pentyloxy group, a t-pentyloxy group, and an n-hexyloxy group.

[0040] The C_6-C_{18} aryloxy group includes a phenoxy group and a naphthyloxy group.

[0041] The C_6-C_{20} aryl group includes a phenyl group and a naphthyl group.

[0042] The alkylamino group includes NHR and NR_2. The alkyl group (R) of the alkylamino group may be selected from a C_1-C_6 alkyl group.

[0043] The arylamino group includes -NHAr and NAr_2. The aryl group (Ar) of the arylamino group may be selected from a C_6-C_{20} aryl group.

[0044] The halogen atom includes fluorine, chlorine, bromine, and iodine.

[0045] When the dopant material includes a compound including deuterium, the heat resistance of the organic material

may be further improved.

[0046] An OLED display including the foregoing organic material, according to the present invention in its second aspect, will now be described with reference to Figure 1.

[0047] Figure 1 is a cross-sectional view of an OLED display according to an exemplary embodiment.

[0048] With reference to Figure 1, a lower electrode 120 and an upper electrode 160 are disposed on a substrate 110, and an organic light emission layer 140 is disposed between the lower electrode 120 and the upper electrode 160. A lower auxiliary layer 130 may be interposed between the lower electrode 120 and the organic light emission layer 140. An upper auxiliary layer 150 may be interposed between the organic light emission layer 140 and the upper electrode 160.

[0049] The substrate 110 may made of glass, polymer, or a combination thereof.

[0050] One of the lower electrode 120 and the upper electrode 160 may be an anode and the other may be a cathode. The lower electrode 120 and the upper electrode 160 may be transparent or opaque electrodes. For example, the lower electrode 120 and the upper electrode 160 may be made of ITO, IZO, or a combination thereof, or may be made of aluminum (Al), silver (Ag), or a combination thereof.

[0051] One of the lower auxiliary layer 130 and the upper auxiliary layer 150 may include a hole injection layer and/or a hole transport layer, and the other may include an electron transport layer and/or an electron injection layer. For example, when the lower electrode 120 is an anode and the upper electrode 150 is a cathode, the lower auxiliary layer 130 may include a hole injection layer and/or a hole transport layer and the upper auxiliary layer 150 may include an electron injection layer and/or an electron transport layer. In this case, at least one of the lower auxiliary layer 130 and the upper auxiliary layer 150 may be omitted.

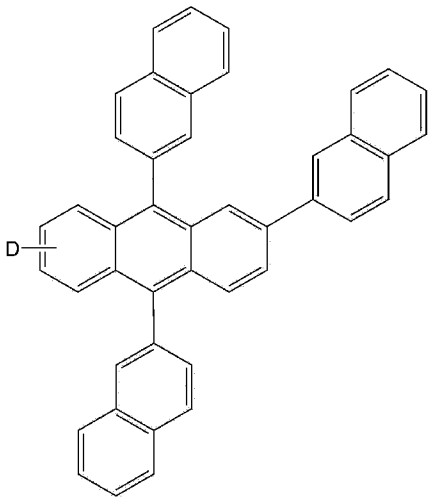
[0052] The organic material according to an exemplary embodiment may be included in the lower auxiliary layer 130, the organic light emission layer 140, the upper auxiliary layer 150, or any combination thereof. For example, the organic material may be included in the organic light emission layer 140. Here, the organic material may include a host material and a dopant material mixed in the host material.

[0053] Hereinafter, the case in which the organic material is included in a blue host material will be described, but the present invention is not meant to be limited thereto.

[0054] The blue host material includes an anthracene derivative including at least one deuterium. In the anthracene derivative, at least one of hydrogen atoms of an anthracenyl group may be substituted by a deuterium atom or at least one of hydrogen atoms of a functional group other than the anthracenyl group may be substituted by a deuterium atom. Alternatively, in the anthracene derivative, a hydrogen atom of the anthracenyl group and a hydrogen atom of a substituent other than the anthracenyl group may be simultaneously substituted with deuterium atoms.

[0055] The blue host material may include at least one selected from among compounds represented by Formula 2 to Formula 14.

[Formula 2]



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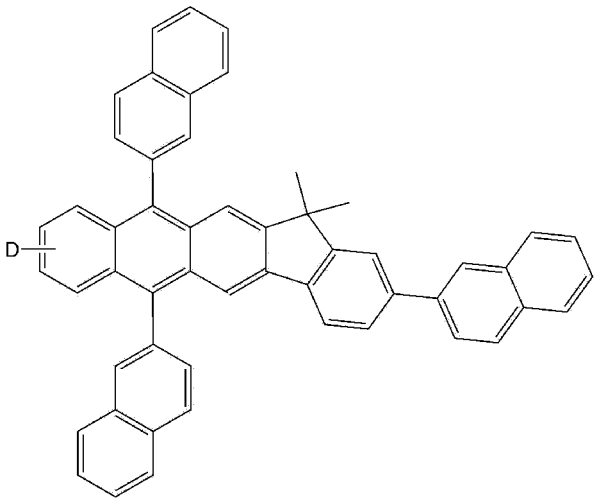

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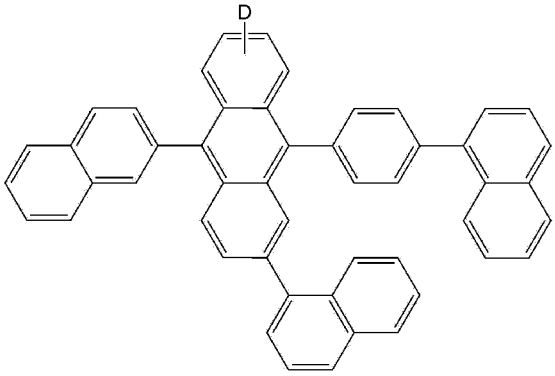

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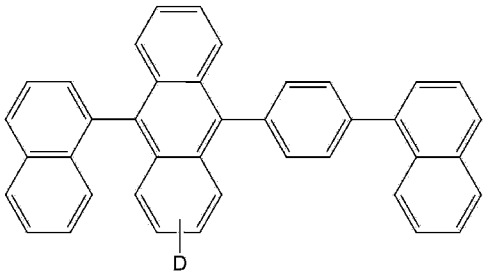

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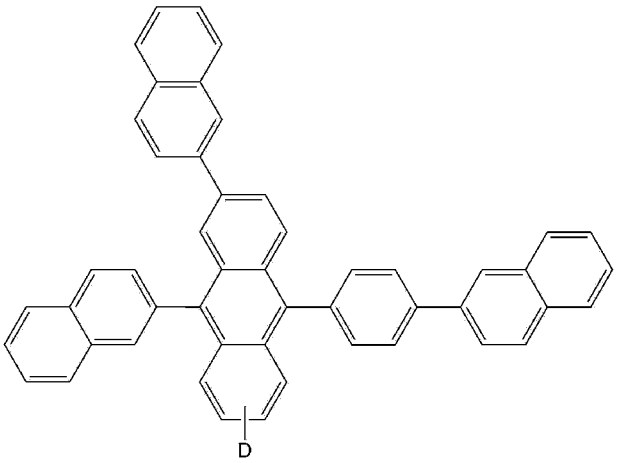

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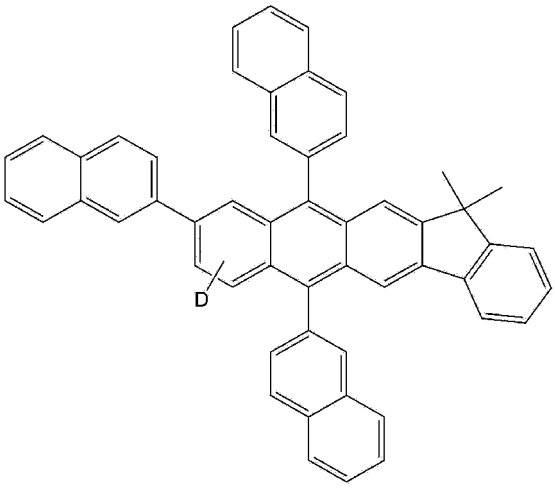

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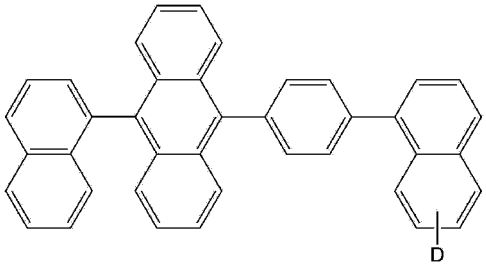

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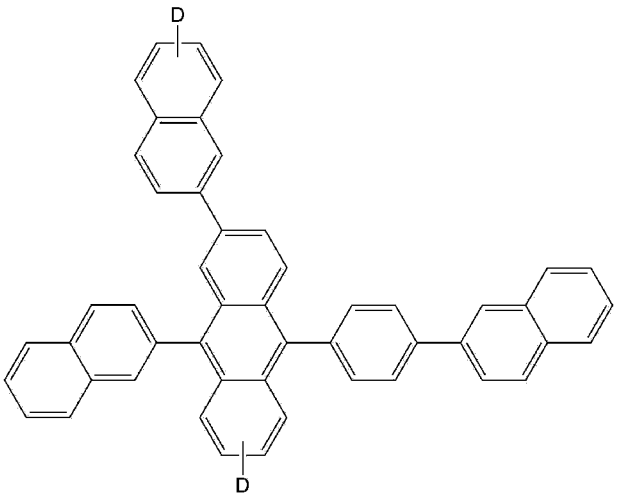
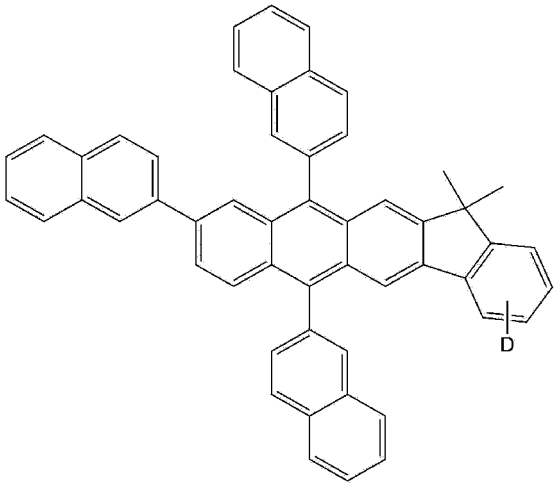
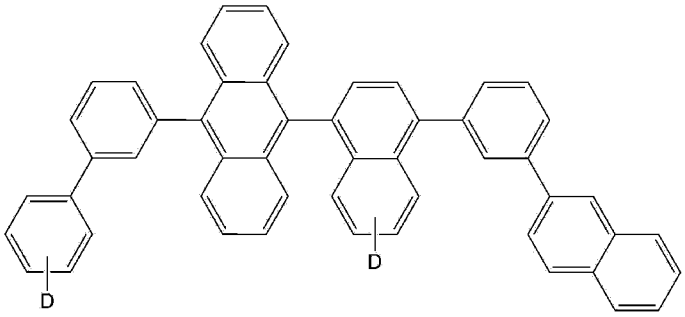


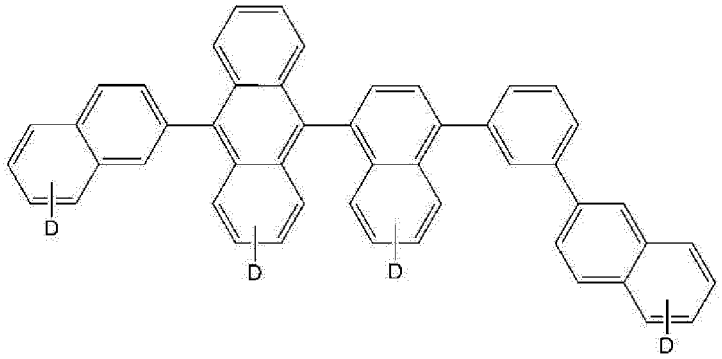
[Formula 10]



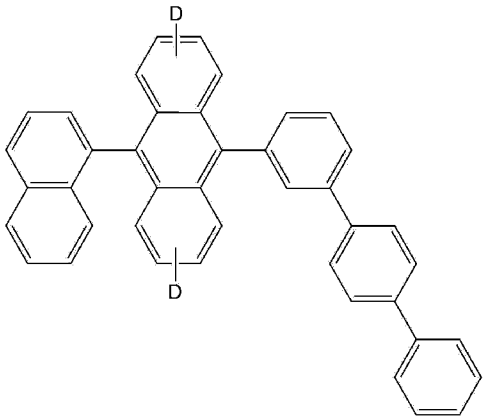
[Formula 11]



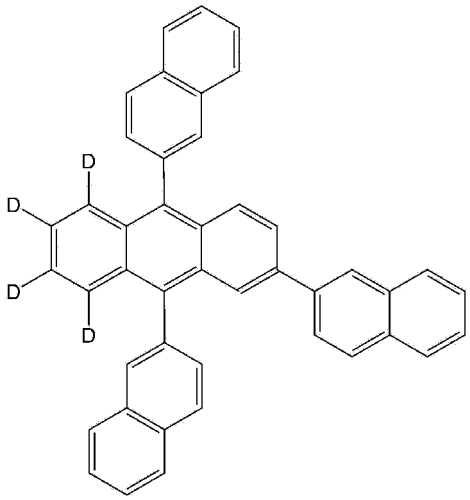
[Formula 12]



[Formula 13]



[Formula 14]



[0056] In Formula 2 to Formula 14, D is deuterium.

[0057] The molecular weight of the compound is increased by the deuterium. The increase in the molecular weight of the compound may lead to an increase in a melting point and/or glass transition temperature of the organic material including the blue host material. Accordingly, heat resistance of the organic light emission layer 140 including the blue host material may be improved. Thus, the reliability of the OLED display including the blue host material may be improved and a life span of the OLED display may be lengthened.

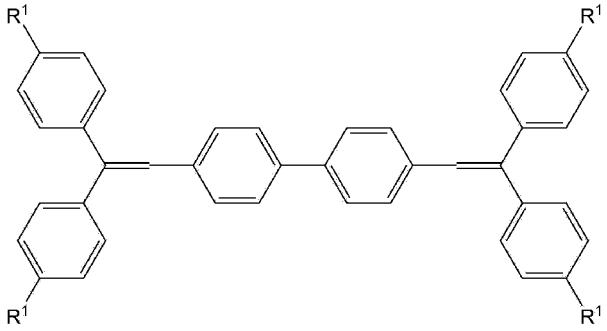
[0058] The organic light emission layer 140 may selectively further include hosts of different colors. For example, the organic light emission layer 140 may further include red hosts and/or green hosts therein.

[0059] The organic emission layer 140 may include a dopant material. The dopant material may be, for example, a

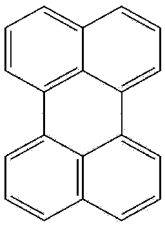
substituted or unsubstituted styrene, a substituted or unsubstituted perylene, a substituted or unsubstituted pyrene, a substituted or unsubstituted arylethylbenzene, a substituted or unsubstituted paraphenylene, a substituted or unsubstituted thiophene, a chelate metal complex, or combinations thereof.

[0060] For example, the dopant material may include at least one selected from among compounds represented by Formula 15 to Formula 22 and Formula 14.

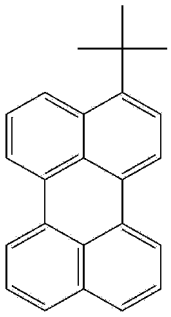
[Formula 15]



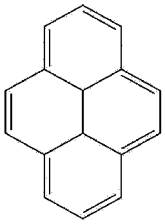
[Formula 16]



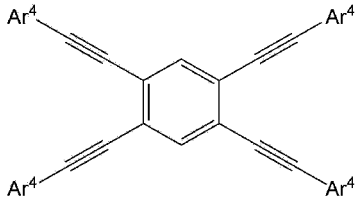
[Formula 17]



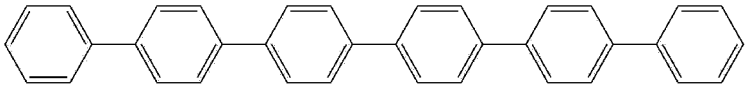
[Formula 18]



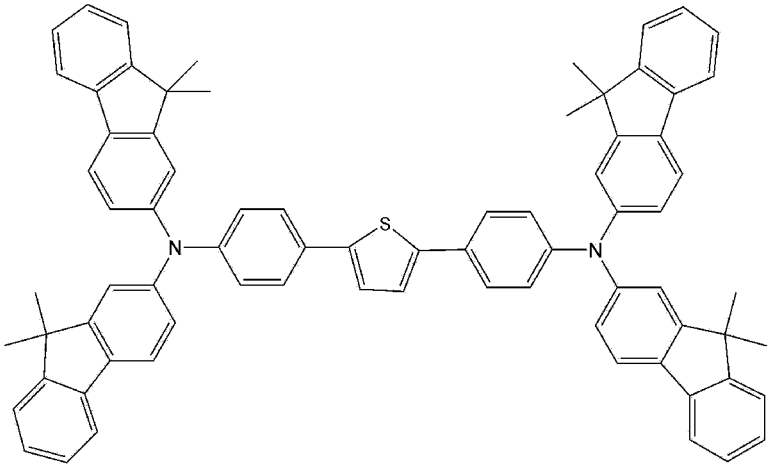
[Formula 19]



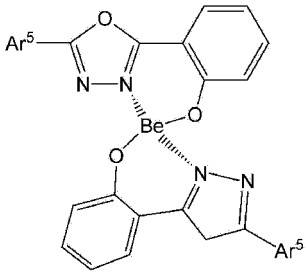
[Formula 20]



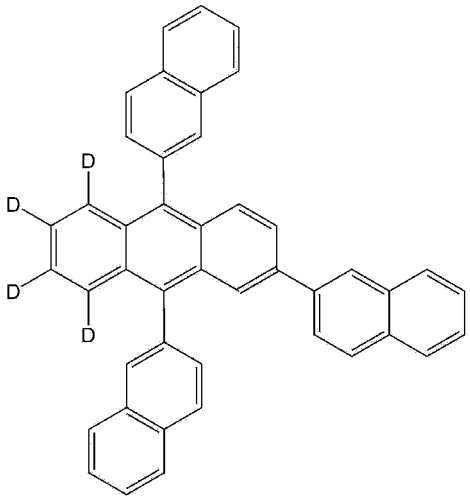
[Formula 21]



[Formula 22]



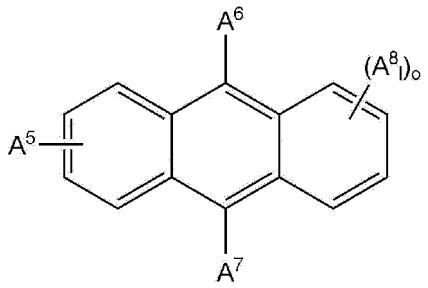
[Formula 14]



[0061] In Formula 15, each R^1 is independently selected from the group consisting of hydrogen, a methyl group, and a t-butyl group. In Formula 19, Ar^4 is selected from a C_6-C_{20} aryl group. For example, in Formula 19, Ar^4 is selected from a C_6-C_{14} aryl group.

[0062] In an exemplary embodiment, the dopant material may include a compound of which a constituent has been substituted with deuterium. For example, the dopant material may be selected from compounds represented by Formula 15 to Formula 22 and Formula 14, and the selected compound may be substituted with deuterium. For another example, the dopant material may include a compound represented by Formula 24 shown below.

[Formula 24]



[0063] In Formula 24, A^5 to A^8 are independently selected from the group consisting of hydrogen, a C_1-C_6 alkyl group, a C_1-C_6 alkoxy group, a C_6-C_{18} aryloxy group, a C_6-C_{20} aryl group, an amino group, an alkylamino group, an arylamino group, a cyano group, a nitro group, a hydroxyl group, and a halogen atom, 1 is an integer of 0 to 4, o is an integer of 0 to 4, and at least one of A^5 to A^8 is deuterium or a substituent including deuterium. The compound represented by Formula 24 may be a compound that is different from that used as the host material.

[0064] The C_1-C_6 alkyl group includes a methyl group, an ethyl group, an n-propyl group, an i-propyl group, an n-butyl group, an i-butyl group, a sec-butyl group, a t-butyl group, an i-pentyl group, a t-pentyl group, a neopentyl group, an n-hexyl group, and an i-hexyl group.

[0065] The C_1-C_6 alkoxy group includes a methoxy group, an ethoxy group, an n-propoxy group, an i-propoxy group, an n-butyloxy group, an i-butyloxy group, a sec-butyloxy group, an i-pentyloxy group, a t-pentyloxy group, and an n-hexyloxy group.

[0066] The C_6-C_{18} aryloxy group includes a phenoxy group and a naphthyloxy group.

[0067] The C_6-C_{20} aryl group includes a phenyl group and a naphthyl group.

[0068] The alkylamino group includes NHR and NR_2. The alkyl group (R) of the alkylamino group may be selected from a C_1-C_6 alkyl group.

[0069] The arylamino group includes -NHAr and NAr_2. The aryl group (Ar) of the arylamino group may be selected from a C_6-C_{20} alkyl group.

[0070] The halogen atom includes fluorine, chlorine, bromine, and iodine.

[0071] When the dopant material includes a compound including deuterium, the heat resistance of the organic material may be further improved.

[0072] An OLED display including the organic material according to an exemplary embodiment will now be described

with reference to Figure 2. The same reference numerals are used for the same elements as those described above with reference to Figure 1, and descriptions thereof will be omitted.

[0073] Figure 2 is a cross-sectional view of an OLED display according to another exemplary embodiment.

[0074] With reference to Figure 2, organic light emission layers 140 and 142 may include a plurality of stacked layers. The layers emit light of different colors, respectively, and the combination of the stacked layers may emit white light. For example, the lower light emission layer 140 may emit blue light, the upper light emission layer 142 may emit light of a different color other than blue color, and the stacked lower and upper light emission layers 140 and 142 may emit white light.

[0075] The upper electrode 160 may be disposed on the upper light emission layer 140, and color filters 172, 174, and 176 may be disposed on the upper electrode 160. As the white light emitted through the organic light emission layers 140 and 142 passes through the color filters 172, 174, and 176, it may be converted into red, blue, and green colors. Alternatively, color filters of any other colors may be disposed on the upper electrode 160, and light beams of different colors may be emitted.

[0076] The present invention will be described in detail through the following exemplary embodiments. The following exemplary embodiments are merely described for the purpose of explanation, without limiting the scope of the present invention.

Fabrication of OLED display

Example 1

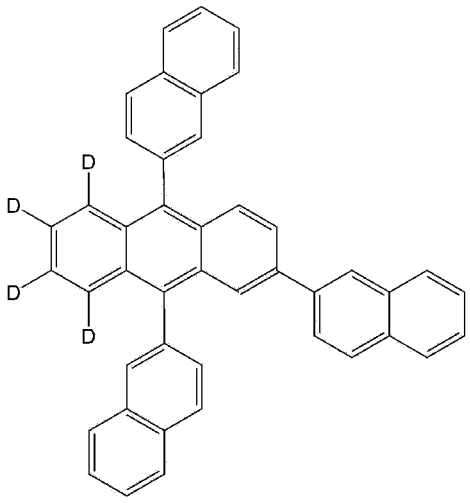
[0077] An ITO electrode was formed on a glass substrate, on which 4,4',4"-tris (3-methylphenylamino)triphenylamine (MTDATA), 1,4,5,8,9,12-hexaazatriphenylenehexanitrile (HAT-CN6), and N,N'-diphenyl-N,N'-di(1-naphthyl)-1,1'-biphenyl-4,4'-diamine (NPB) were then deposited to have thicknesses of about 70nm, 5nm, and 70nm, respectively.

[0078] A mixture obtained by mixing a compound represented by Formula 14 and a compound represented by Formula 16 was deposited on the resultant structure to form an organic light emission layer. The compound represented by Formula 16 was mixed with the concentration of 3 wt% based on the compound represented by Formula 14, and used as a dopant of the organic light emission layer.

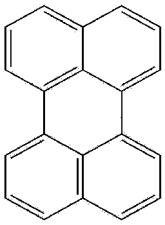
[0079] Then, a mixture of 2,9-dimethyl-4,7-diphenyl-1,10-phenanthroline (BCP) and 8-hydroxyquinolinate lithium (LiQ) was deposited on the organic light emission layer. In this case, the BCP and the LiQ were mixed in the ratio of 50 wt% : 50 wt%.

[0080] Thereafter, magnesium and silver were deposited in the weight ratio of 160 : 10 to form an upper electrode on the organic light emission layer. As a result, an OLED display was fabricated.

[Formula 14]



[Formula 16]



Example 2

[0081] An OLED display was fabricated in the same manner as that of the Example 1, except that the compound represented by formula 16 as a dopant was used at the concentration of about 2 wt% based on the compound represented by Formula 14.

Example 3

[0082] An OLED display was fabricated in the same manner as that of the Example 1, except that the compound represented by formula 16 as a dopant was used at the concentration of about 1 wt% based on the compound represented by Formula 14.

Comparative Example 1

[0083] An OLED display was fabricated in the same manner as those of Example 1, except that the compound represented by Formula 14 was replaced with 2,9,10-tris(2-naphthyl)anthracene.

Evaluation

[0084] The luminance of each of the OLED displays fabricated according to the Examples 1 to 3 and Comparative Example 1 according to time was measured. The change in the luminance over time was measured by applying a constant current of about 39 mA/cm^2 to the respective OLED displays, at room temperature, according to the highly accelerated life test.

[0085] A change in the luminance of each of the OLED displays over time was measured at room temperature, and the results are shown in Figure 3.

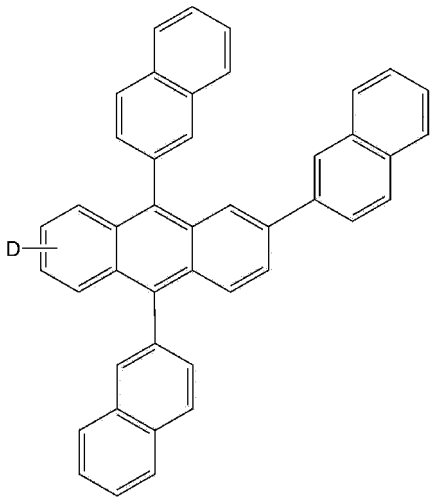
[0086] With reference to Figure 3, it is noted that a luminance reduction rate of each of the OLED displays according to Examples 1 to 3 is smaller than that of the OLED display according to Comparative Example 1. It is noted that the OLED displays according to Examples 1 to 3 have stable luminance characteristics. Therefore, the OLED displays may be implemented with improved reliability.

[0087] While the present invention has been described in relation to certain exemplary embodiments thereof, it is to be understood that the present invention is not limited to such embodiments, but, on the contrary, is defined by the appended claims.

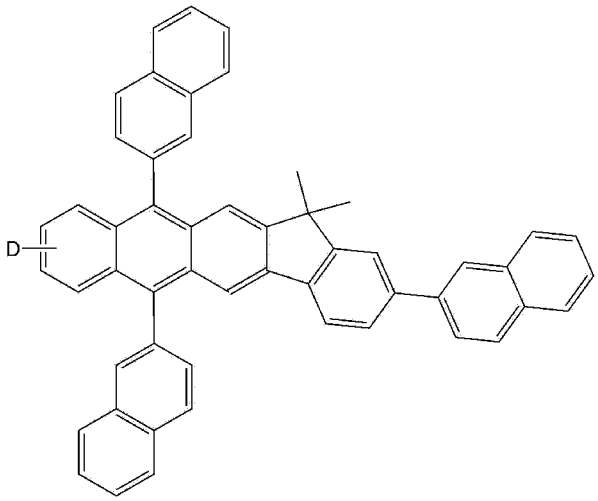
Claims

1. An organic material for an organic light emitting diode (OLED) display, comprising an anthracene derivative of which at least one constituent is substituted with deuterium,
characterised in that the anthracene derivative is selected from compounds represented by Formula 2 to Formula 14:

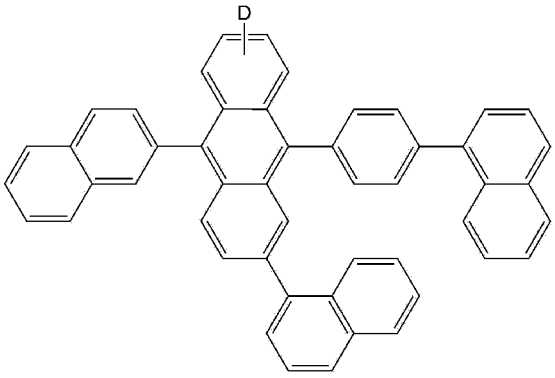
[Formula 2]



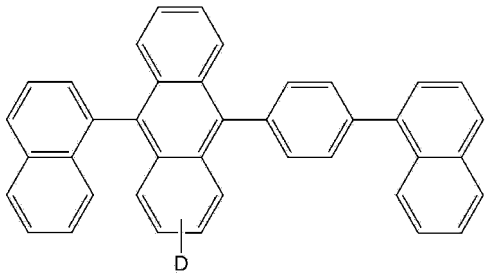
[Formula 3]



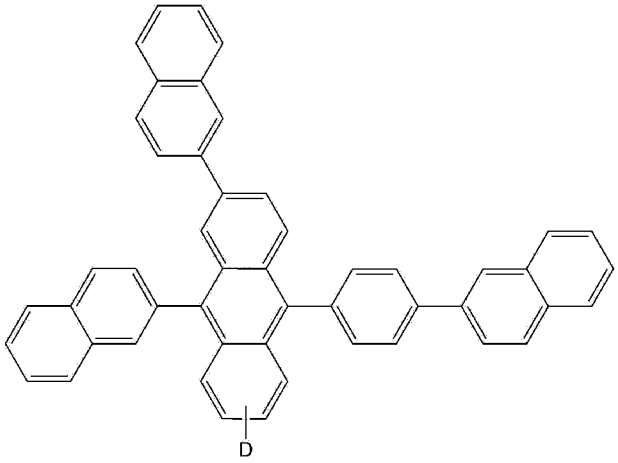
[Formula 4]



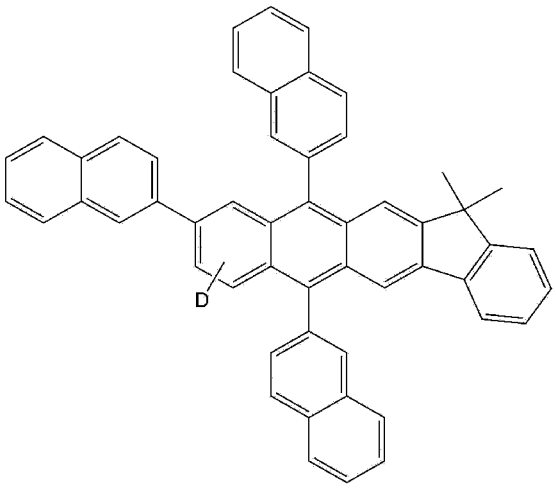
[Formula 5]



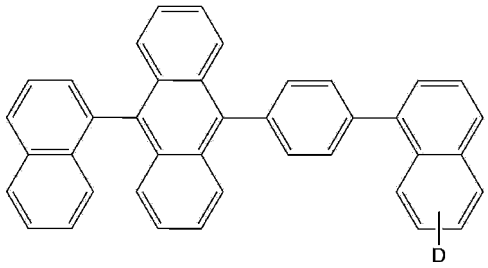
[Formula 6]



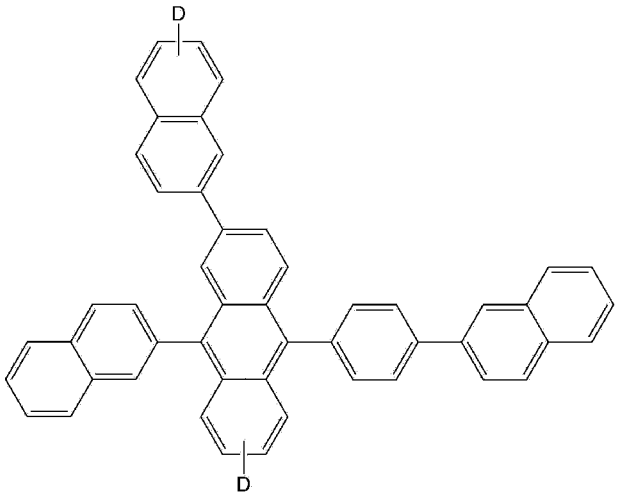
[Formula 7]



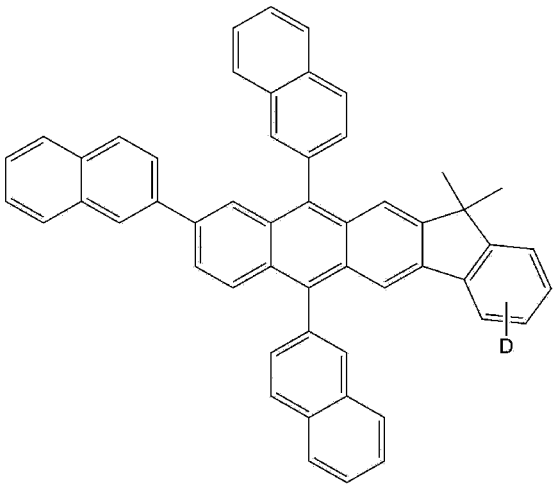
[Formula 8]



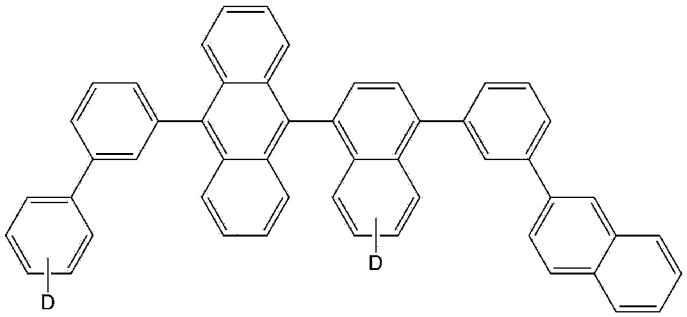
[Formula 9]



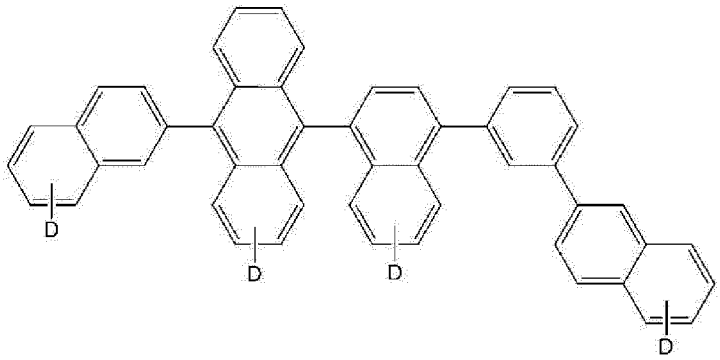
[Formula 10]



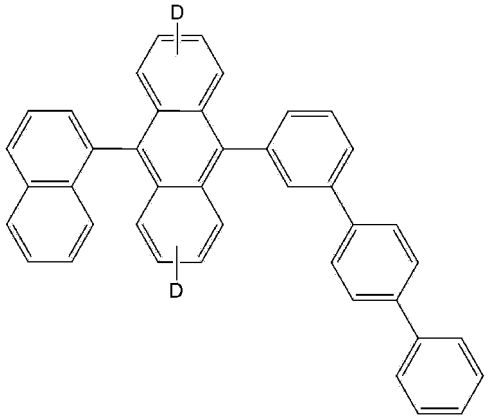
[Formula 11]



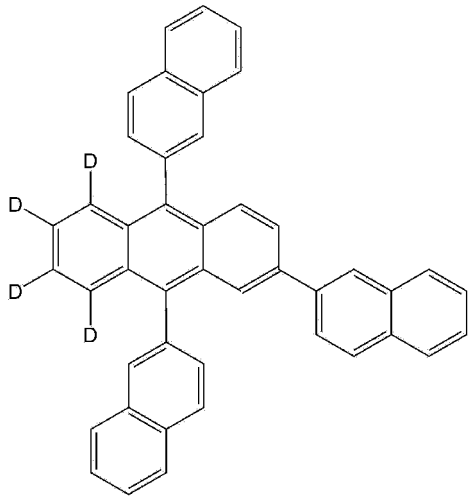
[Formula 12]



[Formula 13]



[Formula 14]



wherein D is deuterium.

2. The organic material of claim 1, further comprising a dopant material.

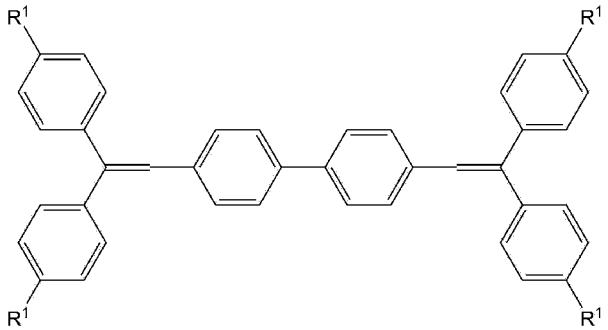
3. The organic material of claim 2, wherein the dopant material comprises a substituted or unsubstituted styrene, a substituted or unsubstituted perylene, a substituted or unsubstituted pyrene, a substituted or unsubstituted arylethylbenzene, a substituted or unsubstituted paraphenylene, a substituted or unsubstituted thiophene, a chelate metal complex, or combinations thereof.

4. The organic material of claims 2 or 3, wherein the dopant material is substituted with one or more deuterium atoms.

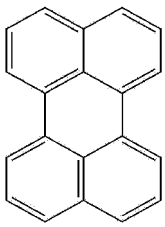
5. The organic material of claim 2, wherein the dopant material comprises an anthracene derivative further substituted with one or more deuterium atoms.

6. The organic material of claim 2, wherein the dopant material comprises at least one selected from compounds represented by Formula 15 to Formula 22 and Formula 14

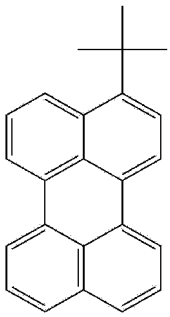
[Formula 15]



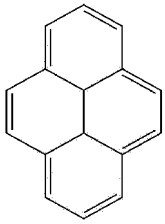
[Formula 16]



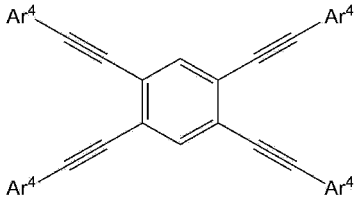
[Formula 17]



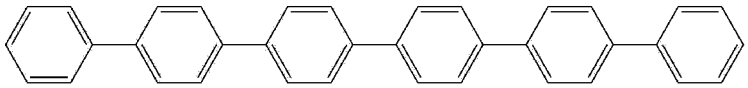
[Formula 18]



[Formula 19]



[Formula 20]



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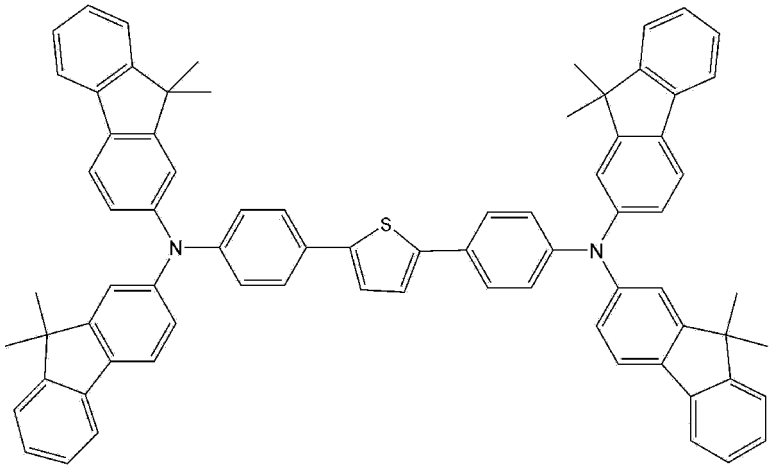

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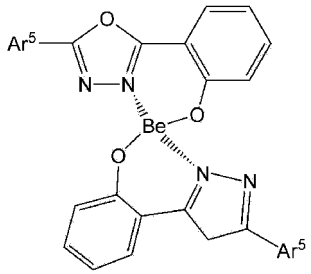
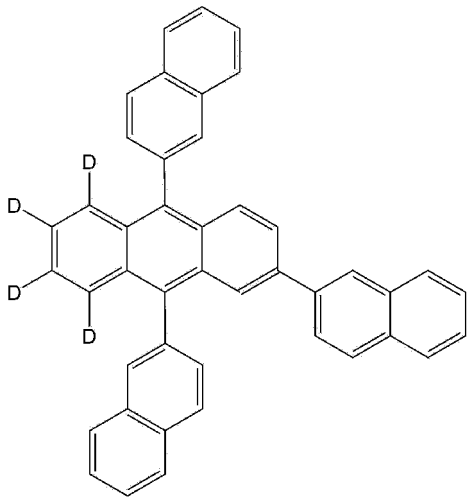
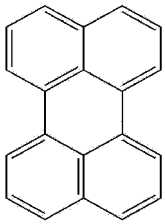


[Formula 14]



7. The organic material of claim 6, wherein the dopant material comprises at least one selected from compounds represented by Formula 16 and Formula 14.

[Formula 16]



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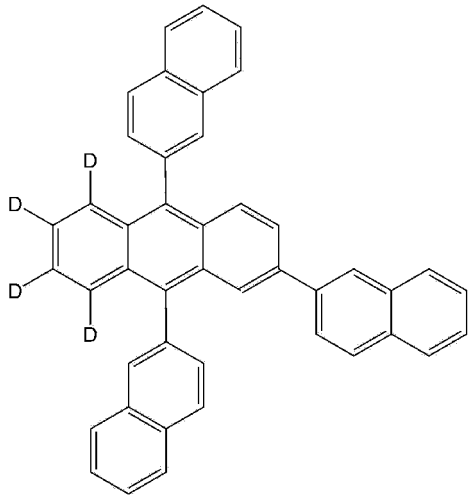


8. An organic light emitting diode display comprising:

first and second electrodes (120, 160) that face each other; and
an organic layer interposed between the first and second electrodes (120, 160),
characterised in that the organic layer comprises an organic material as claimed in any one of claims 1 to 7.

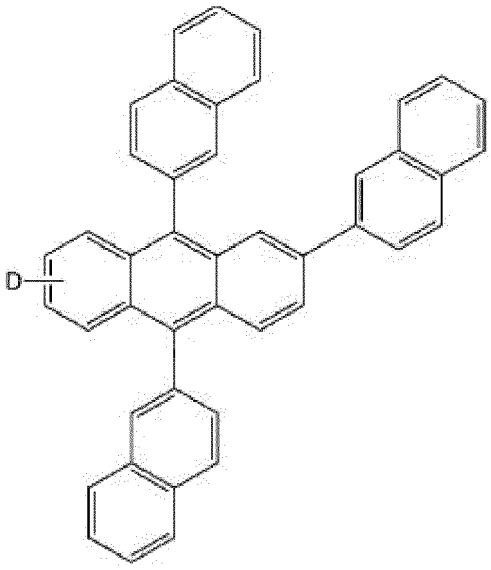
9. The organic light emitting diode display of claim 8, wherein the organic layer is an organic emission layer.

10. Use of an organic material as claimed in any one of claims 1 to 7 in an organic light emitting diode (OLED) display.

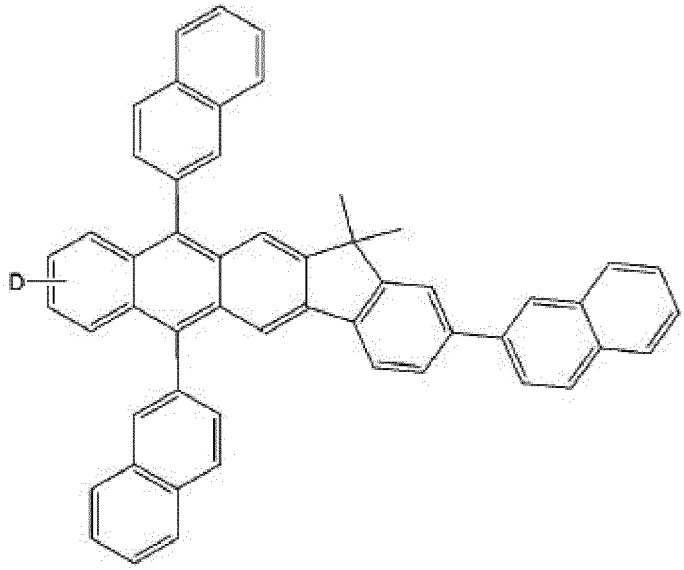
Patentansprüche

1. Organisches Material für eine organische lichtemittierende Diode (OLED), umfassend ein Anthracenderivat, von dem mindestens ein Bestandteil mit Deuterium substituiert ist,
dadurch gekennzeichnet, dass das Anthracenderivat ausgewählt ist aus Verbindungen, dargestellt durch Formel 2 bis Formel 14:

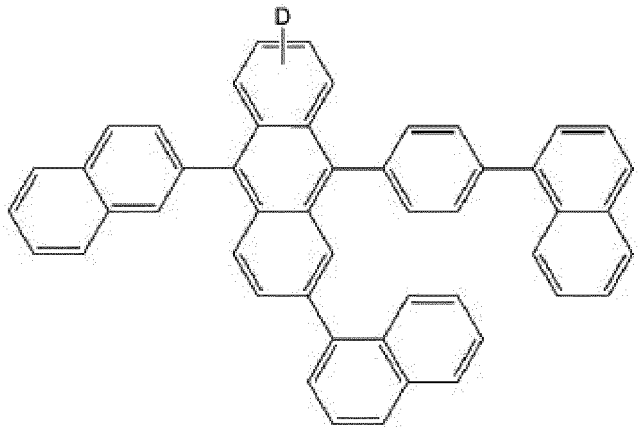
[Formel 2]



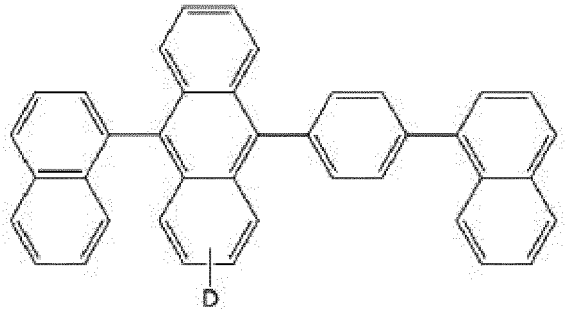
[Formel 3]



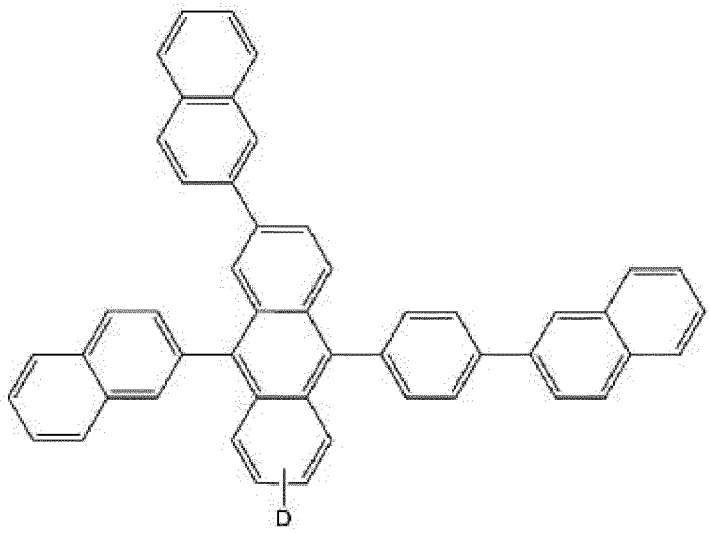
[Formel 4]



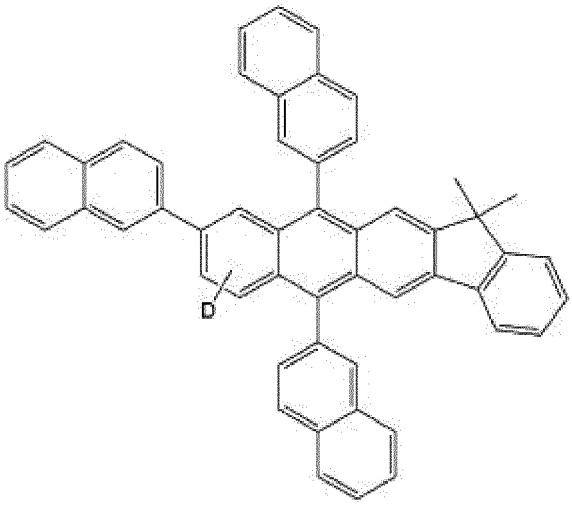
[Formel 5]



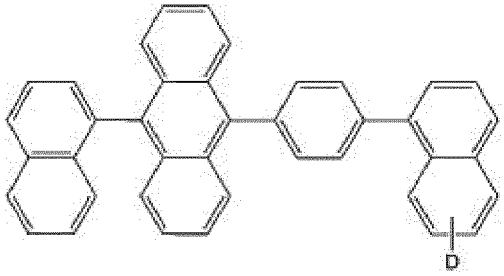
[Formel 6]



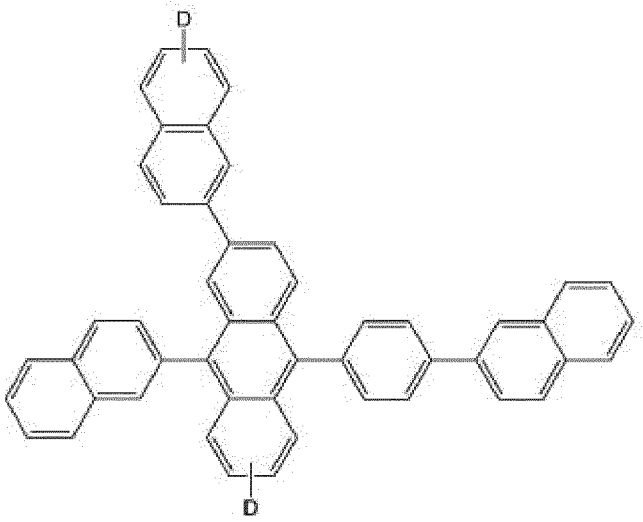
[Formel 7]



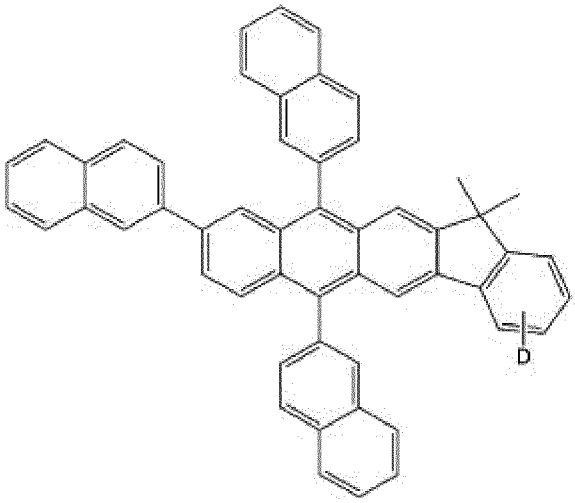
[Formel 8]



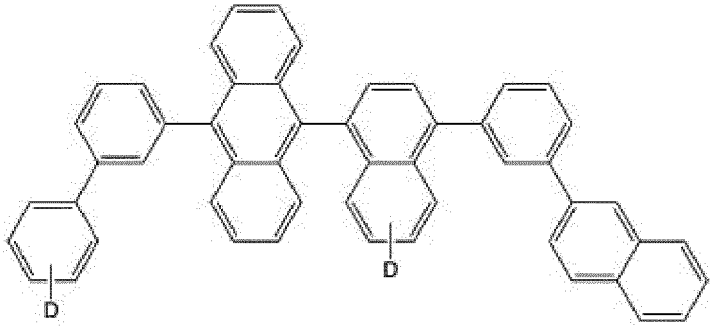
[Formel 9]



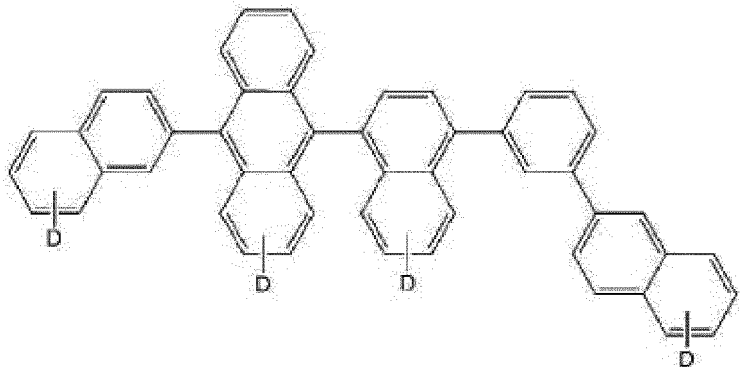
[Formel 10]



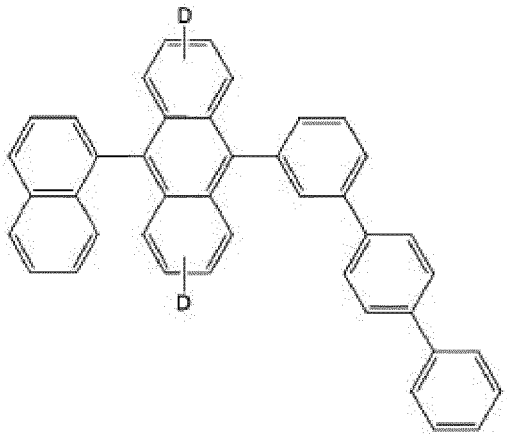
[Formel 11]



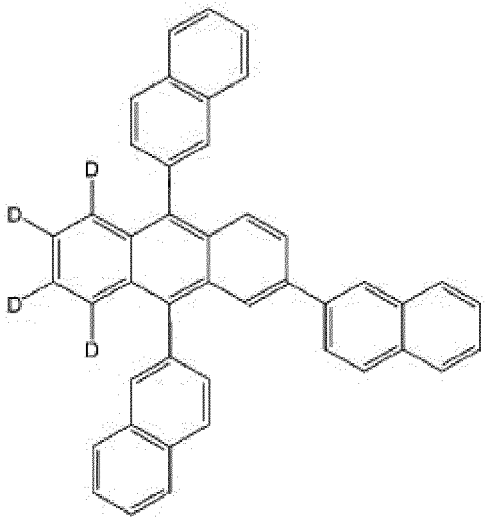
[Formel 12]



[Formel 13]



[Formel 14]



wobei D Deuterium ist.

2. Organisches Material nach Anspruch 1, weiterhin umfassend ein Dotantenmaterial.

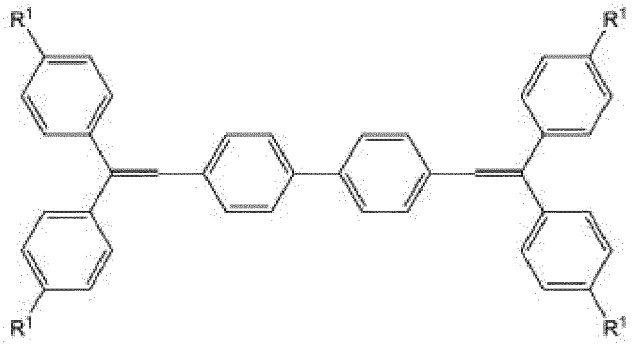
3. Organisches Material nach Anspruch 2, wobei das Dotantenmaterial ein substituiertes oder unsubstituiertes Styrol, ein substituiertes oder unsubstituiertes Perylen, ein substituiertes oder unsubstituiertes Pyren, ein substituiertes oder unsubstituiertes Arylethylbenzol, ein substituiertes oder unsubstituiertes para-Phenylen, ein substituiertes oder unsubstituiertes Thiophen, einen Chelat-Metall-Komplex, oder Kombinationen davon umfasst.

4. Organisches Material nach den Ansprüchen 2 oder 3, wobei das Dotantenmaterial mit einem oder mehreren Deuteriumatomen substituiert ist.

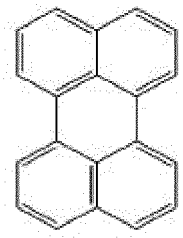
5. Organisches Material nach Anspruch 2, wobei das Dotantenmaterial ein Anthracenderivat, das weiterhin mit einem oder mehreren Deuteriumatomen substituiert ist, umfasst.

6. Organisches Material nach Anspruch 2, wobei das Dotantenmaterial mindestens eines, ausgewählt aus Verbindungen, dargestellt durch Formel 15 bis Formel 22 und Formel 14, umfasst:

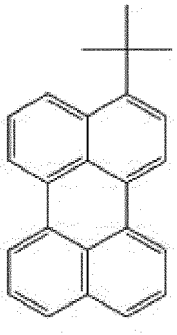
[Formel 15]



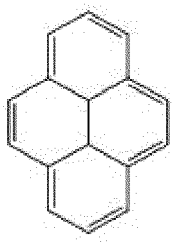
[Formel 16]



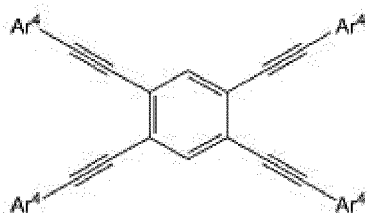
[Formel 17]



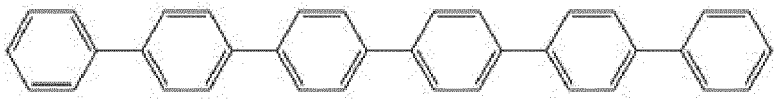
[Formel 18]



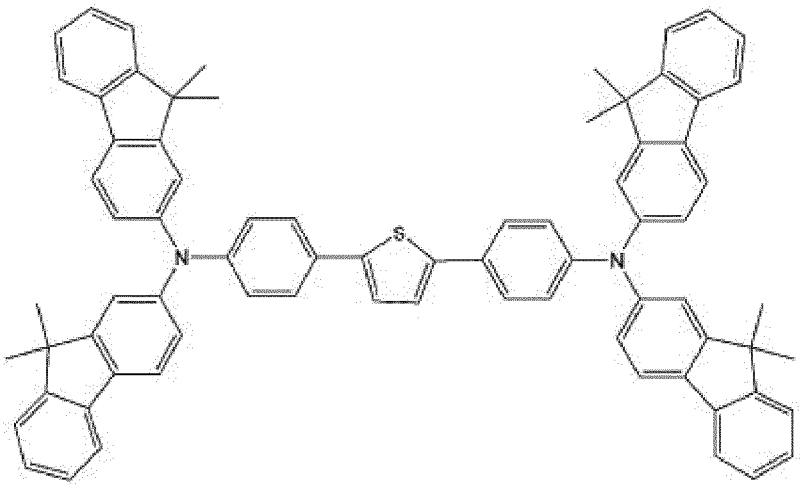
[Formel 19]



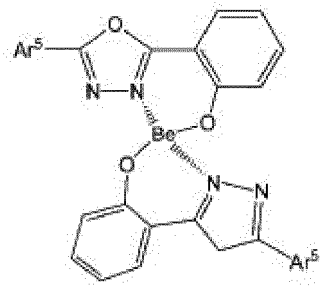
[Formel 20]



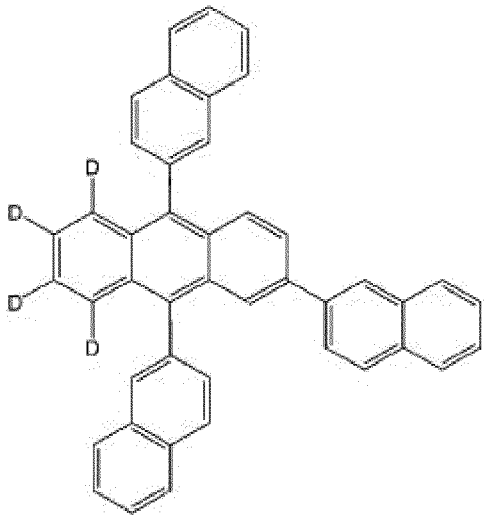
[Formel 21]



[Formel 22]

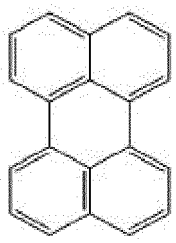


[Formel 14]

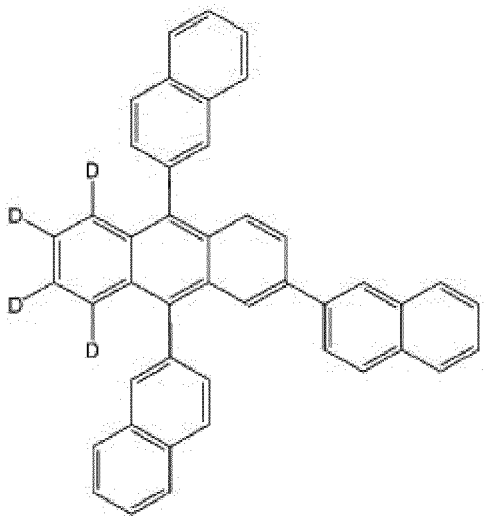


7. Organisches Material nach Anspruch 6, wobei das Dotantenmaterial mindestens eines, ausgewählt aus Verbindungen, dargestellt durch Formel 16 und Formel 14, umfasst:

[Formel 16]



[Formel 14]



8. Organische lichtemittierende Diode, umfassend:

erste und zweite Elektrode (120, 160), die einander gegenüberliegen; und
eine organische Schicht, eingefügt zwischen der ersten und zweiten Elektrode (120, 160),
dadurch gekennzeichnet, dass die organische Schicht ein organisches Material nach einem der Ansprüche 1 bis 7 umfasst.

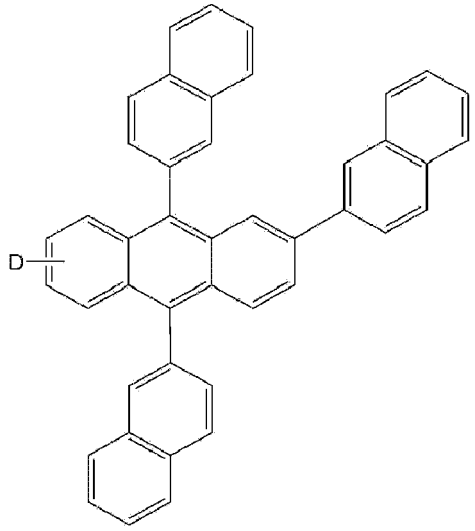
9. Organische lichtemittierende Diode nach Anspruch 8, wobei die organische Schicht eine organische Emissionsschicht ist.

10. Verwendung eines organischen Materials nach einem der Ansprüche 1 bis 7 in einer organischen lichtemittierenden Diode (OLED).

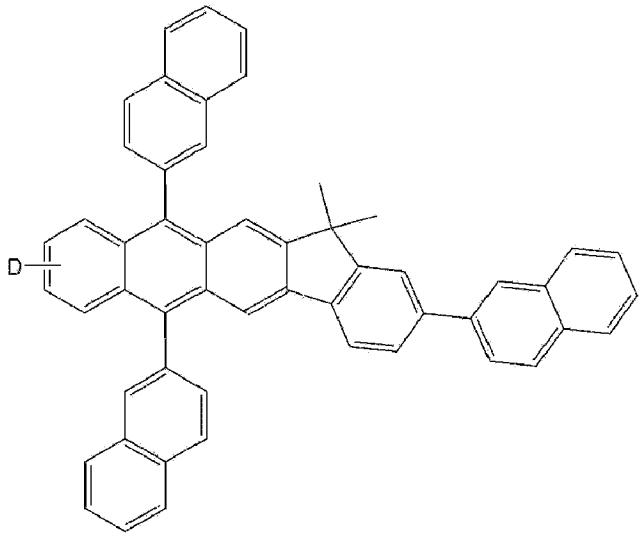
Revendications

1. Matériau organique pour un affichage à diodes électroluminescentes organiques (OLED), comprenant un dérivé d'anthracène dont au moins un constituant est substitué par du deutérium,
caractérisé en ce que le dérivé d'anthracène est choisi parmi les composés représentés par les formules 2 à 14 :

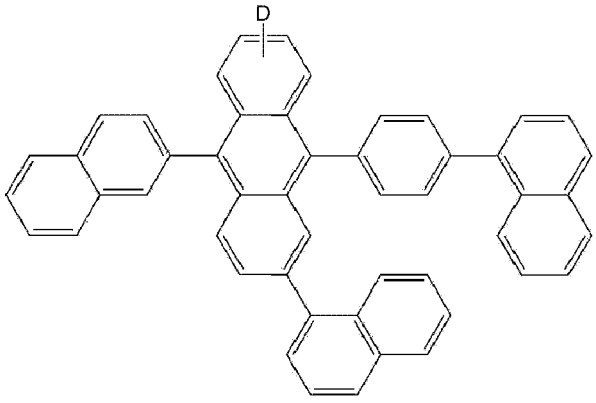
[Formule 2]



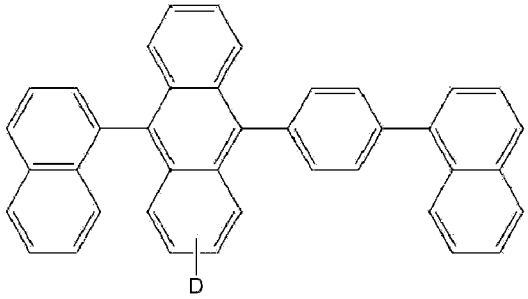
[Formule 3]



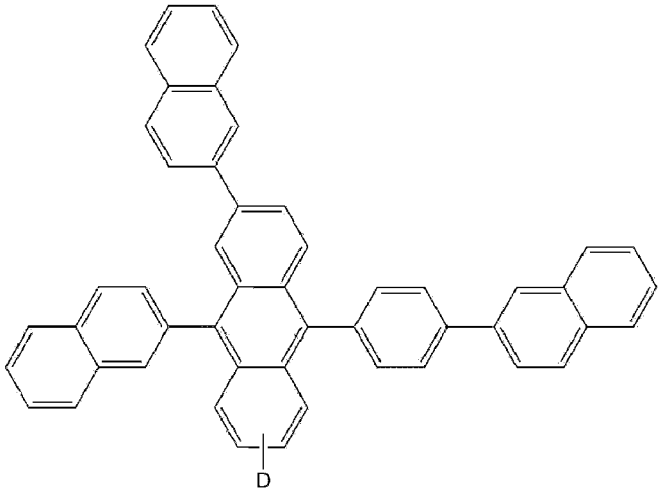
[Formule 4]



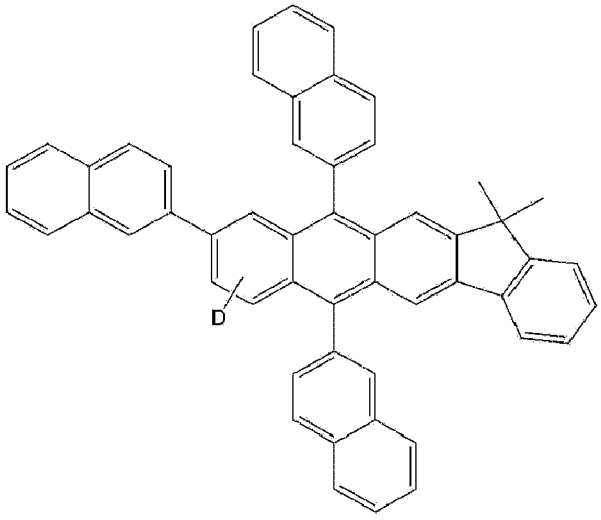
[Formule 5]



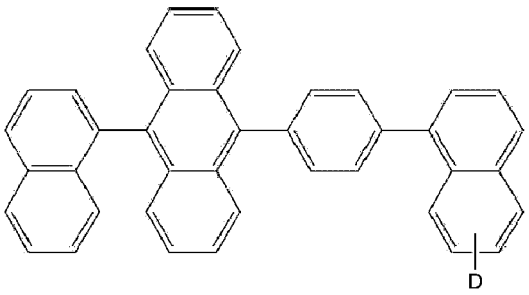
[Formule 6]



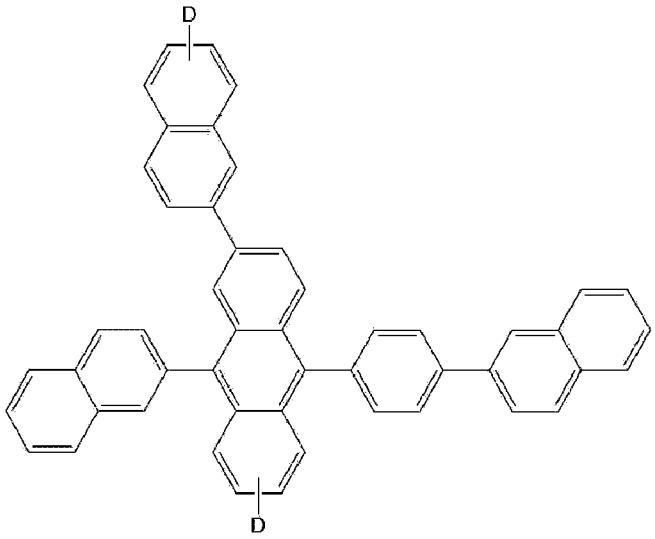
[Formule 7]



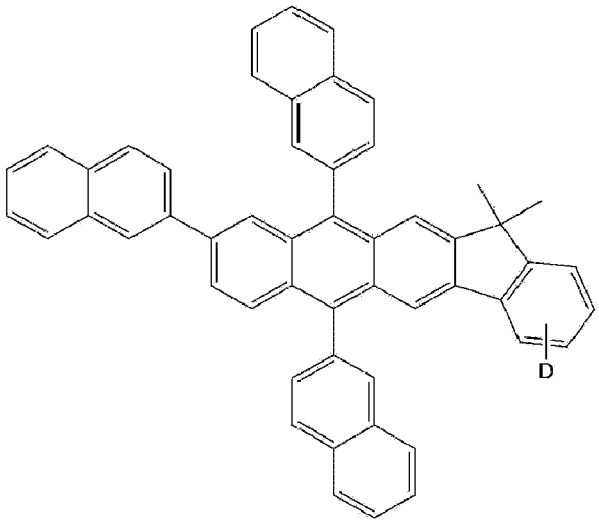
[Formule 8]



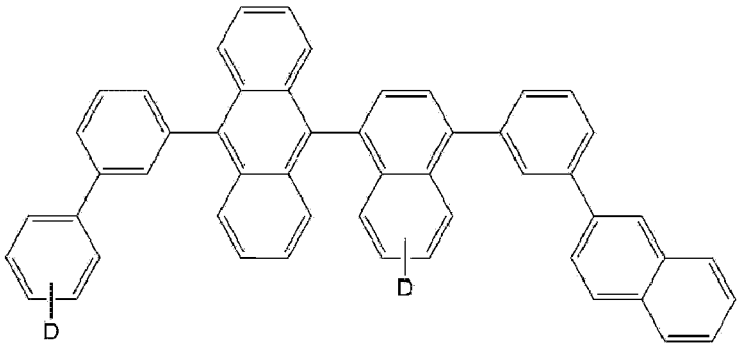
[Formule 9]



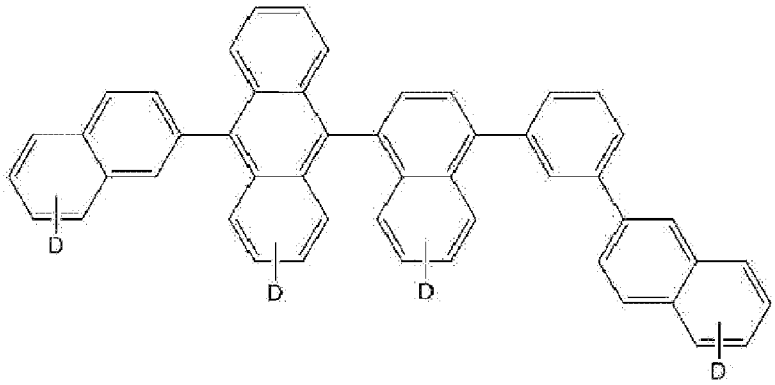
[Formule 10]



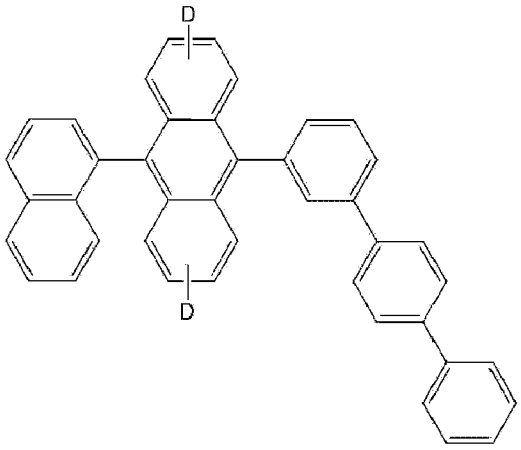
[Formule 11]



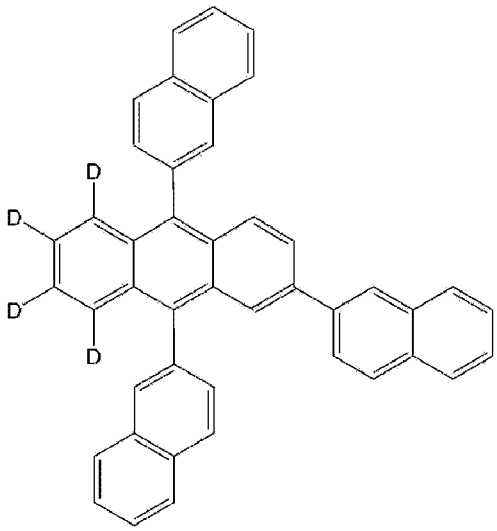
[Formule 12]



[Formule 13]



[Formule 14]



dans lesquelles D est le deutérium.

2. Matériau organique selon la revendication 1, comprenant en outre un matériau dopant.

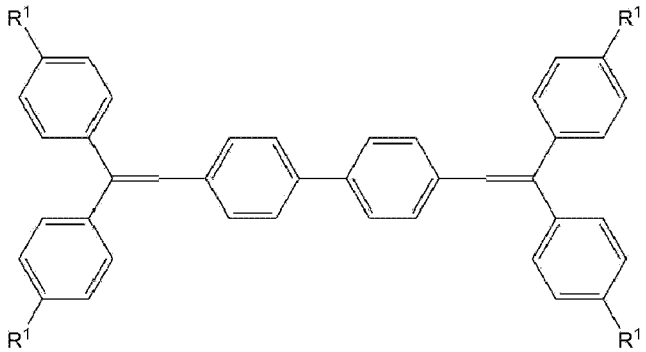
3. Matériau organique selon la revendication 2, dans lequel le matériau dopant comprend un styrène substitué ou non substitué, un pérylène substitué ou non substitué, un pyrène substitué ou non substitué, un aryléthylbenzène substitué ou non substitué, un paraphénylène substitué ou non substitué, un thiophène substitué ou non substitué, un complexe de métal et de chélate, ou leurs combinaisons.

4. Matériau organique selon la revendication 2 ou 3, dans lequel le matériau dopant est substitué par un ou plusieurs atomes de deutérium.

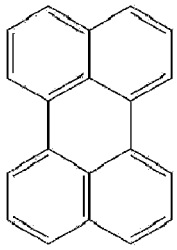
5. Matériau organique selon la revendication 2, dans lequel le matériau dopant comprend un dérivé d'anthracène encore substitué par un ou plusieurs atomes de deutérium.

6. Matériau organique selon la revendication 2, dans lequel le matériau dopant comprend au moins l'un choisi parmi les composés représentés par les formules 15 à 22 et la formule 14

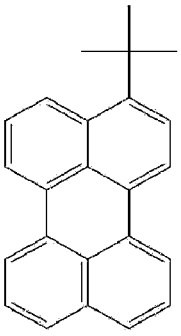
[Formule 15]



[Formule 16]

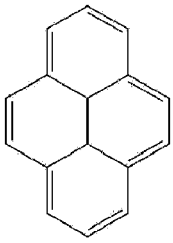


[Formule 17]

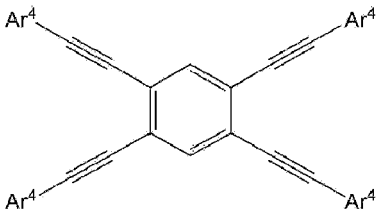


11166396.9

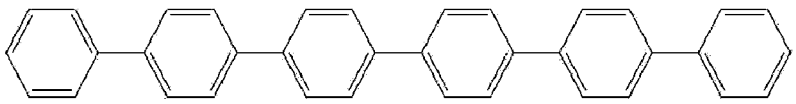
[Formule 18]



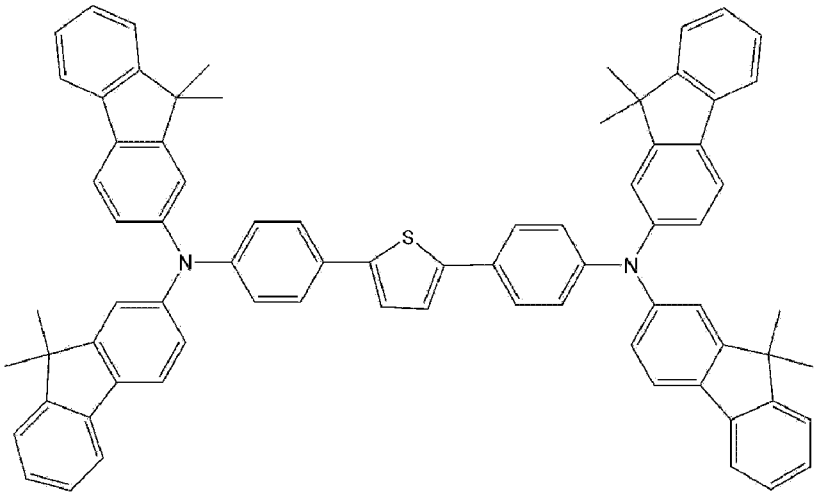
[Formule 19]



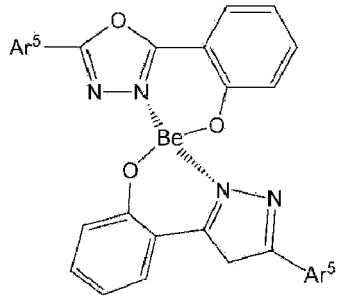
[Formule 20]



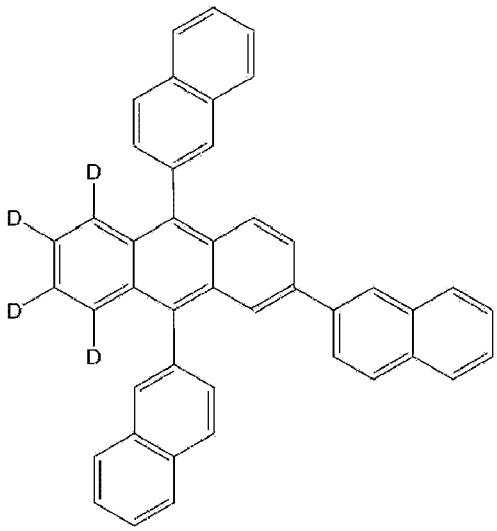
[Formule 21]



[Formule 22]

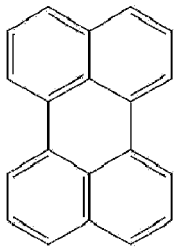


[Formule 14]

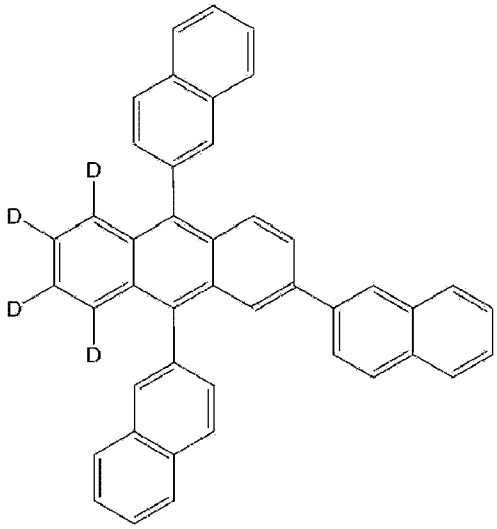


7. Matériau organique selon la revendication 6, dans lequel le matériau dopant comprend au moins l'un choisi parmi les composés représentés par la formule 16 et la formule 14

[Formule 16]



[Formule 14]



8. Affichage à diodes électroluminescentes organiques comprenant :

des première et deuxième électrodes (120, 160) qui se font mutuellement face ; et
une couche organique interposée entre les première et deuxième électrodes (120, 160),
caractérisé en ce que la couche organique comprend un matériau organique selon l'une quelconque des revendications 1 à 7.

9. Affichage à diodes électroluminescentes organiques selon la revendication 8, dans lequel la couche organique est une couche d'émission organique.

10. Utilisation d'un matériau organique selon l'une quelconque des revendications 1 à 7 dans un affichage à diodes électroluminescentes organiques (OLED).

FIG.1

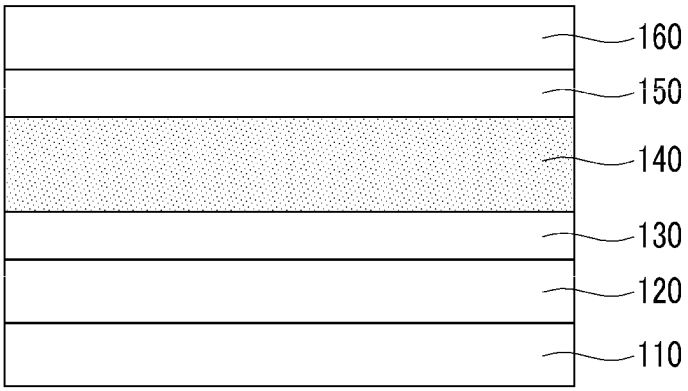


FIG.2

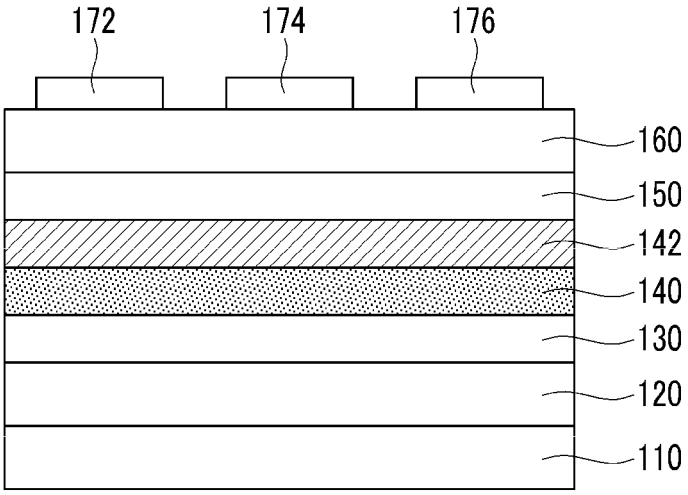
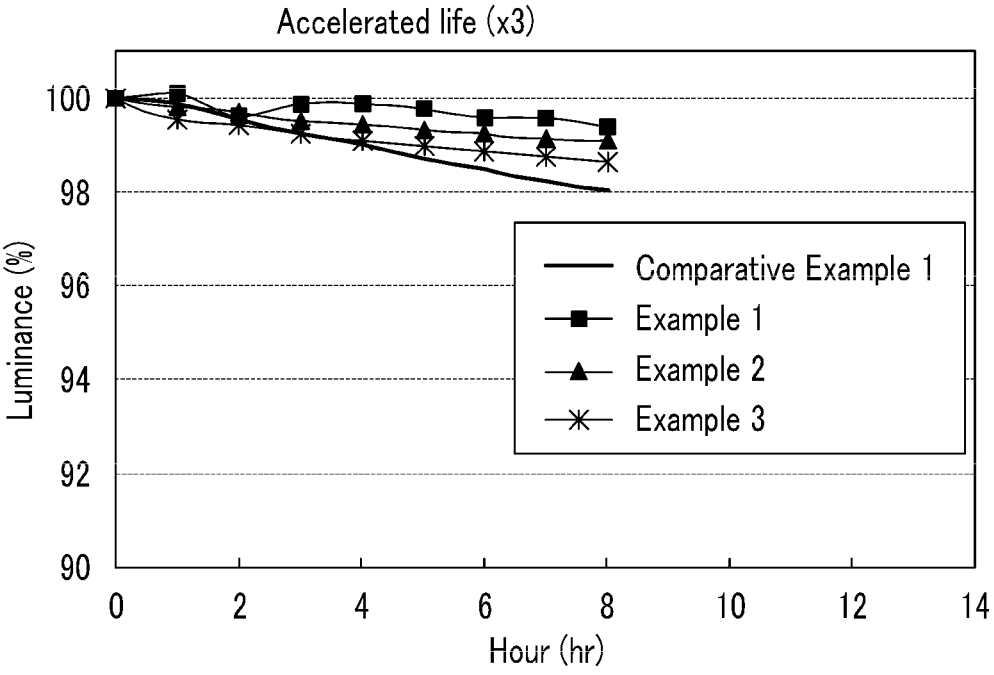


FIG.3


Accelerated life (x3)
Luminance (%)
100
98
96
94
92
90
0
2
4
6
8
10
12
14
Hour (hr)
Comparative Example 1
Example 1
Example 2
Example 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2031037 A1 **[0005]**
- US 2006115678 A1 **[0006]**
- WO 2005000787 A1 **[0007]**
- WO 2010071362 A2 **[0008]**
- WO 2010099534 A **[0009]**

专利名称(译)	有机材料和使用它的有机发光二极管显示器		
公开(公告)号	EP2388843B1	公开(公告)日	2019-08-07
申请号	EP2011166396	申请日	2011-05-17
[标]申请(专利权)人(译)	三星显示有限公司		
申请(专利权)人(译)	三星移动显示器有限公司.		
当前申请(专利权)人(译)	三星DISPLAY CO.，LTD.		
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IPC分类号	H01L51/54 H01L51/46		
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代理机构(译)	RUSSELL，TIM		
优先权	1020100046507 2010-05-18 KR		
其他公开文献	EP2388843A3 EP2388843A2		
外部链接	Espacenet		

摘要(译)

提供用于有机发光二极管（OLED）显示器的有机材料，以及包含该有机材料的OLED显示器，并且所述有机材料包括含有至少一个氘原子的蒽衍生物。

[Formula 2]