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Sakamoto

(54) **MATERIAL FOR ORGANIC ELECTROLUMINESCENCE DEVICE AND ORGANIC ELECTROLUMINESCENCE DEVICE USING THE SAME**

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C07C 211/61	(2006.01)
C07C 211/56	(2006.01)
C07C 255/58	(2006.01)
C07C 217/80	(2006.01)
C07D 213/36	(2006.01)
C07C 211/54	(2006.01)
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(52) **U.S. Cl.**

CPC ***H01L 51/0059*** (2013.01); ***C07C 211/54*** (2013.01); ***C07C 211/58*** (2013.01); ***C07D 307/91*** (2013.01); ***C07D 333/76*** (2013.01); ***C07F 7/081*** (2013.01); ***C07C 211/61*** (2013.01); ***C07C 211/56*** (2013.01); ***C07C 255/58*** (2013.01); ***C07C 217/80*** (2013.01); ***C07D 213/36*** (2013.01); ***C09K 11/06*** (2013.01); ***H01L 51/006*** (2013.01); ***H01L 51/0061*** (2013.01); ***H01L 51/0094*** (2013.01); ***H01L 51/0067*** (2013.01); *C09K 2211/1014* (2013.01); *C09K 2211/1007* (2013.01); *C09K 2211/1011* (2013.01); *C09K 2211/1088* (2013.01); *C09K 2211/1092* (2013.01); *C09K 2211/1029* (2013.01); *H01L 51/0073* (2013.01); *H01L 51/0074* (2013.01); *H01L 51/0052* (2013.01); *H01L 51/0054* (2013.01); *H01L 2251/308* (2013.01); *H01L 51/5206* (2013.01)

(57) **ABSTRACT**

A compound for an organic electroluminescence device and an organic electroluminescence device, the compound being represented by the following Chemical Formula 1:

[Chemical Formula 1]

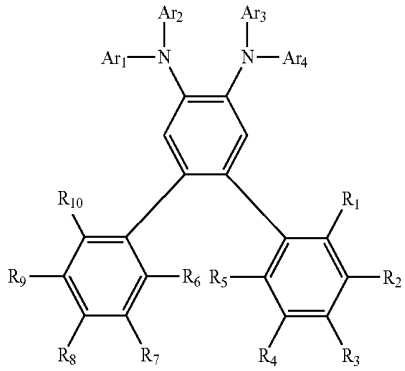
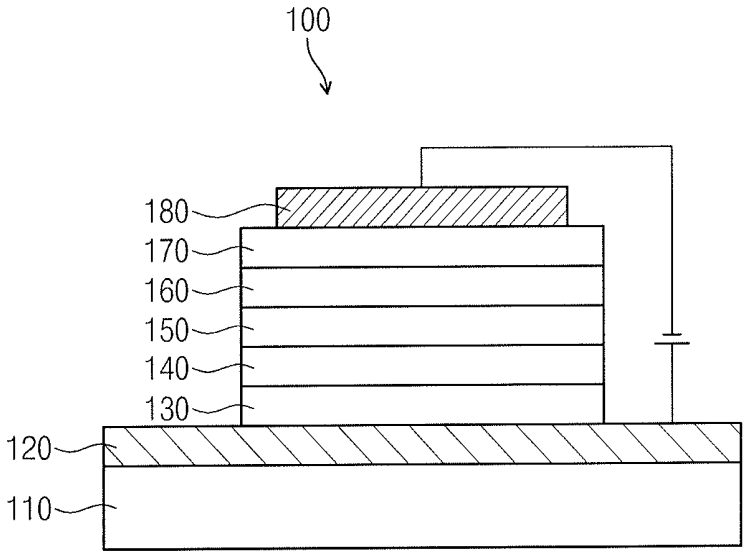


FIG. 1



MATERIAL FOR ORGANIC ELECTROLUMINESCENCE DEVICE AND ORGANIC ELECTROLUMINESCENCE DEVICE USING THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

[0001] Japanese Patent Application No. 2014-133854, filed on Jun. 30, 2014, in the Japanese Patent Office, and entitled: "Material for Organic Electroluminescence Device and Organic Electroluminescence Device Using the Same," is incorporated by reference herein in its entirety.

BACKGROUND

[0002] 1. Field

[0003] Embodiments relate to a material for an organic electroluminescence device and an organic electroluminescence device using the same.

[0004] 2. Description of the Related Art

[0005] In recent years, organic electroluminescence displays have been actively developed. An organic electroluminescence device that is a self-luminescent device used in the organic electroluminescence displays has been actively developed.

[0006] An organic electroluminescence device may have a structure that includes a positive electrode, a hole transport layer disposed on the positive electrode, an emission layer disposed on the hole transport layer, an electron transport layer disposed on the emission layer, and a negative electrode disposed on the electron transport layer.

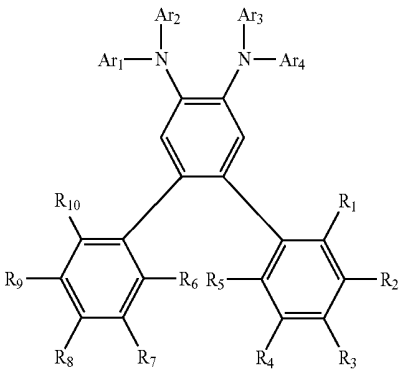
[0007] In the organic electroluminescence device, holes and electrons injected from the positive electrode and the negative electrode are recombined in the emission layer to generate excitons and transit the generated excitons to a ground state, thereby emitting light.

SUMMARY

[0008] Embodiments are directed to a material for an organic electroluminescence device and an organic electroluminescence device using the same.

[0009] The embodiments may be realized by providing a compound for an organic electroluminescence device, the compound being represented by the following Chemical Formula 1:

[Chemical Formula 1]



[0010] wherein, in Chemical Formula 1, Ar_1 to Ar_4 are each independently a substituted or unsubstituted aryl group or a substituted or unsubstituted heteroaryl group, at least one of Ar_1 to Ar_4 is a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms, R_1 to R_{10} are each independently a hydrogen atom, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkoxy group, a halogen atom, an electron suction group, or a deuterium atom, and adjacent ones of R_1 to R_{10} are separate or are combined to each other to form a saturated or unsaturated ring.

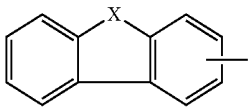
[0011] The aryl group having 10 or more ring carbon atoms may include a biphenyl group, a naphthyl group, a phenanthrenyl group, or a triphenylenyl group.

[0012] The aryl group having 10 or more ring carbon atoms may include the biphenyl group.

[0013] The heteroaryl group having 10 or more ring carbon atoms may include a dibenzohetero group.

[0014] The dibenzohetero group may be a group represented by the following Chemical Formula 2:

[Chemical Formula 2]

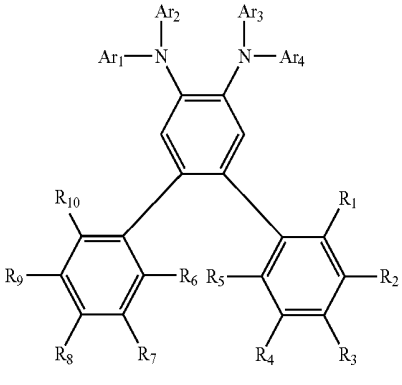


[0015] wherein, in Chemical Formula 2, X may be O, S, or $Si(R_{11})_2$, and R_{11} may be a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

[0016] Ar_1 to Ar_4 may each independently be a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms.

[0017] The embodiments may be realized by providing an organic electroluminescence device, including a compound for an organic electroluminescence device, the compound being represented by the following Chemical Formula 1:

[Chemical Formula 1]



[0018] wherein, in Chemical Formula 1, Ar_1 to Ar_4 are each independently a substituted or unsubstituted aryl group or a substituted or unsubstituted heteroaryl group, at least one of Ar_1 to Ar_4 is a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms, R_1 to R_{10} are each independently a hydrogen atom, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkoxy group, a halogen atom, an electron withdrawing group, or a deuterium atom, and adjacent ones of R_1 to R_{10} are separate or are combined to each other to form a saturated or unsaturated ring.

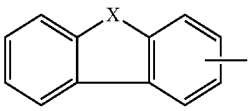
[0019] The aryl group having 10 or more ring carbon atoms may include a biphenyl group, a naphthyl group, a phenanthrenyl group, or a triphenylenyl group.

[0020] The aryl group having 10 or more ring carbon atoms may include a biphenyl group.

[0021] The heteroaryl group having 10 or more ring carbon atoms may include a dibenzohetero group.

[0022] The dibenzohetero group may be a group represented by the following Chemical Formula 2:

[Chemical Formula 2]

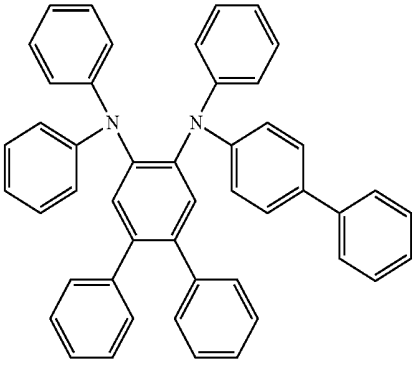


[0023] wherein, in Chemical Formula 2, X may be O, S, or $Si(R_{11})_2$, and R_{11} may be a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

[0024] Ar_1 to Ar_4 may each independently be a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms.

[0025] The compound for an organic electroluminescence device may include one of the following Compounds 1-1 to 1-24:

1-1



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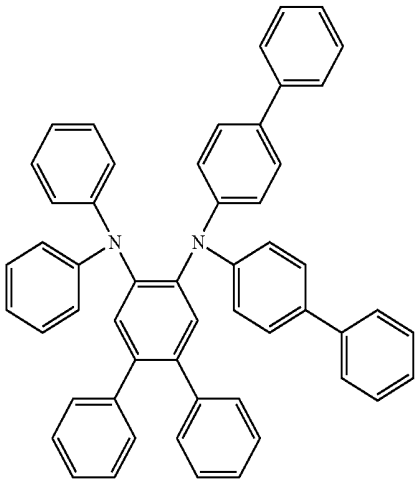
1-2



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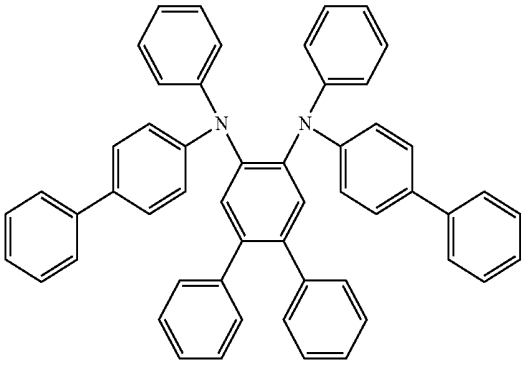

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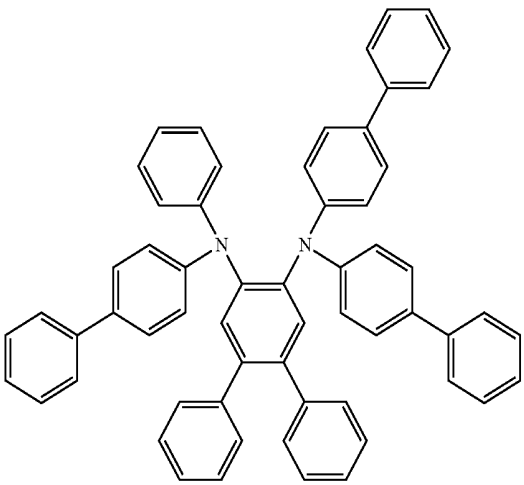

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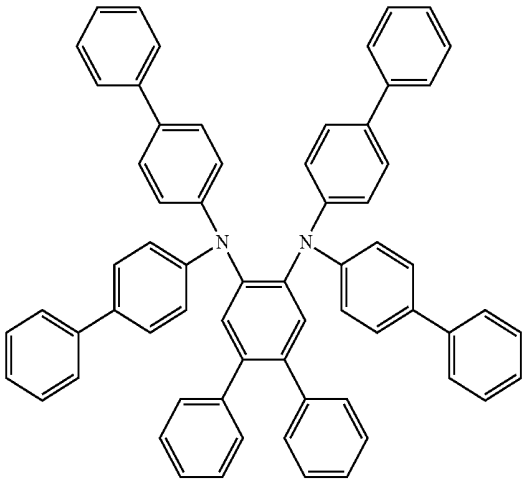

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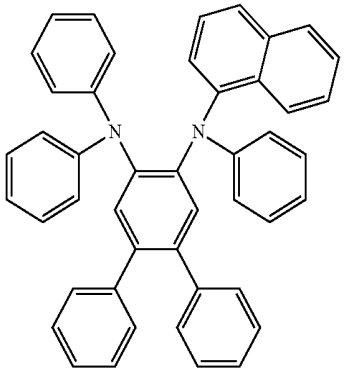

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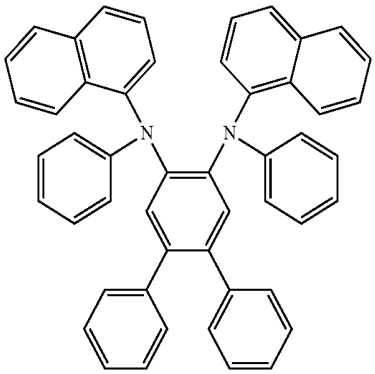

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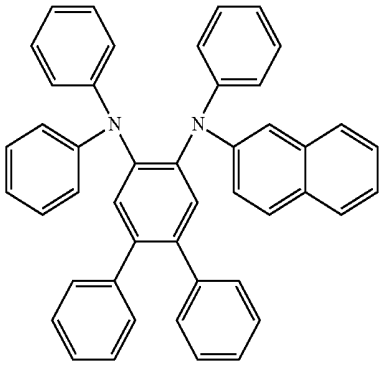

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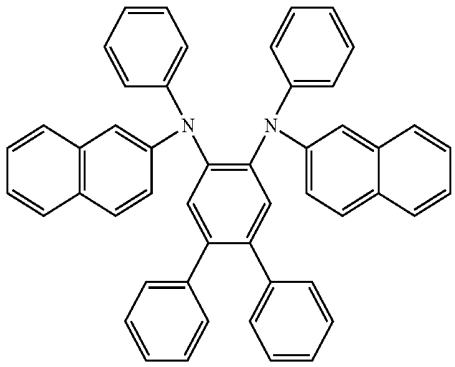

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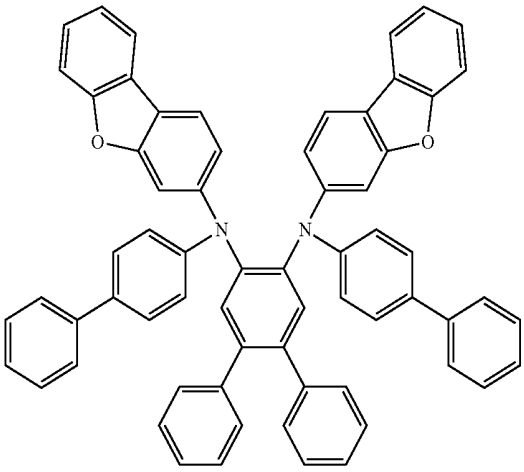

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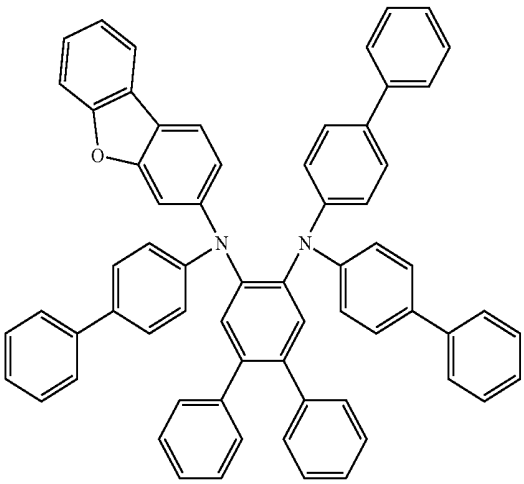

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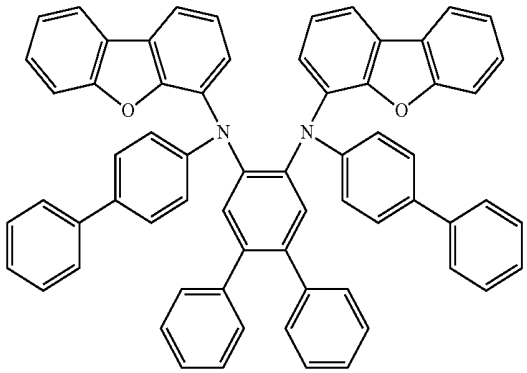

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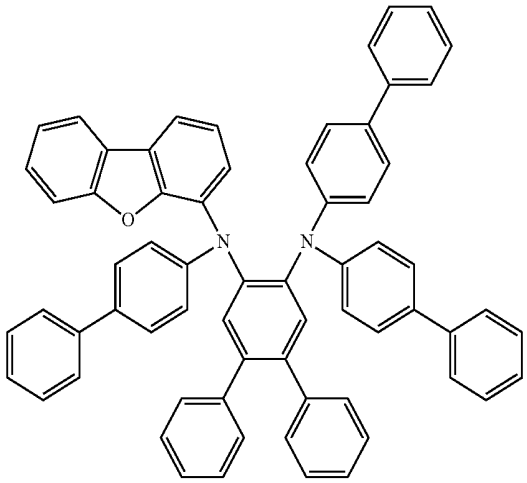

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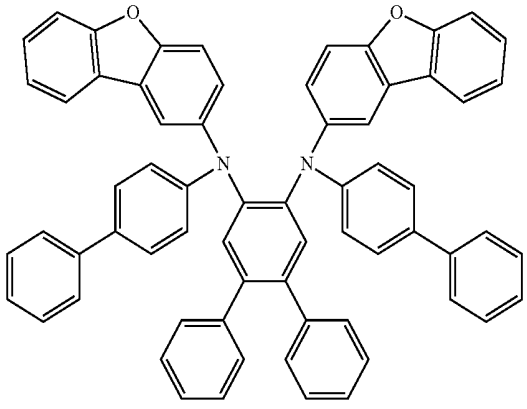

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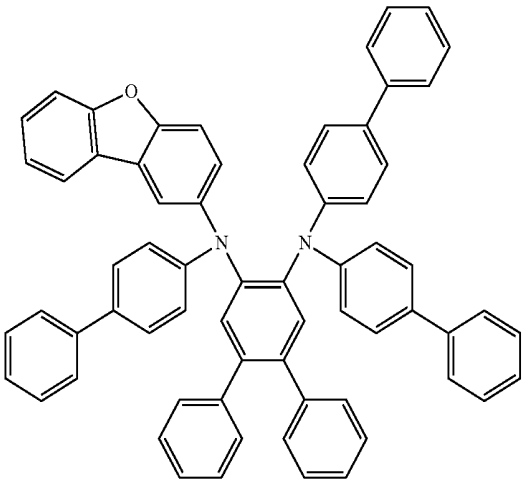

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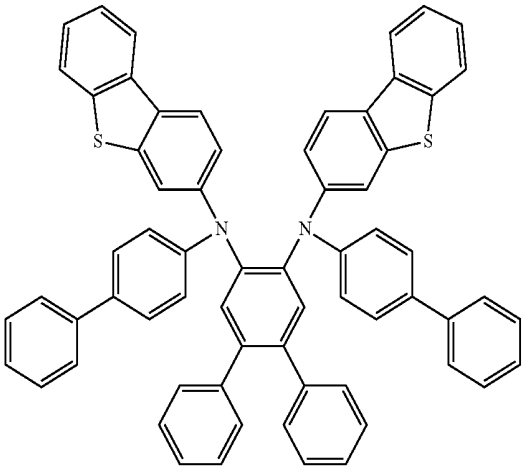

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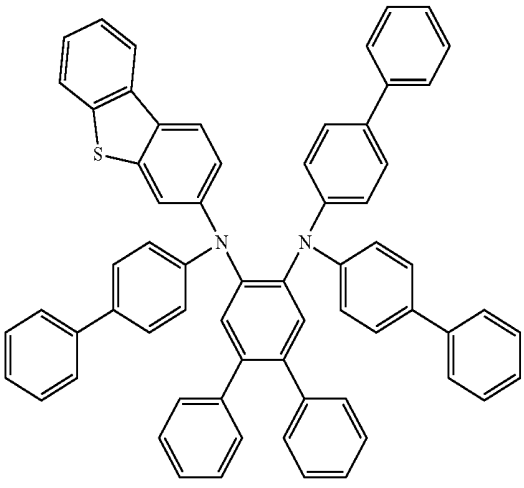

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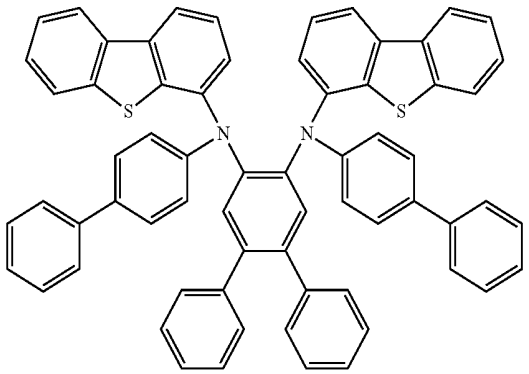

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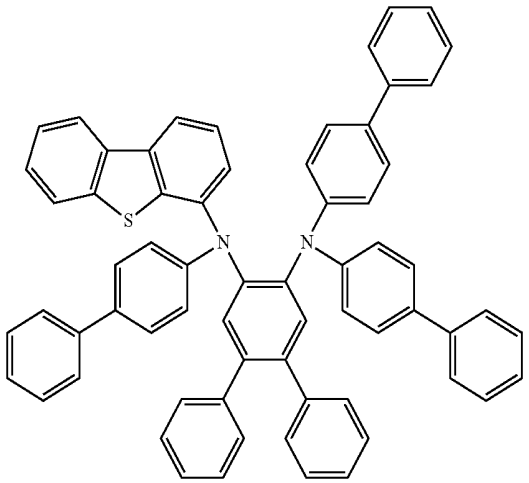

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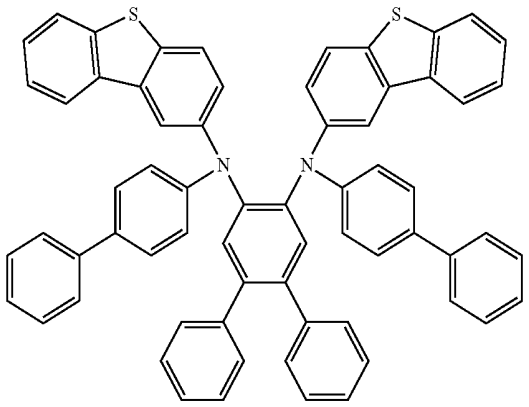

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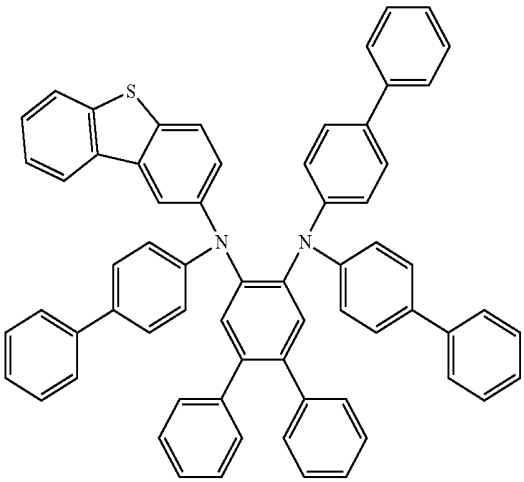

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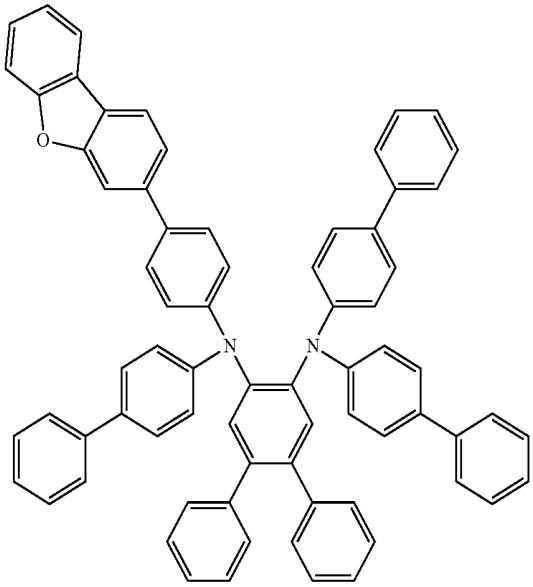

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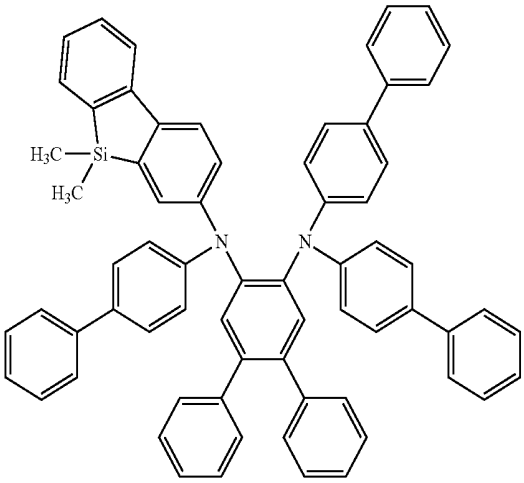

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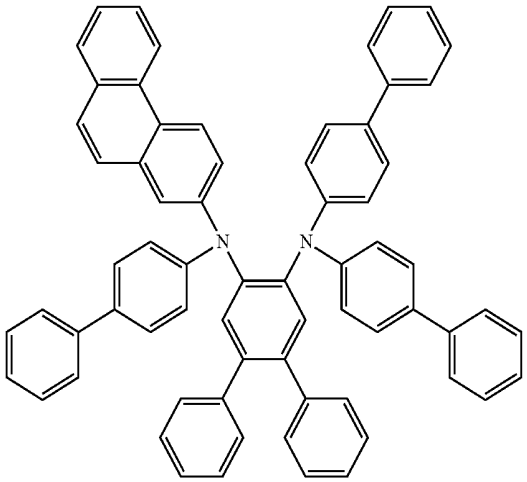
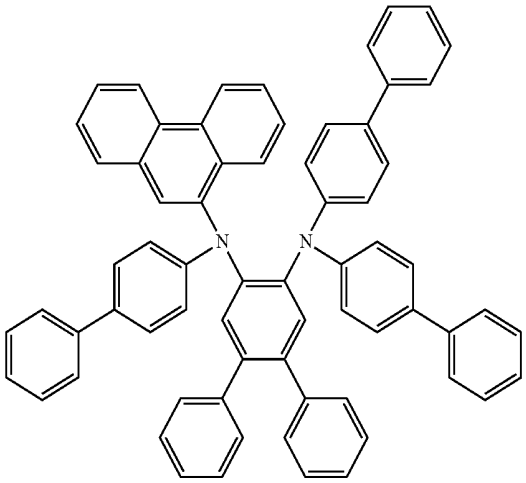


[0026] The compound for an organic electroluminescence device may include one of the following Compounds 1-25 to 1-44:

1-25



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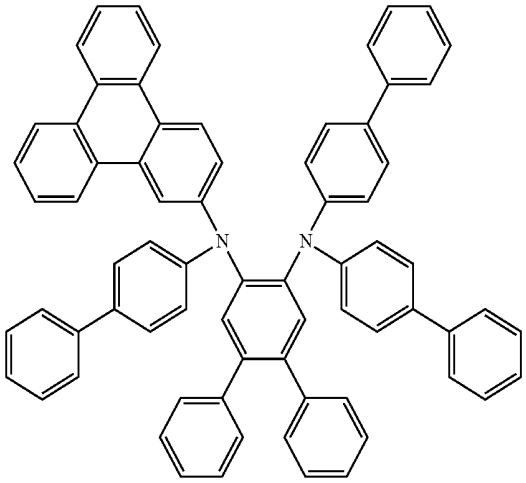

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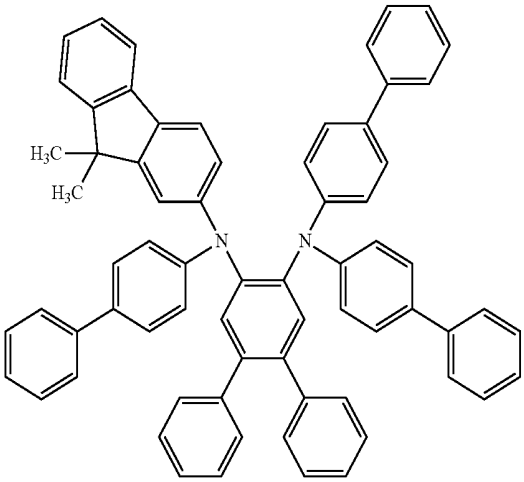

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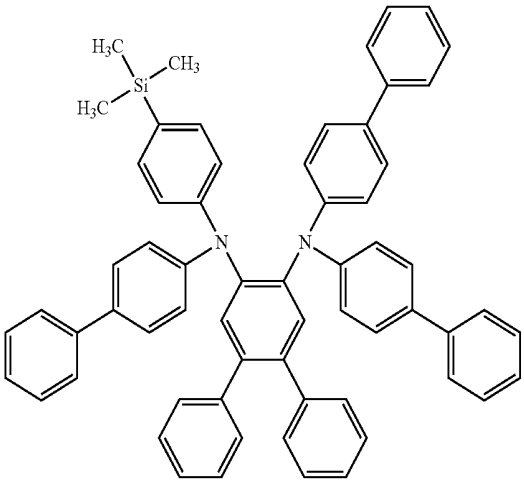

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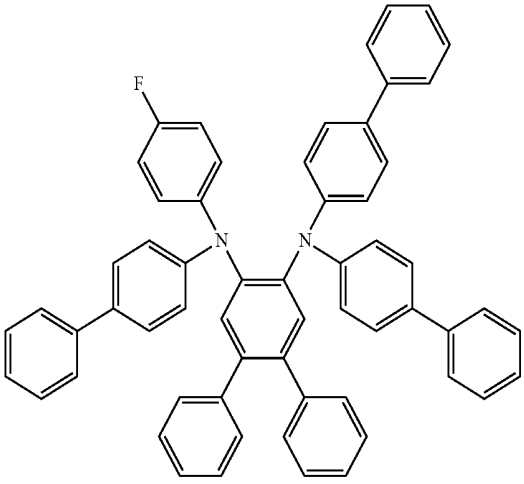

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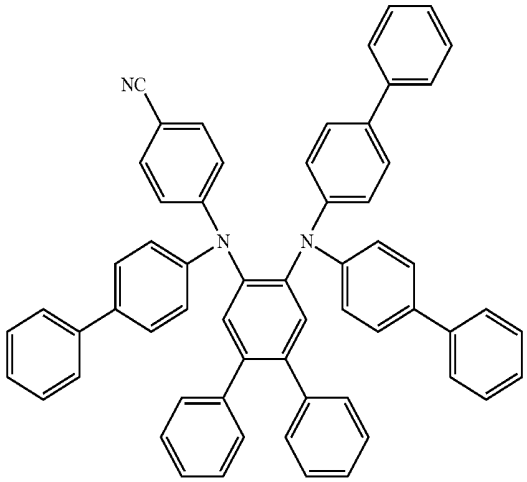

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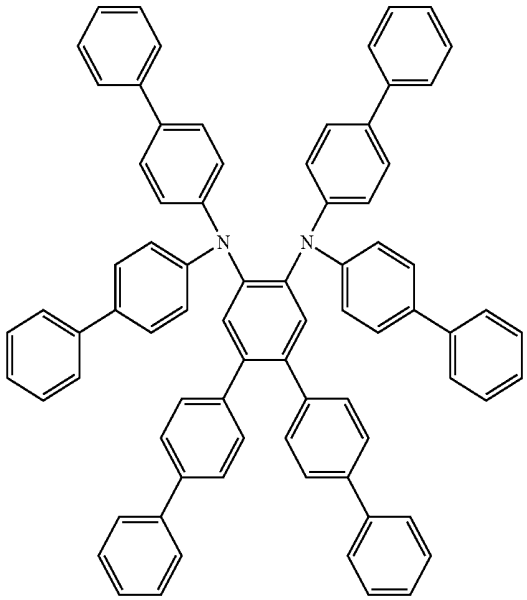

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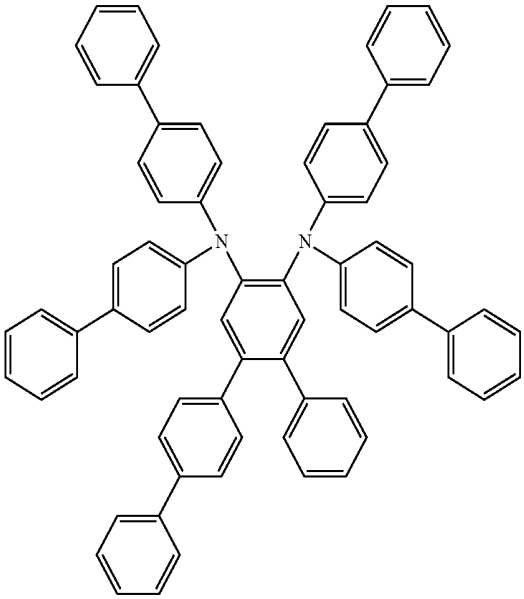

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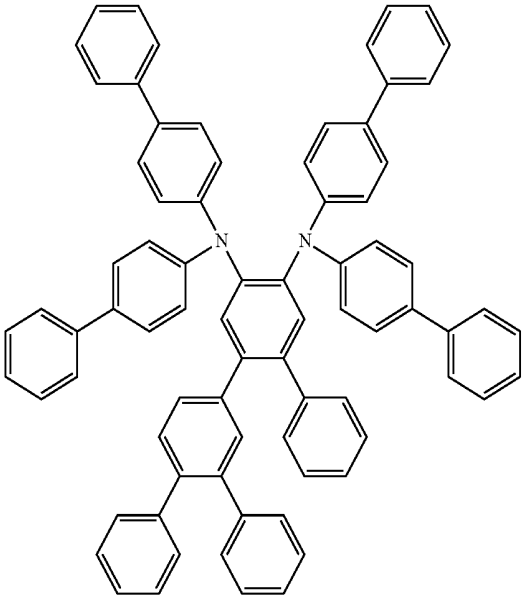

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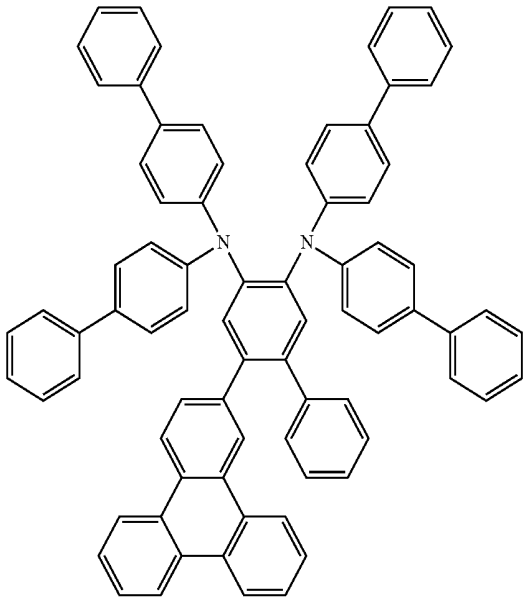

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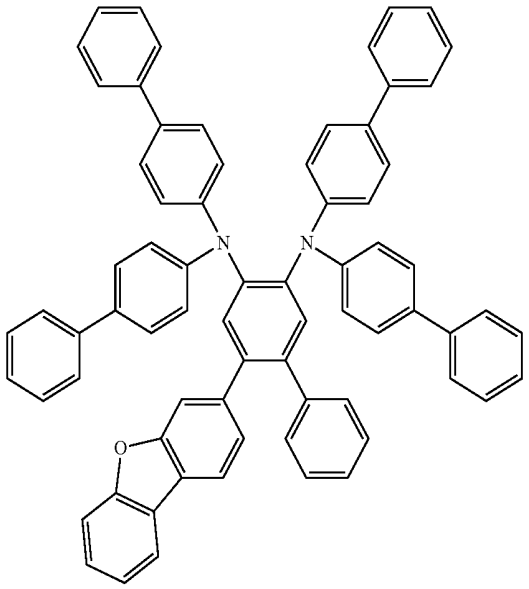

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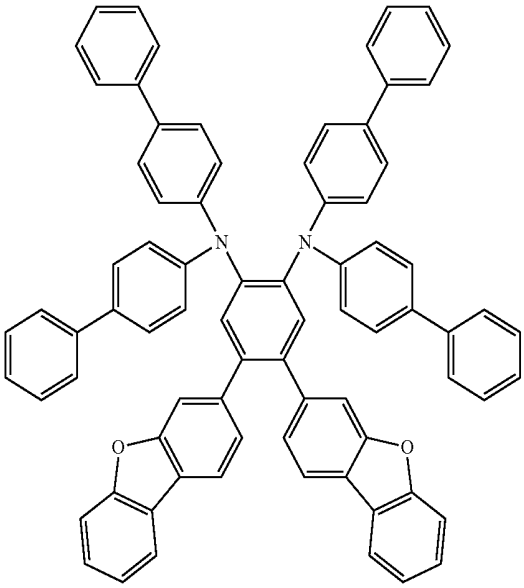

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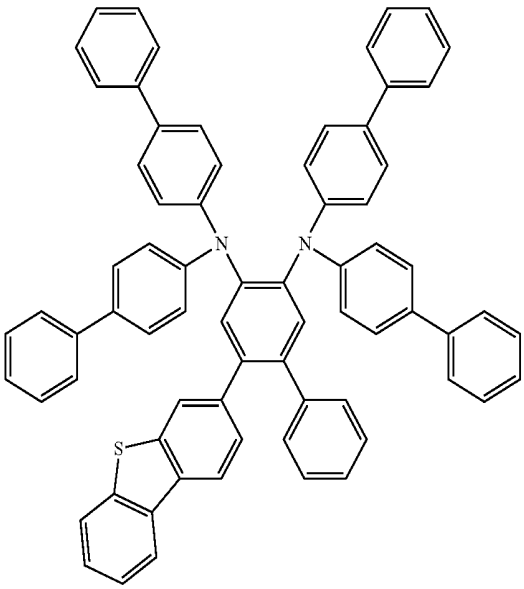

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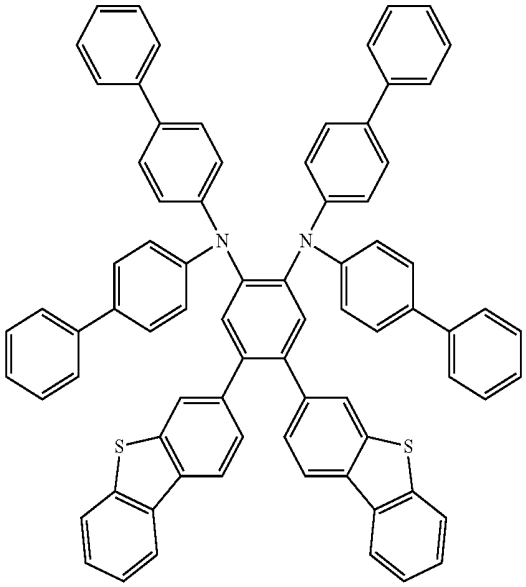

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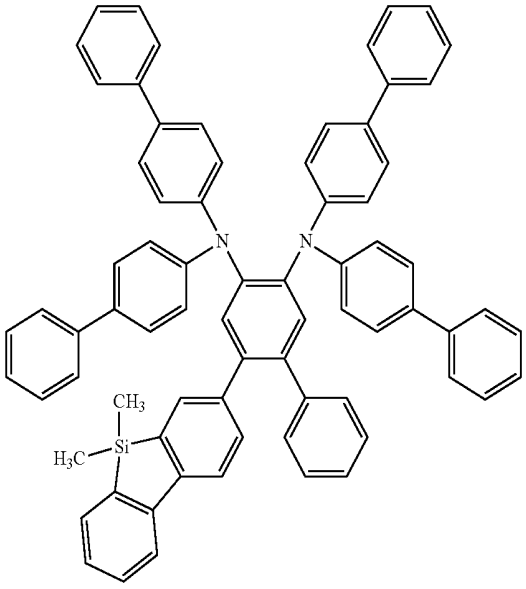

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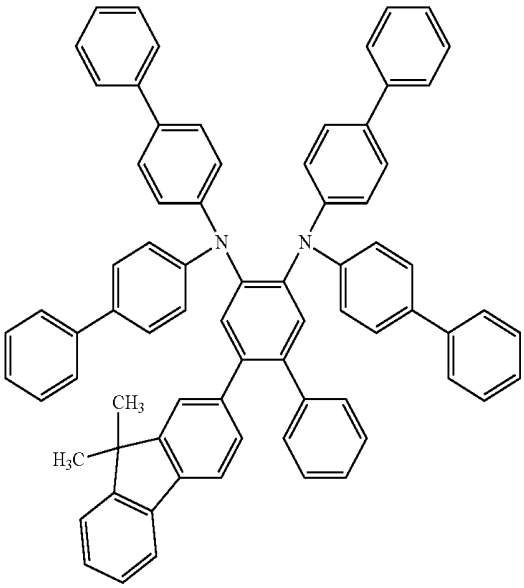

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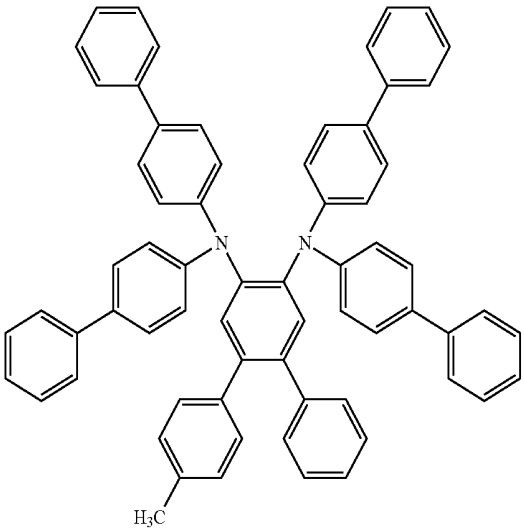

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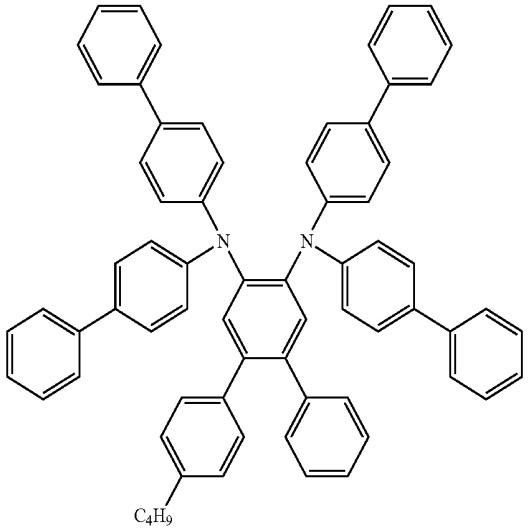

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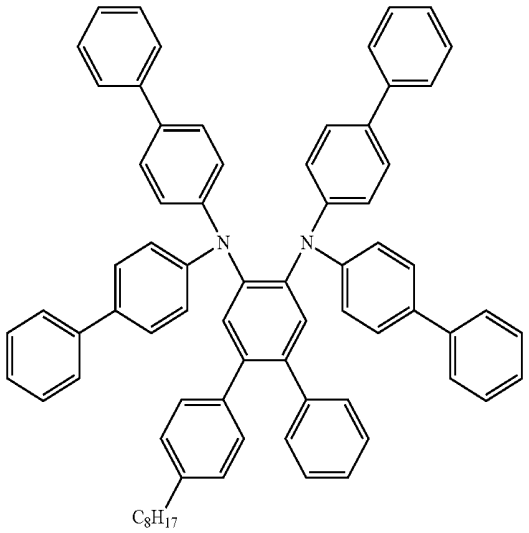

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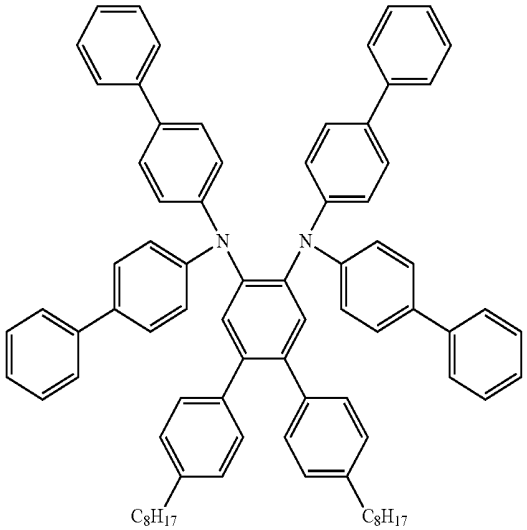
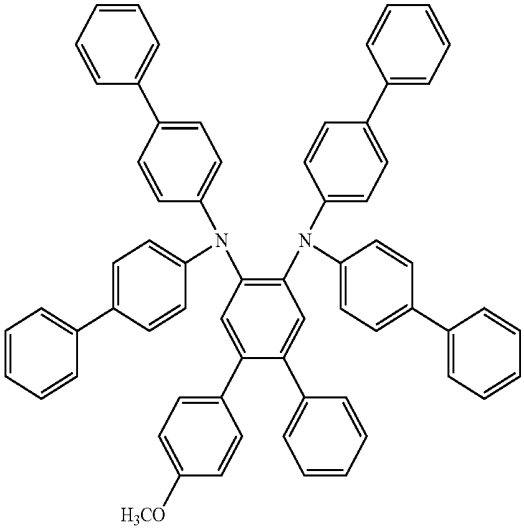


[0027] The compound for an organic electroluminescence device may include one of the following Compounds 1-45 to 1-58:

1-45



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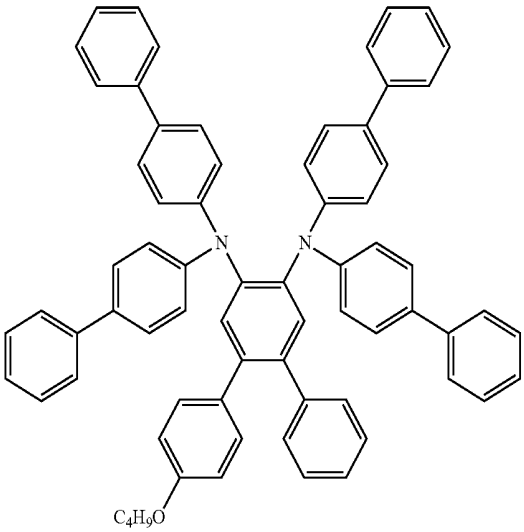

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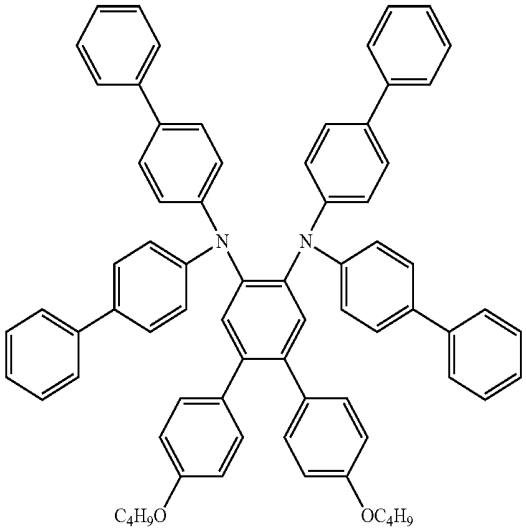

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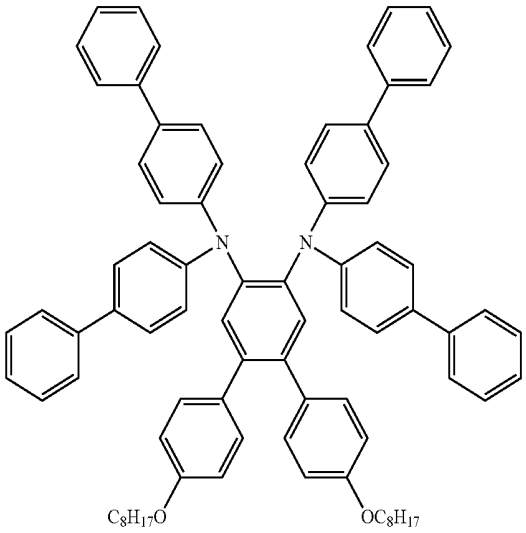

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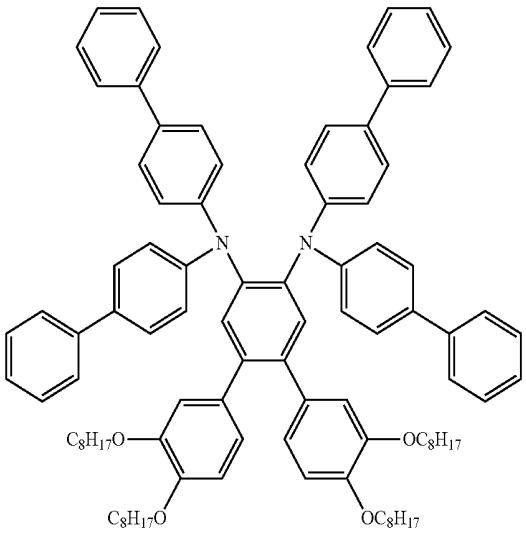

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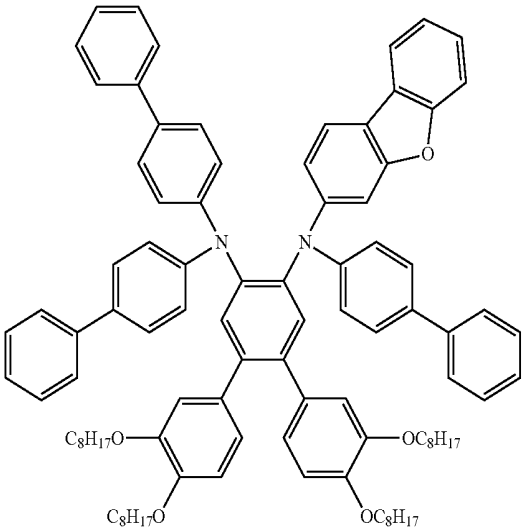

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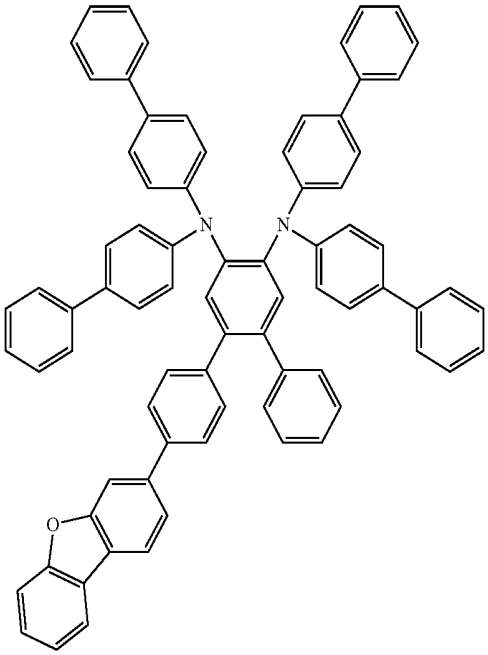

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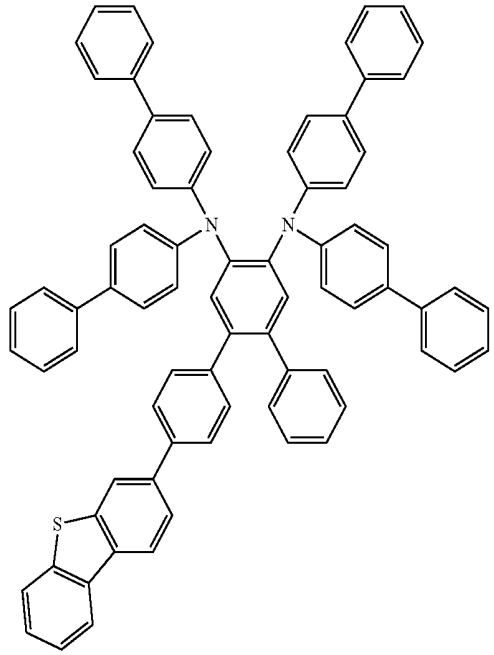

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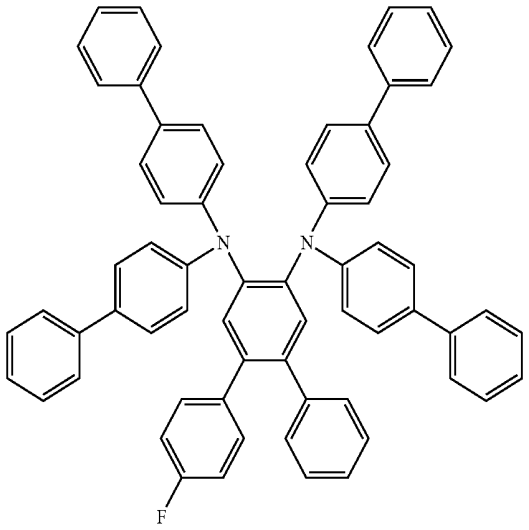

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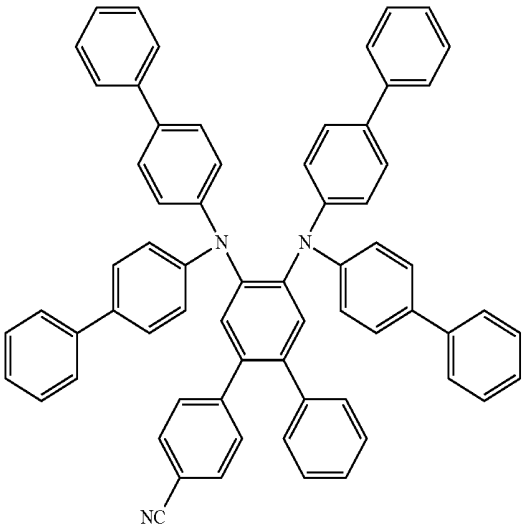

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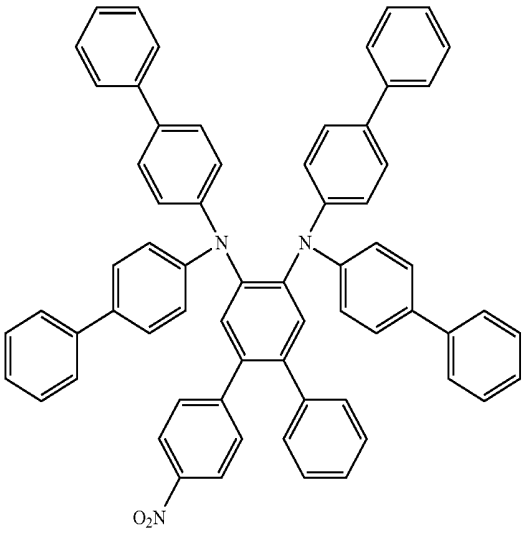

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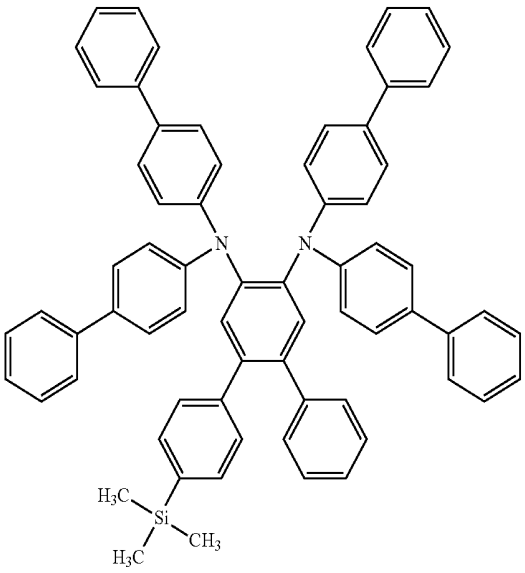

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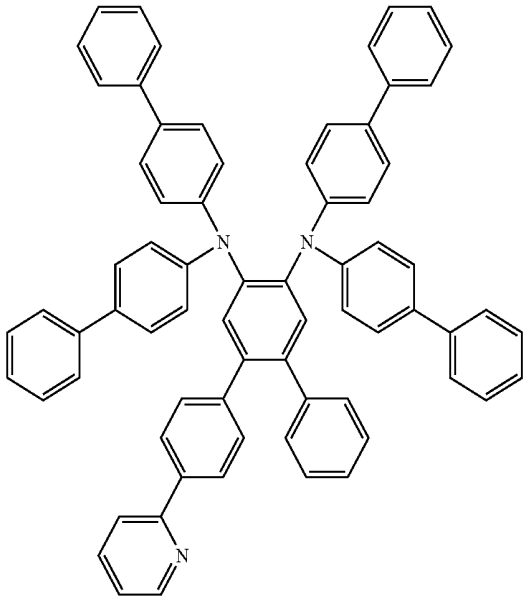
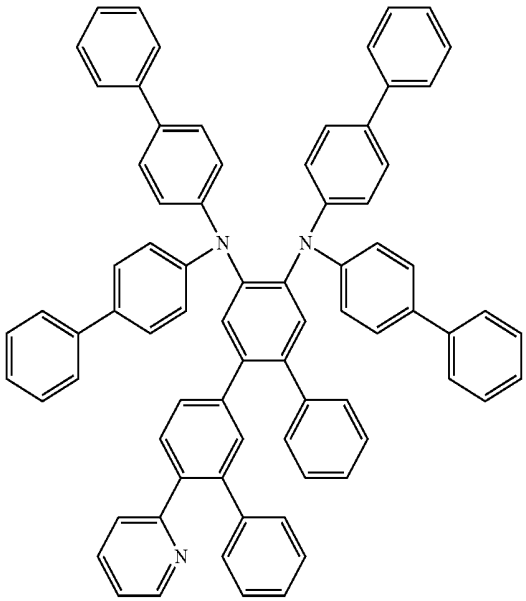


1-58



[0028] The organic electroluminescence device may include a hole transport layer, and the compound for an organic electroluminescence device may be included in the hole transport layer.

BRIEF DESCRIPTION OF THE DRAWING

[0029] Features will be apparent to those of skill in the art by describing in detail exemplary embodiments with reference to the attached drawing in which:

[0030] FIG. **1** illustrates a cross-sectional view of a schematic configuration of an organic light-emitting device according to an embodiment.

DETAILED DESCRIPTION

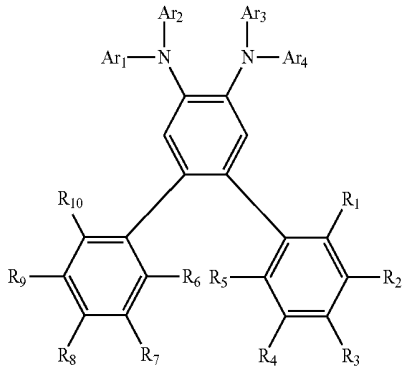
[0031] Example embodiments will now be described more fully hereinafter with reference to the accompanying drawing; however, they may be embodied in different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey exemplary implementations to those skilled in the art.

[0032] In the drawing FIGURE, the dimensions of layers and regions may be exaggerated for clarity of illustration. Like reference numerals refer to like elements throughout.

[0033] <1. Configuration of Compound for Organic Electroluminescence Device>

[0034] A compound for an organic electroluminescence device according to an embodiment may be capable of improving a driving voltage, emission efficiency, and an emission life of the organic electroluminescence device. For example, in the case where the compound for an organic electroluminescence device is used as a hole transport material, the driving voltage, emission efficiency, and the emission life of the organic electroluminescence device may be improved. First, the configuration of the compound for an organic electroluminescence device according to the present embodiment will be described. The compound for an organic electroluminescence device according to the present embodiment may be represented by the following Chemical Formula 1.

[Chemical Formula 1]

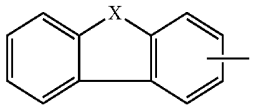


[0035] In Chemical Formula 1, Ar_1 to Ar_4 may each independently be or include, e.g., a substituted or unsubstituted aryl group or a substituted or unsubstituted heteroaryl group.

[0036] Examples of the aryl group and the heteroaryl group may include a phenyl group, a biphenyl group, a terphenyl group, a naphthyl group, an anthryl group, a phenanthryl group, a fluorenyl group, an indenyl group, a pyrenyl group, a fluoranthenyl group, a triphenylenyl group, a pyridyl group, a furanyl group, a pyranyl group, a thienyl group, a quinolyl group, an isoquinolyl group, a benzofuranyl group, a benzothienyl group, an indolyl group, a benzoxazolyl group, a benzothiazolyl group, a quinoxalyl group, a benzoxazolyl group, a pyrazolyl group, a dibenzohetero group, and the like. In an implementation, the aryl group and the heteroaryl group may include, e.g., a phenyl group, a biphenyl group, a naphthyl group, a dibenzohetero group, a phenanthrenyl group, or a triphenylenyl group. In an implementation, the dibenzohetero group may be a group represented by the following Chemical Formula 2. In Chemical Formula 2, X may be, e.g., one of O, S, or $Si(R_{11})_2$. R_{11} may be or may include, e.g., a substituted or unsubstituted alkyl group (such as a methyl group, an ethyl group, or the like). In an implementation, R_{11}

may be or may include, e.g., a substituted or unsubstituted aryl group (such as a phenyl group or the like).

[Chemical Formula 2]



[0037] In an implementation, in Chemical Formula 1, at least one of Ar_1 to Ar_4 may be or may include, e.g., a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms. Examples of the aryl group and the heteroaryl group having 10 or more ring carbon atoms may include the groups having 10 or more ring carbon atoms among the aforementioned examples of the aryl group and the heteroaryl group. In an implementation, the aryl group having 10 or more ring carbon atoms or the heteroaryl group having 10 or more ring carbon atoms may include, e.g., a biphenyl group, a naphthyl group, a dibenzohetero group, a phenanthrenyl group, or a triphenylenyl group. In an implementation, the aryl group having 10 or more ring carbon atoms or the heteroaryl group having 10 or more ring carbon atoms may include, e.g., a biphenyl group or a dibenzohetero group. In an implementation, all of Ar_1 to Ar_4 may be or include the substituted or unsubstituted aryl group having 10 or more ring carbon atoms or the substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms. In this case, stability of a cationic radical may be improved.

[0038] Examples of substituents of the aryl group and the heteroaryl group of Ar_1 to Ar_4 may include an alkyl group (for example, a methyl group, an ethyl group, and the like), a halogen atom (for example, a fluorine atom, a chlorine atom, and the like), a silyl group (for example, a trimethylsilyl group), a cyano group, an alkoxy group (for example, a methoxy group, a butoxy group, an octoxy group), a nitro group, a hydroxy group, a thiol group, and the like.

[0039] R_1 to R_{10} may each independently be or include, e.g., a hydrogen atom, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a substituted or unsubstituted alkyl group (for example, a methyl group, an ethyl group, and the like), a substituted or unsubstituted alkoxy group (for example, a methoxy group, a butoxy group, and an octoxy group), a halogen atom (for example, a fluorine atom, a chlorine atom, and the like), an electron suction or withdrawing group (for example, a nitro group, and the like), or a deuterium atom. In an implementation, adjacent ones of R_1 to R_{10} may be separate or may be combined to each other to form a saturated or unsaturated ring.

[0040] Examples of the aryl group and the heteroaryl group of R_1 to R_{10} may include the same examples as the aryl group and the heteroaryl group of Ar_1 to Ar_4. Examples of substituents of the aryl group, the heteroaryl group, the alkyl group, and the alkoxy group of R_1 to R_{10} may include an alkyl group (for example, a methyl group), a halogen atom (for example, a fluorine atom), a silyl group (for example, a trimethylsilyl group), a cyano group, an alkoxy group (for example, a methoxy group, a butoxy group, and an octoxy group), a nitro group, a hydroxy group, a thiol group, and the like.

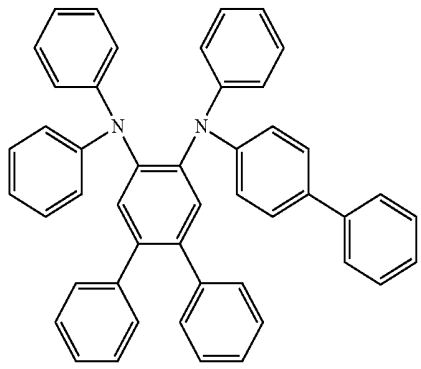
[0041] In an implementation, the compound for an organic electroluminescence device according to the present embodiment may be included in at least one of a hole transport layer and an emission layer (among layers configuring the organic electroluminescence device). In an implementation, the compound for an organic electroluminescence device may be included in the hole transport layer, e.g., as a hole transport material.

[0042] In the organic electroluminescence device including the compound for an organic electroluminescence device having the aforementioned configuration, as will be described in the Examples below, a driving voltage, emission efficiency, and an emission life may be significantly improved. As the reason, without being bound by theory, the following two points may be considered.

[0043] First, a HOMO level of the compound for an organic electroluminescence device according to the present embodiment may be low. For example, as will be described in the Examples below, the HOMO level of the compound for an organic electroluminescence device according to the present embodiment may be about −5.69 eV or less. With respect to this, the HOMO level of another hole transport material may be about −5.3 eV. Accordingly, by including the compound for an organic electroluminescence device according to the present embodiment in the hole transport layer, holes may be smoothly injected from a hole injection layer to the hole transport layer.

[0044] Second, the compound for an organic electroluminescence device according to the present embodiment may have a large molecular weight, because at least one of Ar_1-Ar_4 may be the aryl group having 10 or more ring carbon atoms or the heteroaryl group having 10 or more ring carbon atoms. Therefore, a glass transition point may be high. In addition, the glass transition point of the material for an organic electroluminescence device may be increased, and thermal stability of the material may be increased. In addition, a film quality may be improved, and a long life or high efficiency of the device may be achieved. In an implementation, the compound for an organic electroluminescence device may include one of the following Compounds 1-1 to 1-58.

1-1



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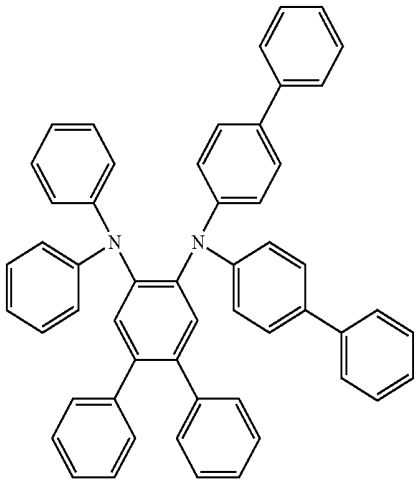
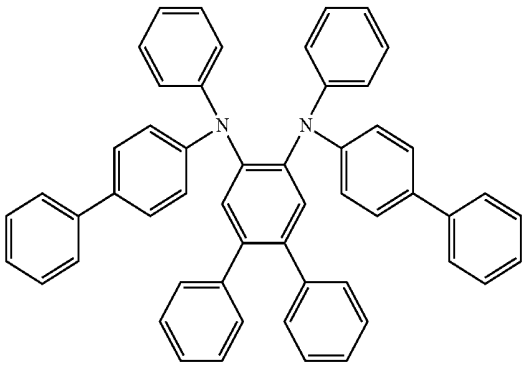
1-2



1-3



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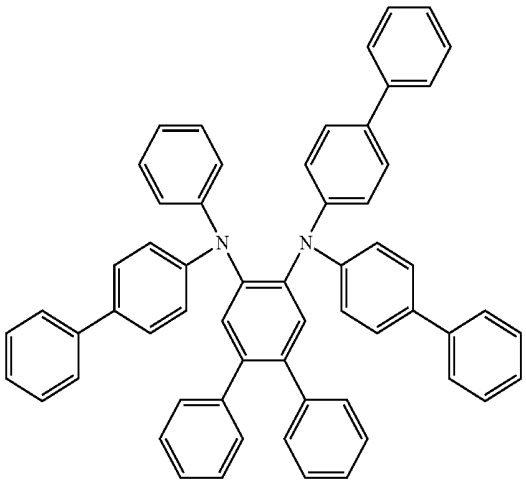

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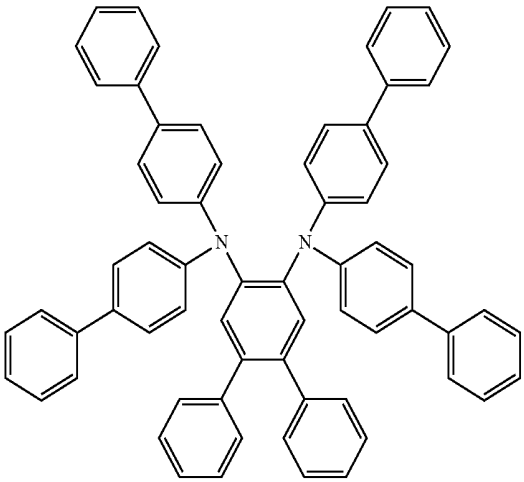

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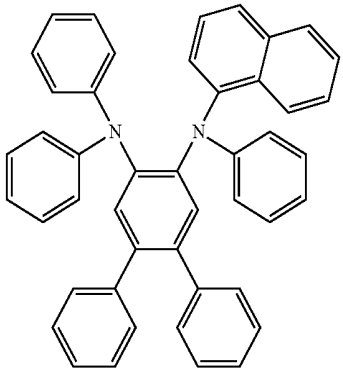

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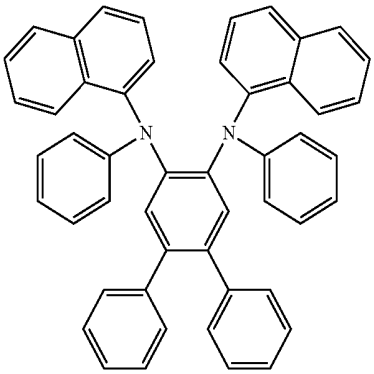

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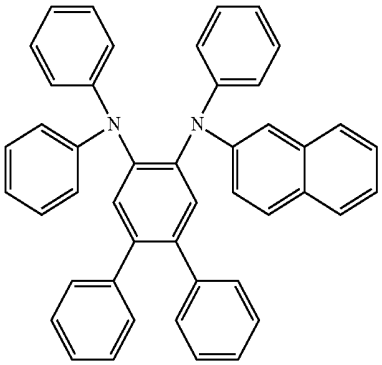

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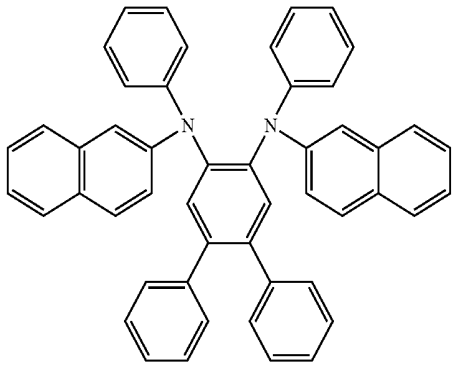

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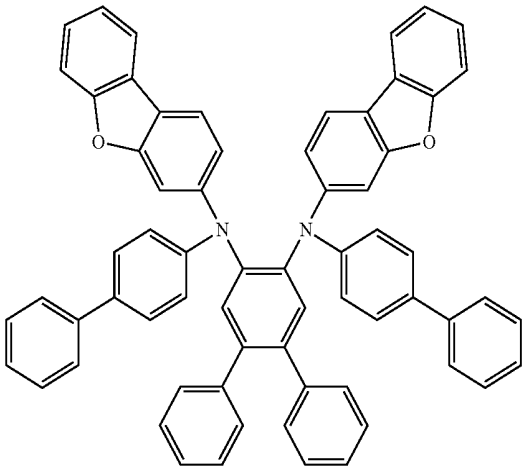

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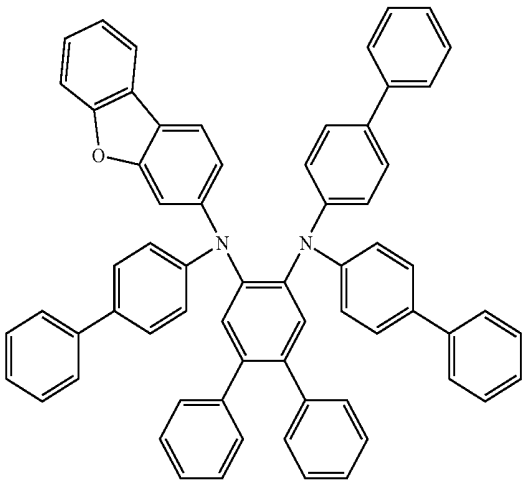

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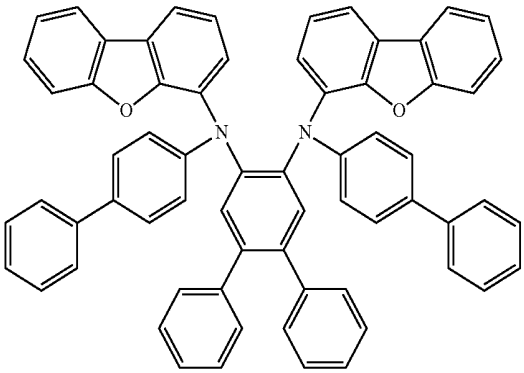

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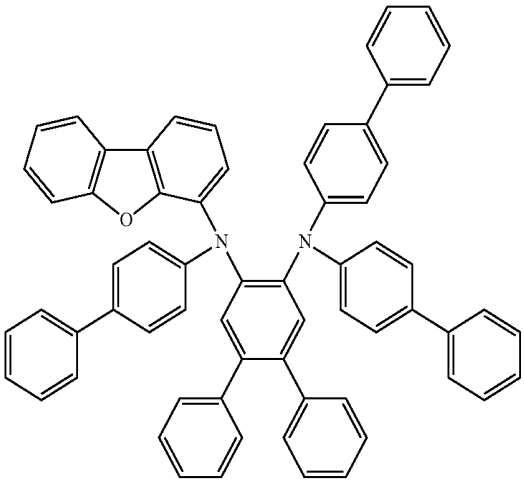

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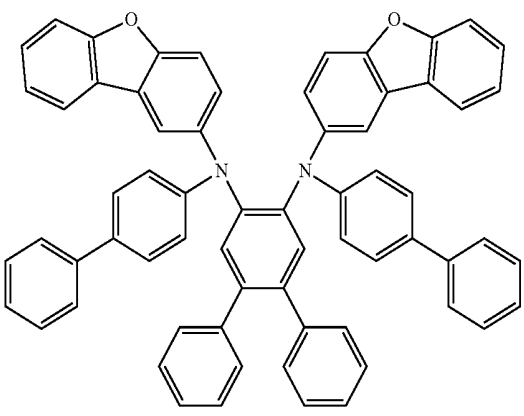

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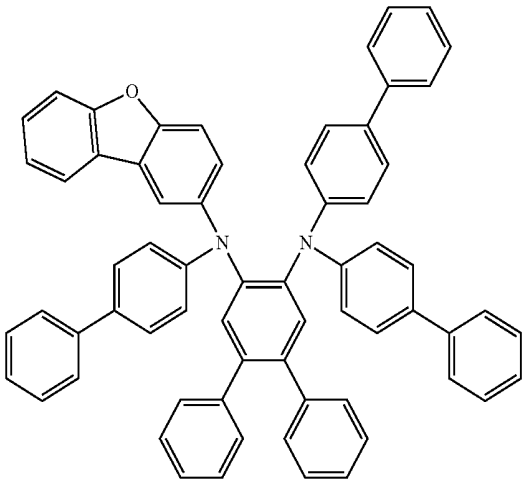

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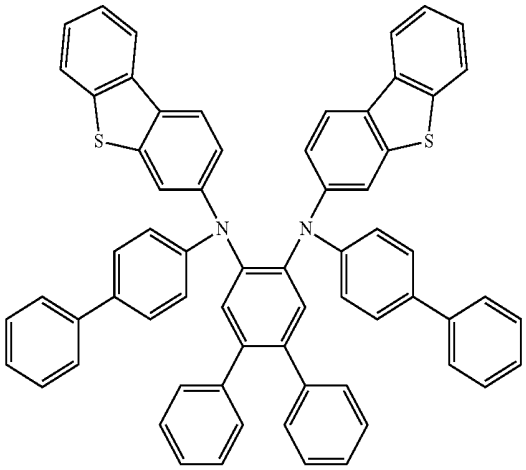

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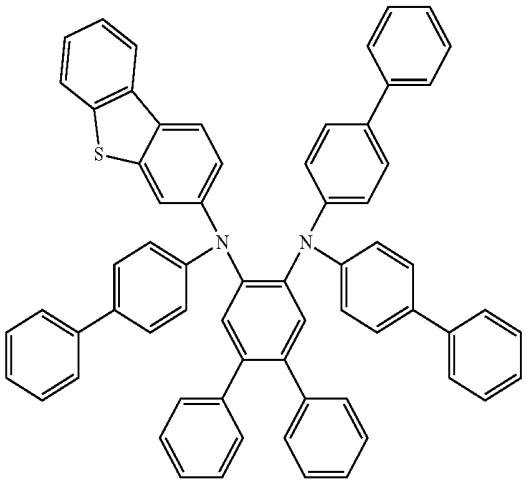

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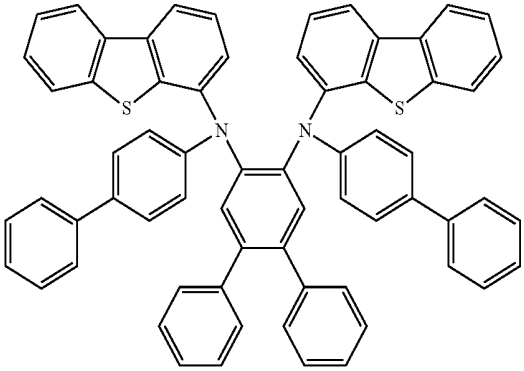

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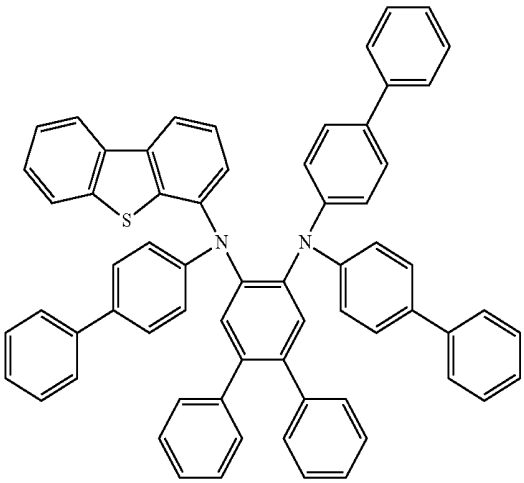

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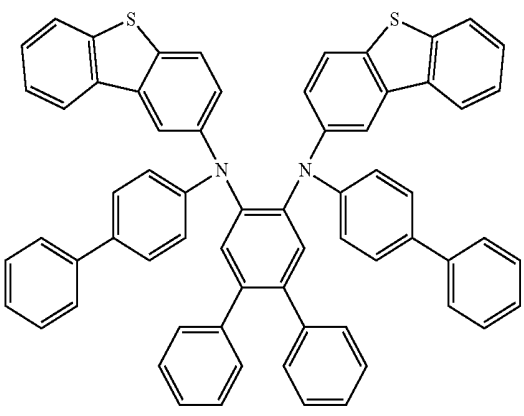

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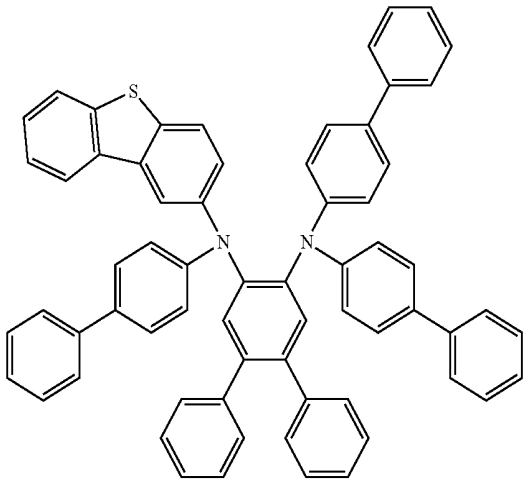

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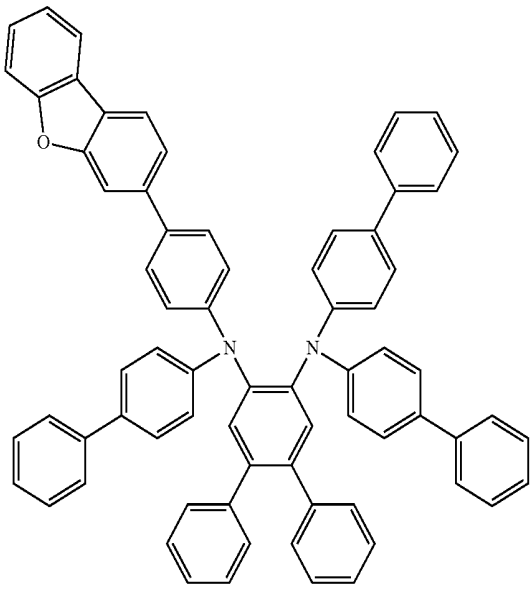

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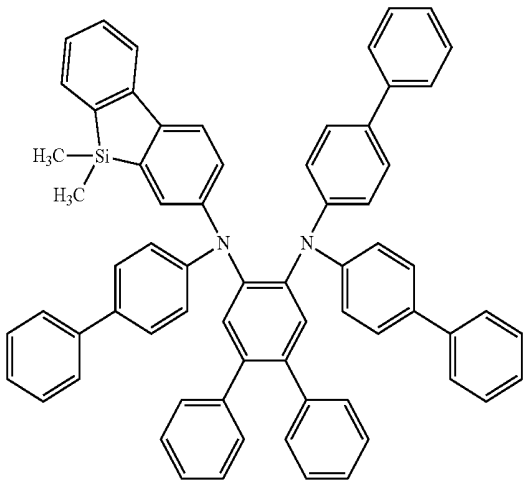

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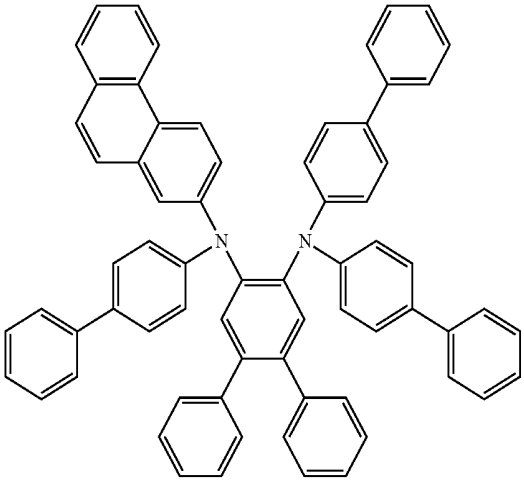

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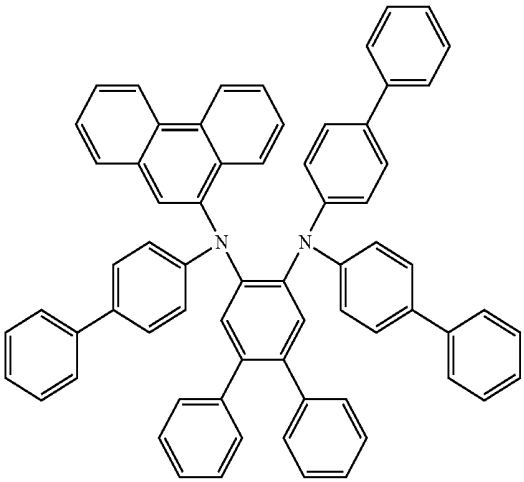

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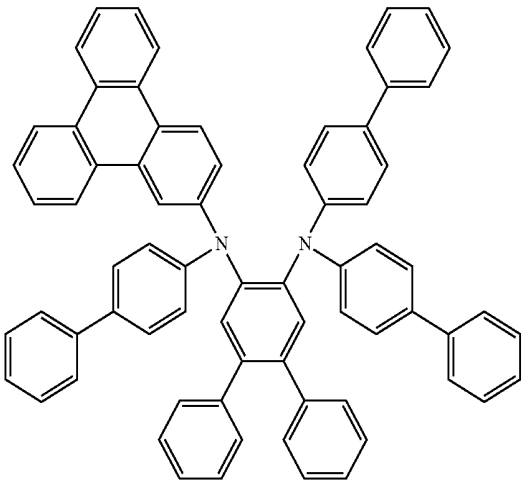

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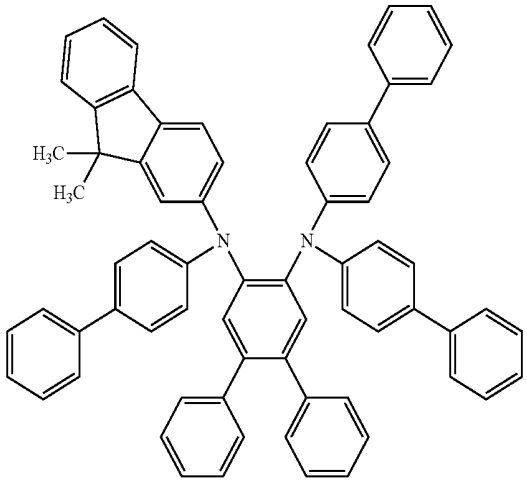

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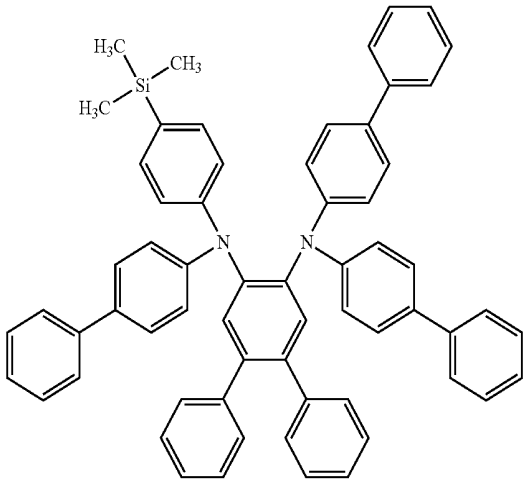

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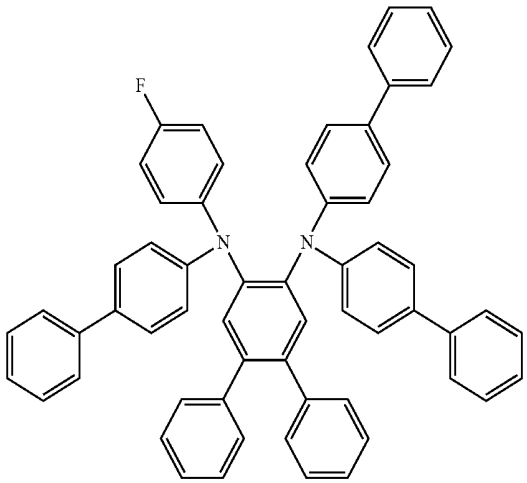

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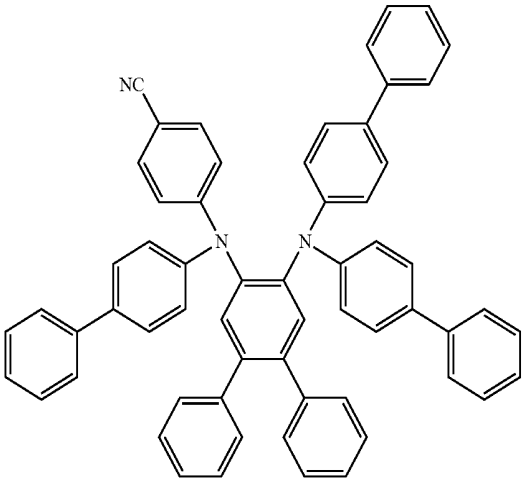

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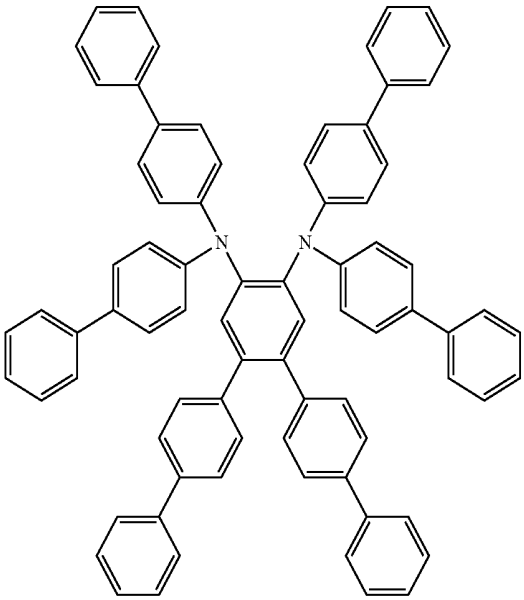

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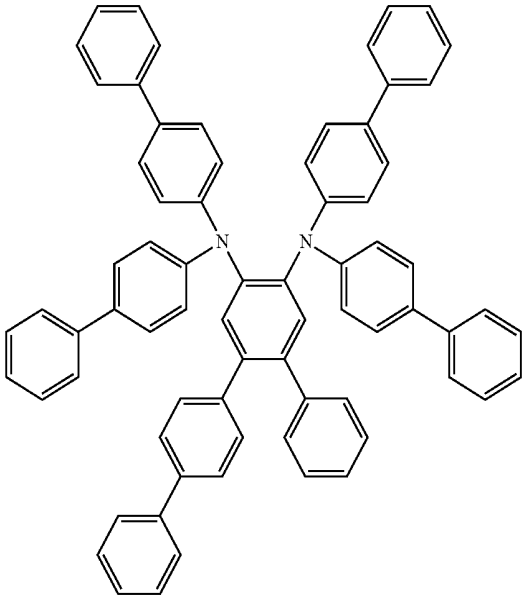

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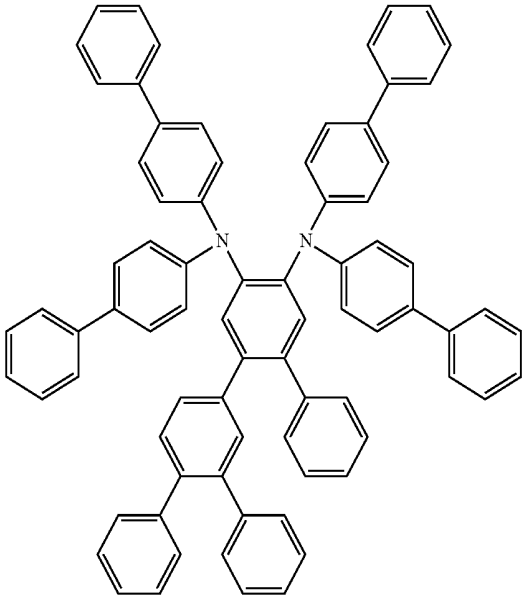

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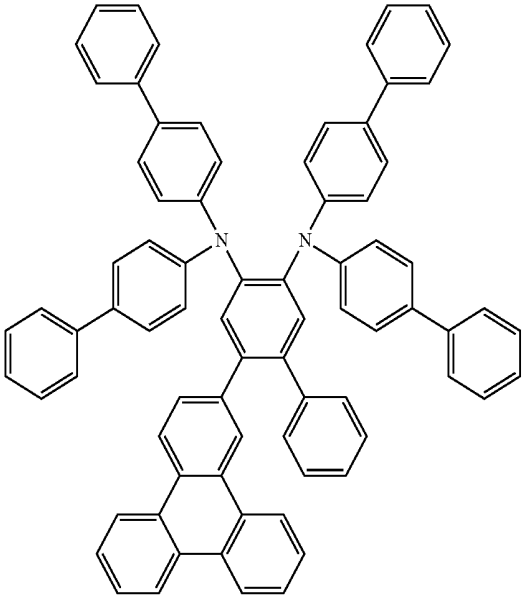

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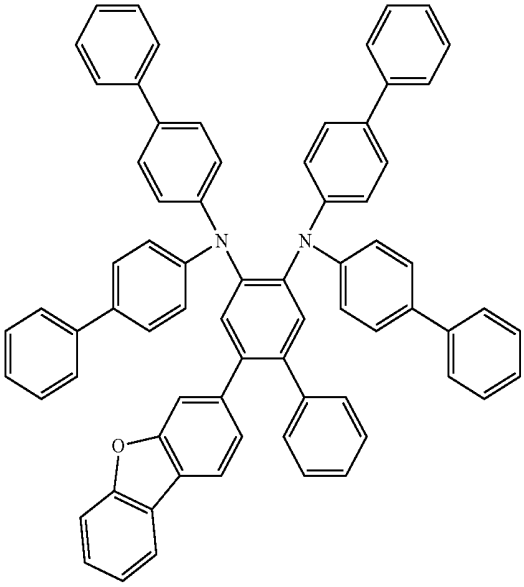

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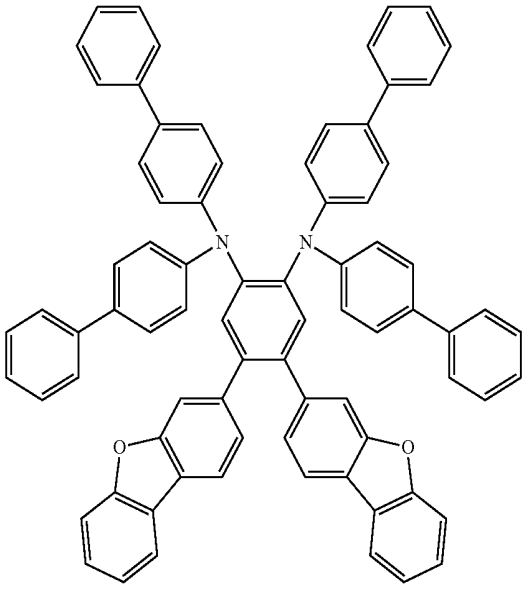

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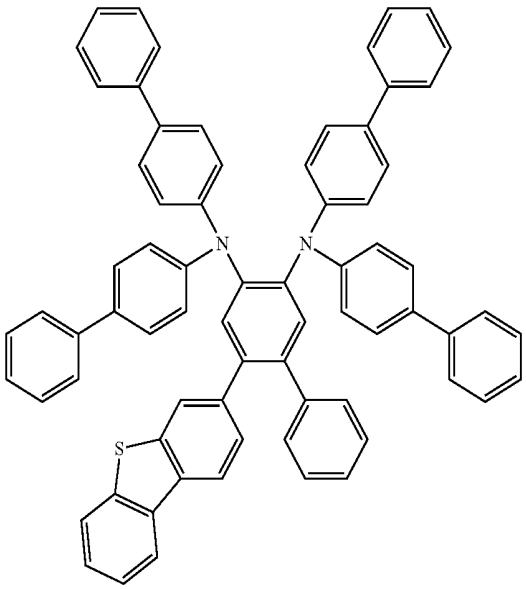

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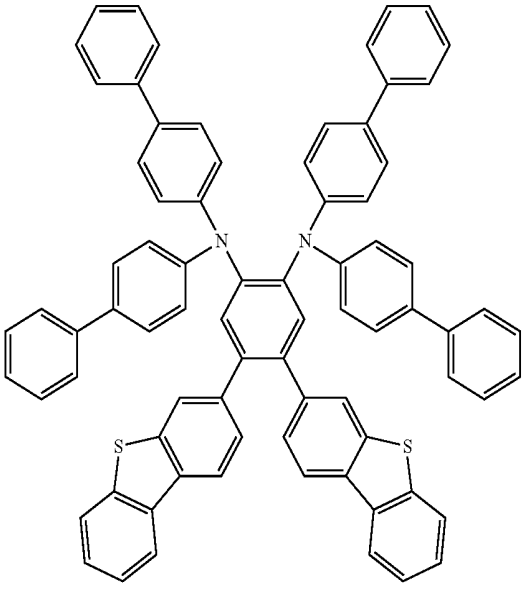

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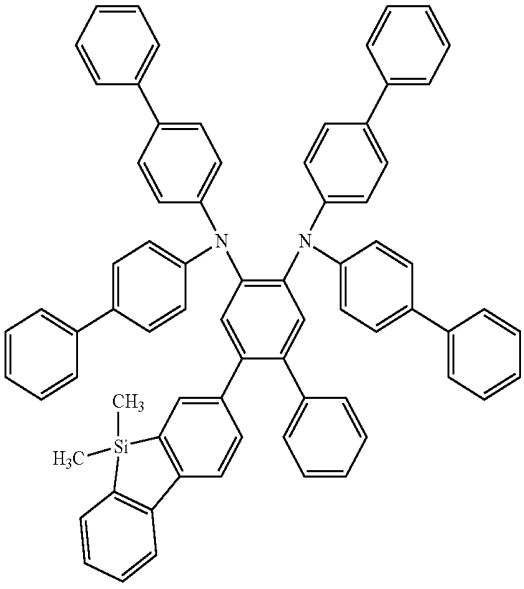

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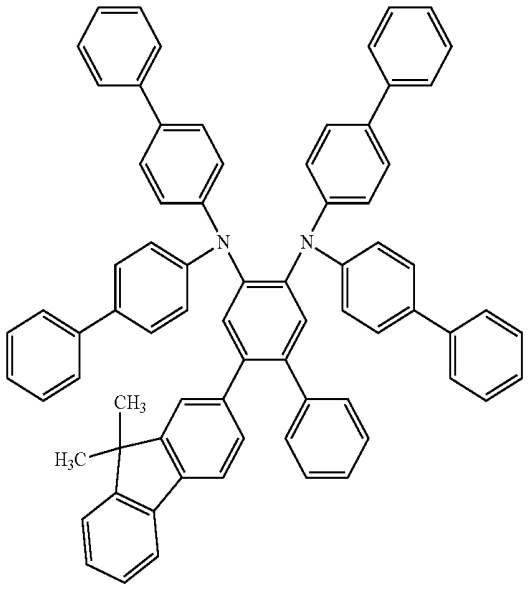

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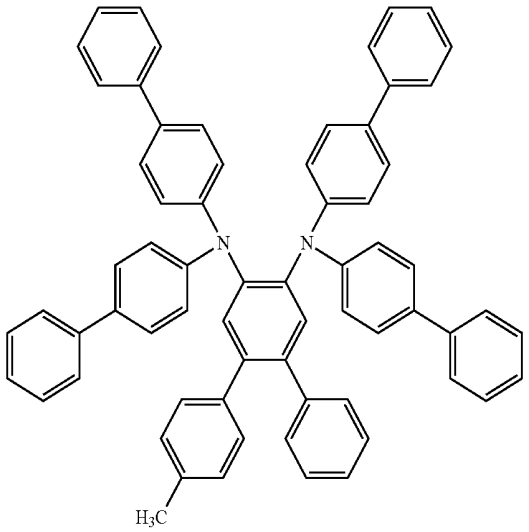

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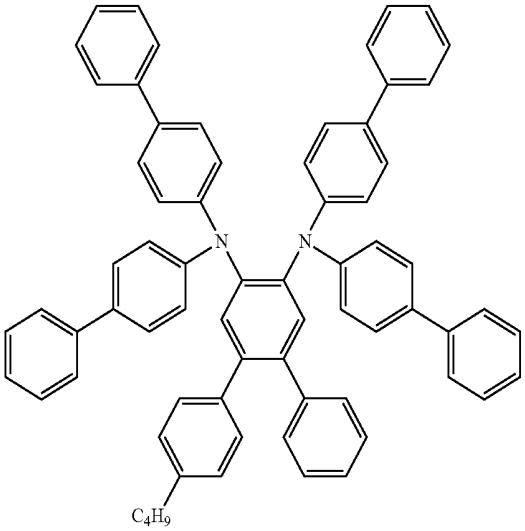

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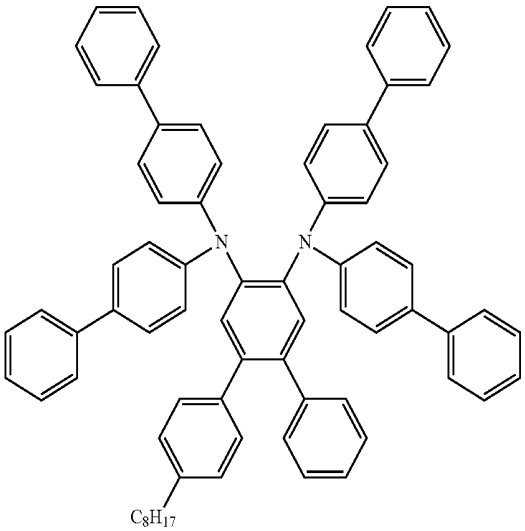

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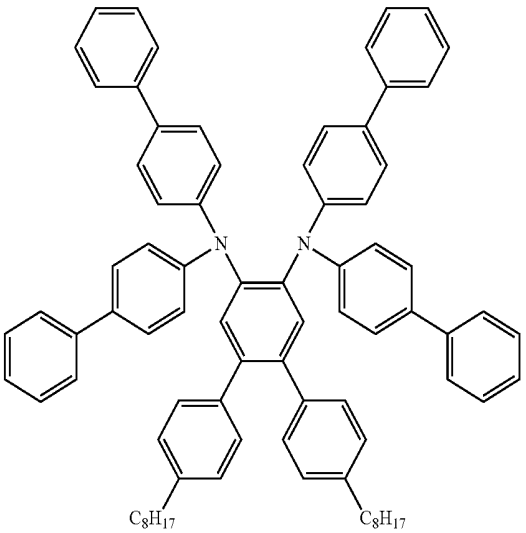

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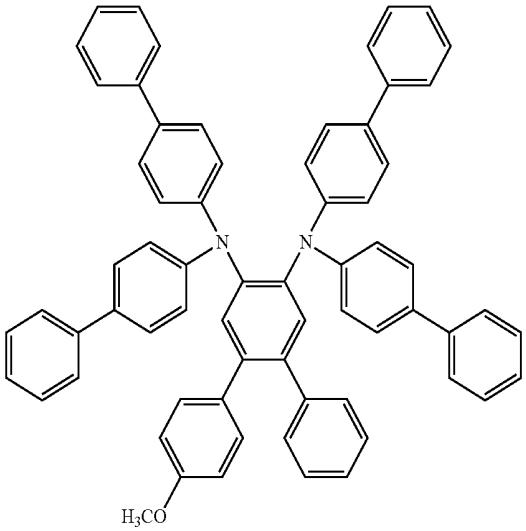

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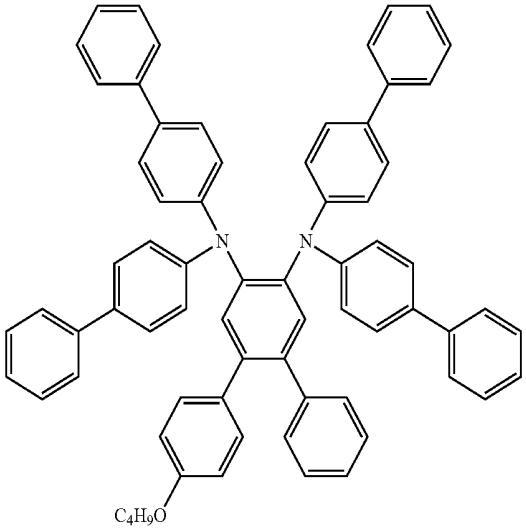

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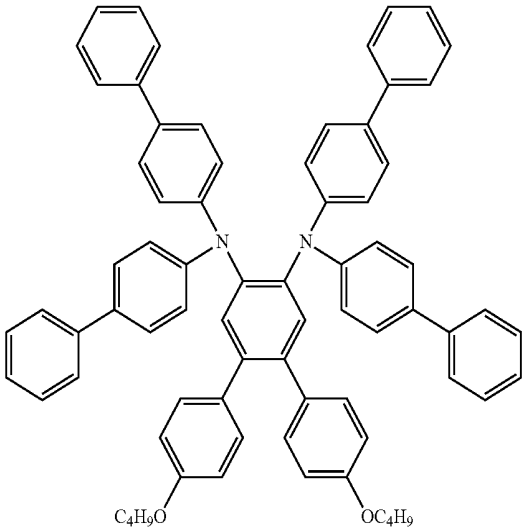

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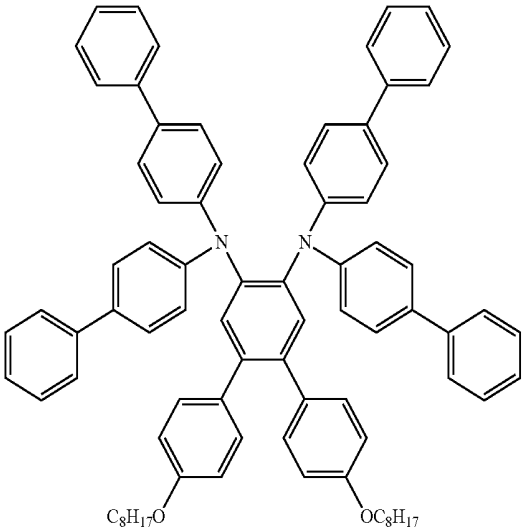

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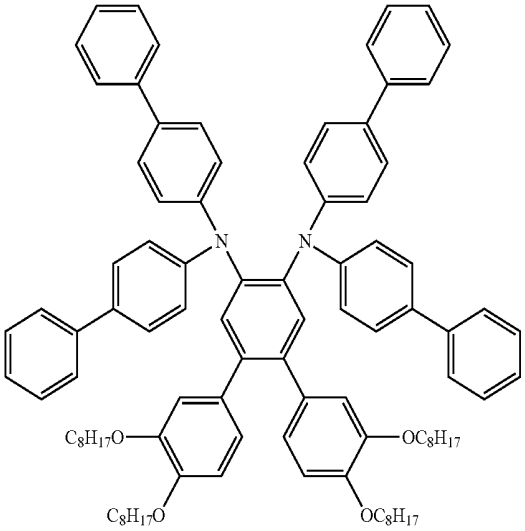

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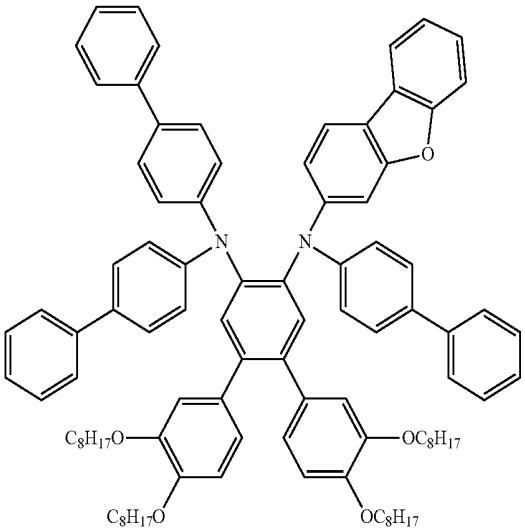

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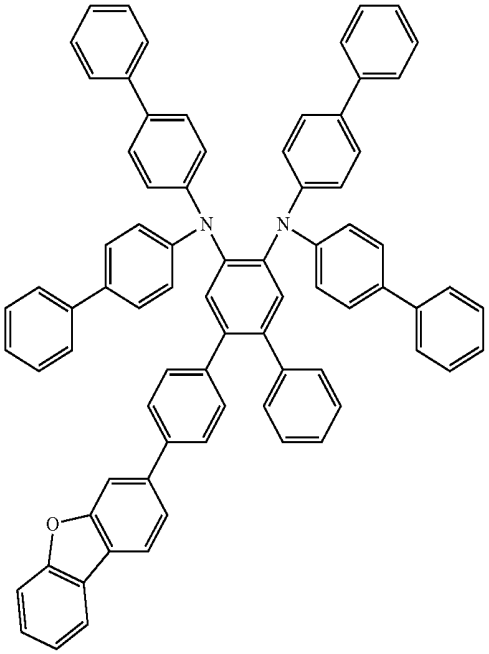

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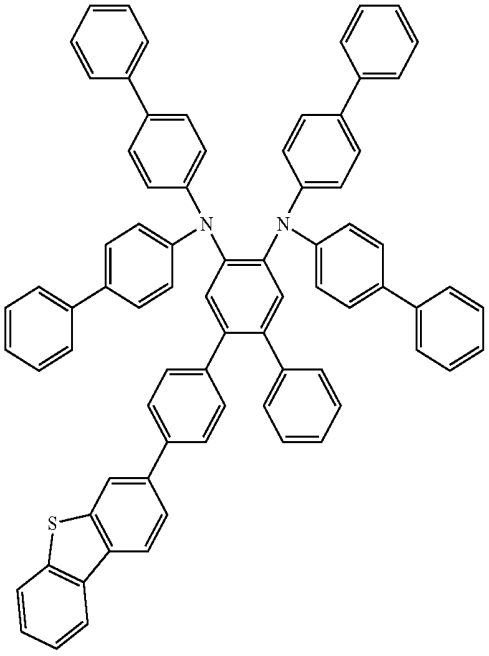

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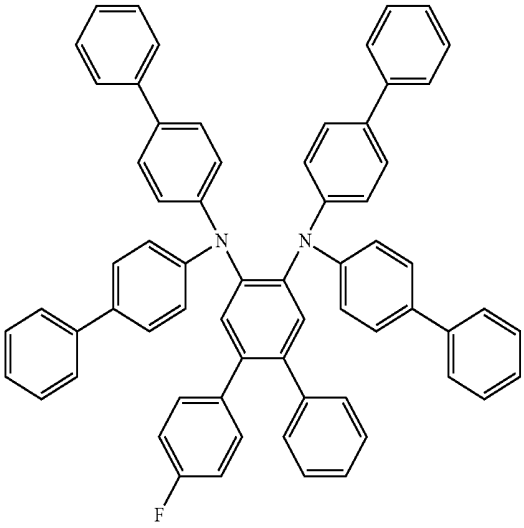

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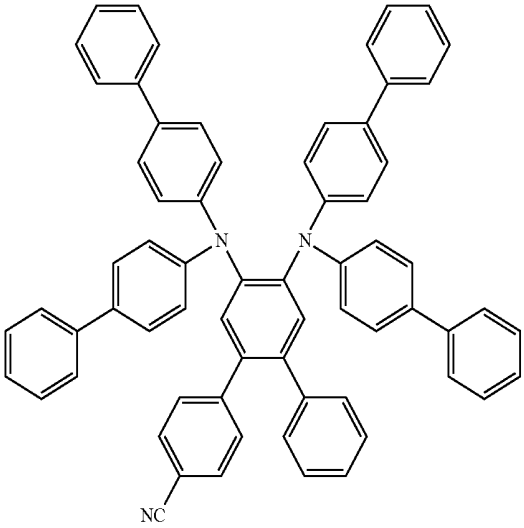

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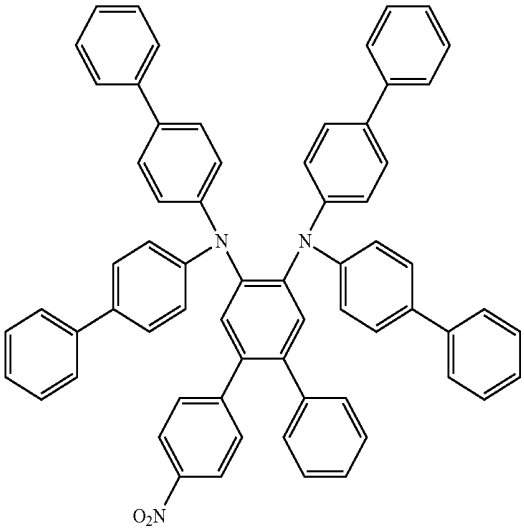

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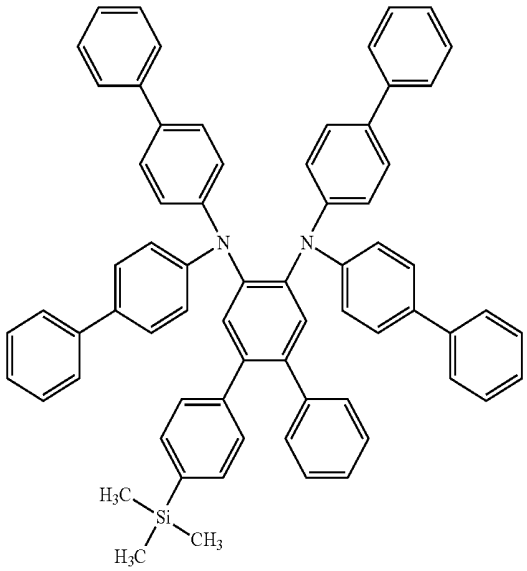

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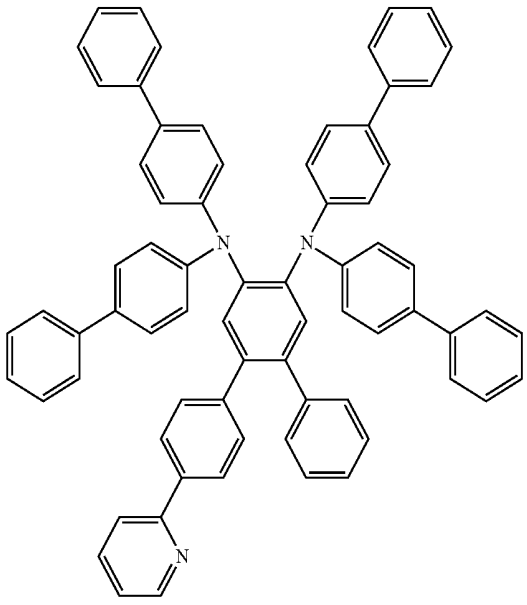

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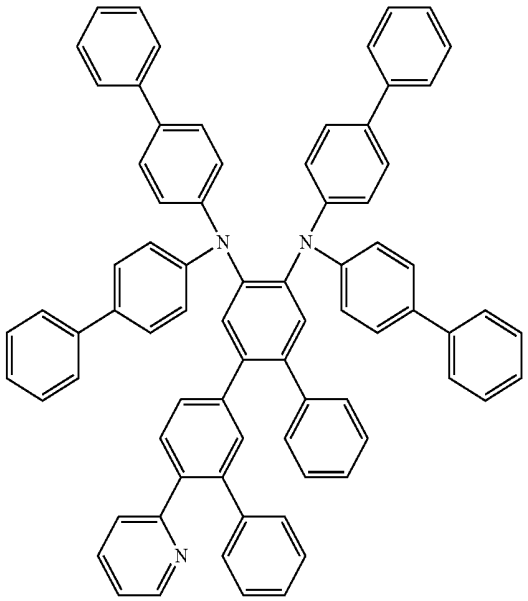


[0045] <2. Organic Light-Emitting Device Including Compound for Organic Electroluminescence Device>

[0046] Next, the organic light-emitting device including the material for an organic electroluminescence device according to the present embodiment will be described in brief with reference to FIG. **1**. FIG. **1** illustrates a schematic cross-sectional view of an example of the organic light-emitting device according to the embodiment.

[0047] As illustrated in FIG. **1**, an organic light-emitting device **100** according to the embodiment may include, e.g., a substrate **110**, a first electrode **120** disposed on the substrate **110**, a hole injection layer **130** disposed on the first electrode **120**, a hole transport layer **140** disposed on the hole injection layer **130**, an emission layer **150** disposed on the hole transport layer **140**, an electron transport layer **160** disposed on the emission layer **150**, an electron injection layer **170** disposed on the electron transport layer **160**, and a second electrode **180** disposed on the electron injection layer **170**.

[0048] The compound for an organic electroluminescence device according to the present embodiment may be a material included in any one of the hole transport layer and the emission layer. In an implementation, the compound for an organic electroluminescence device may be included in both of the layers, e.g., may be included in both the hole transport layer and the emission layer. In an implementation, the compound for an organic electroluminescence device may be included in the hole transport layer **140**.

[0049] Each organic thin film layer between the first electrode **120** and the second electrode **180** of the organic light-emitting device may be formed vis various suitable methods, e.g., a deposition method or the like.

[0050] A substrate for an organic light-emitting device may be used as the substrate **110**. For example, the substrate **110** may be a glass substrate, a semiconductor substrate, a transparent plastic substrate, or the like.

[0051] The first electrode **120** may be, e.g., a positive electrode, and may be formed on the substrate **110** by using a deposition method, a sputtering method, or the like. For example, the first electrode **120** may be formed as a transmis-

sive electrode by metal, an alloy, a conductive compound, and the like having a large work function. The first electrode **120** may be formed using, e.g., indium tin oxide (ITO), indium zinc oxide (IZO), tin oxide (SnO_2), zinc oxide (ZnO), or the like, which is transparent and has excellent conductivity. In an implementation, the positive electrode **120** may be formed as a reflective electrode by using magnesium (Mg), aluminum (Al), or the like.

[0052] The hole injection layer **130** is a layer for facilitating injection of holes from the first electrode **120**, and, e.g., may formed to a thickness of about 10 nm to about 150 nm on the first electrode **120**. The hole injection layer **130** may be formed by using a suitable material. Examples of the suitable material may include triphenylamine-containing polyether ketone (TPAPEK), 4-isopropyl-4'-methyldiphenyliodoniumtetrakis(pentafluorophenyl) boric acid (PPBI), N,N-diphenyl-N,N'-bis-[4-(phenyl-m-tolyl-amino)-phenyl]-biphenyl-4,4'-diamine (DNTPD), a phthalocyanine compound such as copper phthalocyanine, 4,4',4"-tris(3-methylphenylamino)triphenylamine (m-MTDATA), N,N'-di(1-naphthyl)-N,N'-diphenylbenzidine (NPB), 4,4',4"-tris{N,N diamino}triphenylamine (TDATA), 4,4',4"-tris(N,N-2-naphthylphenylamino)triphenylamine (2-TNATA), polyaniline/dodecylbenzenesulfonic acid (Pani/DBSA), poly(3,4-ethylenedioxythiophene)/poly(4-styrene sulfonate) (PEDOT/PSS), polyaniline/camphorsulfonic acid (Pani/CSA), polyaniline/poly(4-styrene sulfonate) (PANI/PSS), or the like.

[0053] The hole transport layer **140** may include a hole transport material having a function of transporting holes, and, e.g., may be formed to a thickness of about 10 nm to about 150 nm on the hole injection layer **130**. In an implementation, the hole transport layer **140** may be formed of or include the compound for an organic electroluminescence device according to the present embodiment. In an implementation, in the case where the compound for an organic electroluminescence device according to the present embodiment is used as a host material of the emission layer **150**, the hole transport layer **140** may be formed by using a suitable hole transport material. Examples of the suitable hole transport material may include 1,1-bis[(di-4-tolylamino)phenyl]cyclohexane (TAPC), a carbazole derivative such as N-phenyl carbazole and polyvinyl carbazole, N,N'-bis(3-methylphenyl)-N,N'-diphenyl-[1,1-biphenyl]-4,4'-diamine (TPD), 4,4',4"-tris(N-carbazolyl)triphenylamine (TCTA), N,N'-di(1-naphthyl)-N,N'-diphenylbenzidine (NPB), and the like.

[0054] The emission layer **150** may emit light by fluorescence, phosphorescence, or the like. The emission layer **150** may include a host material and a dopant material as an emission material. In an implementation, the emission layer **150** may be formed to a thickness of about 10 nm to about 60 nm.

[0055] The compound for an organic electroluminescence device according to the present embodiment may be used or included as the host material of the emission layer **150**. In an implementation, in the case where the compound for an organic electroluminescence device according to the present embodiment is used as the hole transport material, the host material of the emission layer **150** may be a suitable host material.

[0056] The host material of the emission layer **150** may include, e.g., tris(8-quinolinolato)aluminum (Alq_3), 4,4'-N,N'-dicarbazole-biphenyl (CBP), poly(n-vinylcarbazole) (PVK), 9,10-di(naphthalene-2-yl)anthracene (ADN), 4,4',4"-tris(N-carbazolyl)triphenylamine (TCTA), 1,3,5-tris(N-phenylbenzimidazole-2-yl)benzene (TPBI), 3-tert-butyl-9,10-di(naphtho-2-yl)anthracene (TBADN), distyrylarylene (DSA), 4,4'-bis(9-carbazole)-2,2'-dimethyl-biphenyl (dmCBP), or the like.

[0057] The emission layer **150** may be formed as an emission layer for emitting light having a predetermined color. For example, the emission layer **150** may be formed as a red emission layer, a green emission layer, or a blue emission layer.

[0058] In the case where the emission layer **150** is the blue emission layer, a suitable material may be used as a blue dopant, e.g., perylene and a derivative thereof, an iridium (Ir) complex such as bis[2-(4,6-difluorophenyl)pyridinate]picolinate iridium (III) (FIrpic), or the like may be used.

[0059] In the case where the emission layer **150** is the red emission layer, a suitable material may be used as a red dopant, e.g., rubrene and a derivative thereof, 4-dicyanomethylene-2-(p-dimethylaminostyryl)-6-methyl-4H-pyran (DCM) and a derivative thereof, an iridium complex such as bis(1-phenylisoquinoline)(acetylacetonate)iridium (III) (Ir(piq)$_2$(acac)), an osmium (Os) complex, a platinum complex, or the like may be used.

[0060] In the case where the emission layer **150** is the green emission layer, a suitable material may be used as a green dopant, e.g., coumarin and a derivative thereof, an iridium complex such as tris(2-phenylpyridine)iridium (III) (Ir(ppy)$_3$), or the like may be used.

[0061] The electron transport layer **160** may include an electron transport material having a function of transporting electrons, and, e.g., may be formed to a thickness of about 15 nm to about 50 nm on the emission layer **150**. The electron transport layer **160** may be formed by using a suitable electron transport material. Examples of the suitable electron transport material may include a quinoline derivative such as tris(8-quinolinolato)aluminum (Alq_3), 1,2,4-triazole derivative (TAZ), bis(2-methyl-8-quinolinolato)-(p-phenylphenolate)-aluminum (BAlq), beryllium bis(benzoquinoline-10-olate) ($BeBq_2$), a Li complex such as lithium quinolate (LiQ), and the like.

[0062] The electron injection layer **170** may facilitate injection of electrons from the second electrode **180**, and may be formed to a thickness of about 0.3 nm to about 9 nm. In an implementation, the electron injection layer **170** may be formed by using a suitable material, e.g., lithium fluoride (LiF), sodium chloride (NaCl), cesium fluoride (CsF), lithium oxide (Li_2O), barium oxide (BaO), or the like.

[0063] The second electrode **180** may be, e.g., a negative electrode. For example, the second electrode **116** is formed as a reflective electrode by metal, an alloy, a conductive compound, and the like having a small work function. The second electrode **180** may be formed of, e.g., lithium (Li), magnesium (Mg), aluminum (Al), aluminum-lithium (Al—Li), calcium (Ca), magnesium-indium (Mg—In), magnesium-silver (Mg—Ag), or the like. In an implementation, the second electrode **180** may be formed as a transmissive electrode by using indium tin oxide (ITO), indium zinc oxide (IZO), or the like. The second electrode **180** may be formed on the electron injection layer **170**, e.g., by using a deposition method, a sputtering method, or the like.

[0064] An example of the structure of the organic light-emitting device **100** according to the present embodiment is described above. In the organic light-emitting device **100** including the compound for an organic electroluminescence

device according to the present embodiment, the HOMO level of the compound for an organic electroluminescence device may be low and a stable cationic radical may be formed, and hole transport properties may be improved. Accordingly, the driving voltage, emission efficiency, and the emission life of the organic electroluminescence device may be improved.

[0065] In an implementation, the organic light-emitting device **100** according to the present embodiment may be formed by using various typical other structures of the organic light-emitting device. For example, the organic light-emitting device **100** may not include one or more layers of the hole injection layer **130**, the electron transport layer **160**, and the electron injection layer **170**. Further, each layer of the organic light-emitting device **100** may be formed of a single layer or a plurality of layers.

[0066] In an implementation, the organic light-emitting device **100** may include a hole blocking layer between the hole transport layer **140** and the emission layer **150** to help prevent diffusion of triplet excitons or holes into the electron transport layer **160**. In an implementation, the hole blocking layer may be formed using, e.g., an oxadiazole derivative, a triazole derivative, a phenanthroline derivative, or the like.

Example

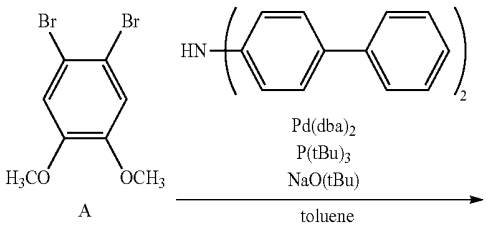
[0067] The following Examples and Comparative Examples are provided in order to highlight characteristics of one or more embodiments, but it will be understood that the Examples and Comparative Examples are not to be construed as limiting the scope of the embodiments, nor are the Comparative Examples to be construed as being outside the scope of the embodiments. Further, it will be understood that the embodiments are not limited to the particular details described in the Examples and Comparative Examples.

[0068] Further, in the embodiment, compounds represented by Chemical Formulas 1-1 to 1-58 (examples of materials for an organic electroluminescence device according to the embodiment) are also called Compounds 1-1 to 1-58.

Synthetic Example 1

Synthesis of Compound 1-2

[0069] Compound 1-2 was synthesized according to the following synthesis scheme.



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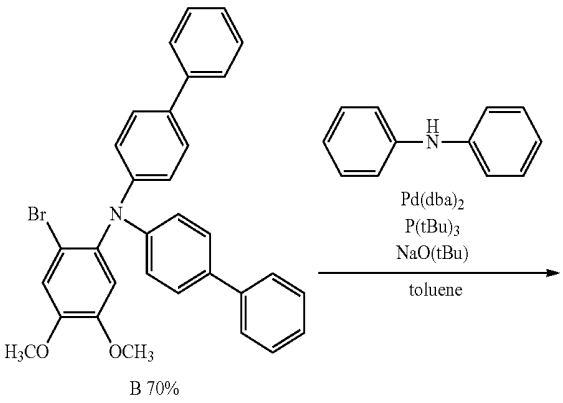

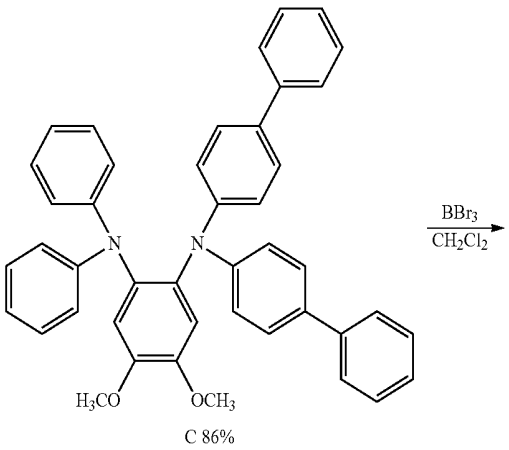

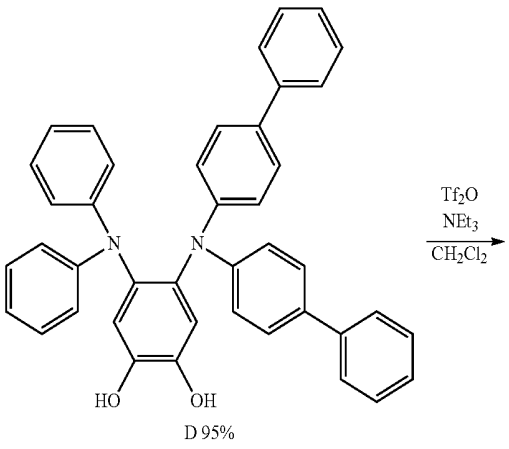

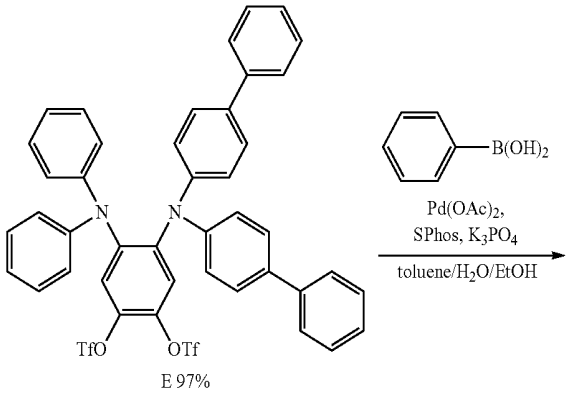

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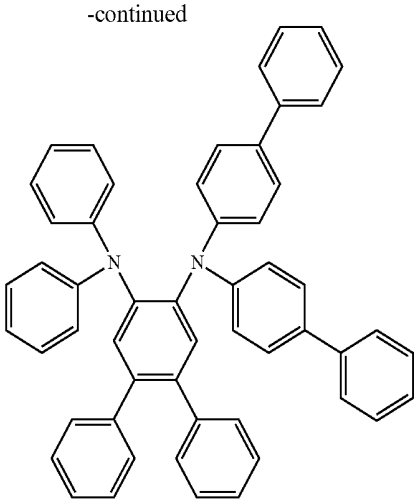


1-2 88%

Synthesis of Compound B

[0070] Under an argon atmosphere, about 10.00 g of Compound A, about 2.17 g of bis(4-biphenylyl)amine, about 0.19 g of bis(dibenzylideneacetone)palladium(0), about 0.27 g of tri-tert-butylphosphine, and about 0.97 g of sodium tert-butoxide were added to a 500 mL three-neck flask, and heated and refluxed in about 150 mL of toluene solvent for about 4 hours. After air cooling, water was added to the reaction solution to separate an organic layer and solvent was removed by distillation. The obtained crude product was purified by silica gel column chromatography (toluene/hexane) to obtain about 2.54 g of Compound B as a white solid (yield about 70%). The molecular weight of obtained Compound B was measured by FAB-MS to obtain a value of 536 ($C_{32}H_{26}BrNO_2$).

Synthesis of Compound C

[0071] Under an argon atmosphere, about 2.54 g of Compound B, about 0.80 g of diphenylamine, about 0.14 g of bis(dibenzylideneacetone)palladium(0), about 0.19 g of tri-tert-butylphosphine, and about 0.68 g of sodium tert-butoxide were added to a 200 mL three-neck flask, and heated and refluxed in about 50 mL of toluene solvent for about 4 hours. After air cooling, water was added to the reaction solution to separate an organic layer and solvent was removed by distillation. The obtained crude product was purified by silica gel column chromatography (toluene) to obtain about 2.55 g of Compound C as a white solid (yield about 86%). The molecular weight of obtained Compound C was measured by FAB-MS to obtain a value of 624 ($C_{44}H_{36}N_2O_2$).

Synthesis of Compound D

[0072] Under an argon atmosphere, in a 200 mL three-neck flask, about 2.55 g of Compound C was dissolved in about 100 mL of dichloromethane, and about 10.2 mL of a dichloromethane solution of boron tribromide (about 1 mol/L) was dripped in the flask while being maintained in an ice bath. After the reaction solution was agitated at ambient temperature for about 6 hours, water was added to the reaction solution to separate an organic layer and solvent was removed by distillation. The obtained crude product was purified by silica gel column chromatography (toluene and ethyl acetate) to obtain about 2.31 g of Compound D as a lemon yellow solid (yield about 95%). The molecular weight of Compound D was measured by FAB-MS to obtain a value of 596 ($C_{42}H_{32}N_2O_2$).

Synthesis of Compound E

[0073] Under an argon atmosphere, in a 200 mL three-neck flask, about 2.31 g of Compound D was dissolved in about 60 mL of dichloromethane, and while the flask was in an ice bath, about 2.7 mL of triethylamine was added, and about 1.6 mL of trifluoromethylsulfonic acid anhydride was then added dropwise. After the reaction solution was agitated at ambient temperature for about 2 hours, water was added to the reaction solution to separate the organic layer and solvent was removed by distillation. The obtained crude product was purified by silica gel column chromatography (dichloromethane) to obtain about 3.23 g of Compound E as a lemon yellow solid (yield about 97%). The molecular weight of Compound E was measured by FAB-MS to obtain a value of 860 ($C_{44}H_{30}F_6N_2O_6S_2$).

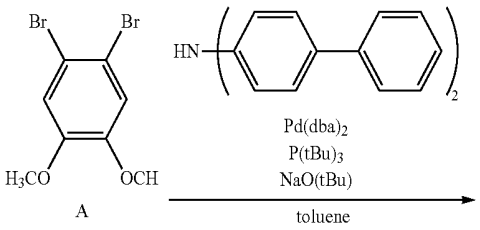
Synthesis of Compound 1-2

[0074] Under an argon atmosphere, in a 200 mL three-neck flask, about 3.23 g of compound E, about 1.14 g of phenyl boronic acid, about 0.08 g of palladium acetate, about 0.31 g of 2-dicyclohexylphosphino-2',6'-dimethoxybiphenyl, and about 3.19 g of tripotassium phosphate were agitated in about 50 mL of a mixed solvent of toluene and water/ethanol (about 10:1:1 (volume ratio)) at about 100° C. for about 16 hours. Water was added to the reaction solution to separate the organic layer and solvent was removed by distillation. The obtained crude product was purified by silica gel column chromatography (toluene and hexane) to obtain about 2.37 g of Compound 1-2 as a white solid (yield about 88%). The molecular weight of Compound 1-2 was measured by FAB-MS to obtain a value of 716 ($C_{54}H_{40}N_2$). ^{1}H NMR (300 MHz, DMSO-d_6) of Compound 1-2 was measured to obtain the following chemical shifts. 7.66-7.32 (m, 30H), 7.15 (s, 1H), 7.12 (s, 1H), 6.99 (d, J=8.5 Hz, 4H), 6.93 (d, J=8.3 Hz, 4H). Accordingly, it could be identified that Compound 1-2 was synthesized.

Synthetic Example 2

Synthesis of Compound 1-5

[0075] Compound 1-5 was synthesized according to the following synthesis scheme.



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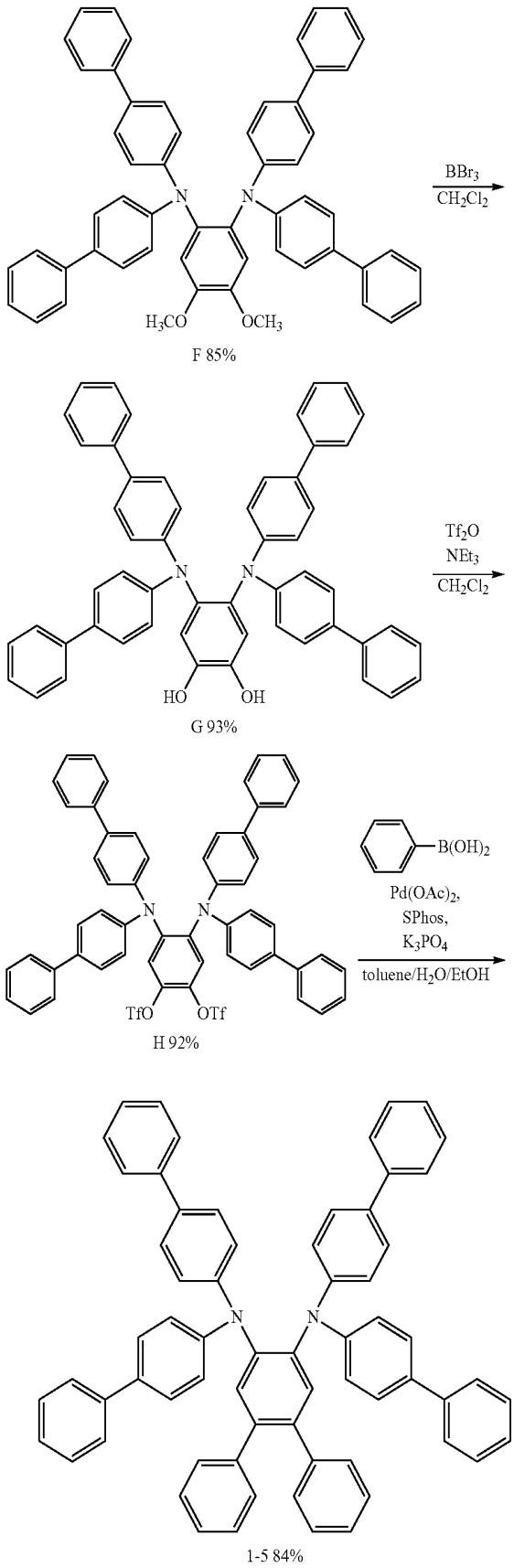


Synthesis of Compound F

[0076] Under an argon atmosphere, about 1.50 g of Compound A, about 3.26 g of bis(4-biphenylyl)amine, about 0.15 g of bis(dibenzylideneacetone)palladium(0), about 0.20 g of tri-tert-butylphosphine, and about 1.22 g of sodium tert-butoxide were added to a 200 mL three-neck flask, and heated and refluxed in about 50 mL of toluene solvent for about 20 hours. After air cooling, water was added to the reaction solution to separate an organic layer and solvent was removed by distillation. The obtained crude product was purified by silica gel column chromatography (toluene) to obtain about 3.34 g of Compound F as a white solid (yield about 85%). The molecular weight of Compound F was measured by FAB-MS to obtain a value of 776($C_{55}H_{44}N_2O_2$).

Synthesis of Compound G

[0077] Under an argon atmosphere, in a 200 mL three-neck flask, about 3.34 g of Compound F was dissolved in about 100 mL of dichloromethane, and about 10.7 mL of a dichloromethane solution of boron tribromide (about 1 mol/L) was added dropwise to the flask as the flask was held in the ice bath. After the reaction solution was agitated at ambient temperature for about 6 hours, water was added to the reaction solution to separate the organic layer and solvent was removed by distillation. The obtained crude product was purified by silica gel column chromatography (toluene and ethyl acetate) to obtain about 2.99 g of Compound G as a lemon yellow solid (yield about 93%). The molecular weight of Compound G was measured by FAB-MS to obtain a value of 748($C_{54}H_{40}N_2O_2$).

Synthesis of Compound H

[0078] Under an argon atmosphere, in a 200 mL three-neck flask, about 2.99 g of Compound G was dissolved in about 80 mL of dichloromethane, and as the flask was held in an ice bath, about 2.8 mL of triethylamine was added, and about 1.7 mL of trifluoromethylsulfonic acid anhydride was added dropwise. After the reaction solution was agitated at ambient temperature for about 2 hours, water was added to the reaction solution to separate the organic layer and solvent was removed by distillation. The obtained crude product was purified by silica gel column chromatography (dichloromethane) to obtain about 3.72 g of Compound H as a lemon yellow solid (yield about 92%). The molecular weight of Compound H was measured by FAB-MS to obtain a value of 1013 ($C_{56}H_{38}F_6N_2O_6S_2$).

Synthesis of Compound 1-5

[0079] Under an argon atmosphere, in a 200 mL three-neck flask, about 3.72 g of compound H, about 1.12 g of phenyl boronic acid, about 0.08 g of palladium acetate, about 0.30 g of 2-dicyclohexylphosphino-2',6'-dimethoxybiphenyl, and about 3.11 g of tripotassium phosphate were agitated in about 50 mL of mixed solvent of toluene and water/ethanol (about 10:1:1 (volume ratio)) at about 100° C. for about 6 hours. After air cooling, water was added to separate the organic layer and solvent was removed by distillation. The obtained

crude product was purified by silica gel column chromatography (toluene and hexane) to obtain about 2.68 g of Compound 1-5 as a white solid (yield about 84%). The molecular weight of Compound 1-5 was measured by FAB-MS to obtain a value of 869($C_{66}H_{48}N_2$). Further, ^{1}H NMR (300 MHz, DMSO-d_6) of Compound 1-5 was measured to obtain the following chemical shifts. 7.65-7.35 (m, 38H), 7.15 (s, 2H), 6.95 (d, J=8.5 Hz, 8H).

Synthetic Example 3

Synthesis of Compound 1-7

[0080] In the synthesis scheme of Compound 1-5, N-phenyl-1-napthylamine was used instead of bis(4-biphenylyl) amine to synthesize Compound 1-7. Further, the molecular weight of Compound 1-7 was measured by FAB-MS to obtain a value of 664($C_{50}H_{36}N_2$). Further, ^{1}H NMR (300 MHz, DMSO-d_6) of Compound 1-7 was measured to obtain the chemical shifts expected from the structure of Compound 1-7. Accordingly, it could be identified that Compound 1-7 was synthesized.

Synthetic Example 4

Synthesis of Compound 1-10

[0081] In the synthesis scheme of Compound 1-5, 3-(biphenylamino)dibenzofuran was used instead of bis(4-biphenylyl)amine to synthesize Compound 1-10. Further, the molecular weight of Compound 1-10 was measured by FAB-MS to obtain a value of 896($C_{66}H_{44}N_2O_2$). Further, ^{1}H NMR (300 MHz, DMSO-d_6) of Compound 1-10 was measured to obtain the chemical shifts expected from the structure of Compound 1-10. Accordingly, it could be identified that Compound 1-10 was synthesized.

Synthetic Example 5

Synthesis of Compound 1-16

[0082] In the synthesis scheme of Compound 1-5, 3-(biphenylylamino)dibenzothiophene was used instead of bis(4-biphenylyl)amine to synthesize Compound 1-16. Further, the molecular weight of Compound 1-16 was measured by FAB-MS to obtain a value of 928($C_{66}H_{44}N_2S_2$). Further, ^{1}H NMR (300 MHz, DMSO-d_6) of Compound 1-16 was measured to obtain the chemical shifts expected from the structure of Compound 1-16. Accordingly, it could be identified that Compound 1-16 was synthesized.

Synthetic Example 6

Synthesis of Compound 1-36

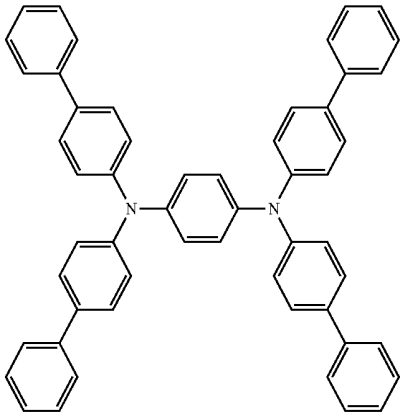
[0083] In the synthesis scheme of Compound 1-5, 3-bromodibenzofuran was used instead of phenylboronic acid to synthesize Compound 1-36. In the synthesis scheme of Compound 1-5, 3-bromodibenzofuran was used instead of phenylboronic acid to synthesize Compound 1-36. Further, the molecular weight of Compound 1-36 was measured by FAB-MS to obtain a value of 1048 ($C_{78}H_{52}N_2O_2$). Further, ^{1}H NMR (300 MHz, DMSO-d_6) of Compound 1-36 was measured to obtain the chemical shifts expected from the structure of Compound 1-36. Accordingly, it could be identified that Compound 1-36 was synthesized.

[0084] (Measurement of HOMO Level)

[0085] Compounds 1-2, 1-5, 1-7, 1-10, 1-16, and 1-36 are compounds corresponding to the Examples of the present embodiment. The HOMO levels of Compounds 1-2, 1-5, 1-7, 1-10, 1-16, and 1-36 were measured by using AC-3 (photoelectron spectroscopy AC-3 in the atmosphere, manufactured by RIKEN KEIKI Co., Ltd.). Further, for comparison, the HOMO level of Comparative Compound C1 was measured. Further, Comparative Compound C1 is represented by the following Chemical Formula C1. Comparative Compound C1 is a Comparative Example. The measurement results are described in Table 1.

TABLE 1

	HOMO (eV)
Compound 1-2	−5.69
Compound 1-5	−5.70
Compound 1-7	−5.69
Compound 1-10	−5.74
Compound 1-16	−5.75
Compound 1-36	−5.74
Comparative Compound C1	−5.30



C1

[0086] As may be seen in Table 1, the HOMO levels of Compounds 1-2, 1-5, 1-7, 1-10, 1-16, and 1-36 were lower than the HOMO level of Comparative Compound C1. Accordingly, it may be seen that, in the organic electroluminescence device using Compounds 1-2, 1-5, 1-7, 1-10, 1-16, and 1-36 as the hole transport material, holes may be smoothly injected from the hole injection layer to the hole transport layer.

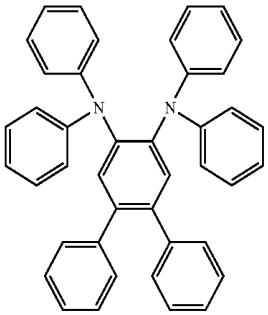
[0087] (Measurement of Glass Transition Point)

[0088] Next, the glass transition points of Compounds 1-2, 1-5, 1-7, 1-10, 1-16, and 1-36 were measured by using a differential scanning calorimeter DSC7020 manufactured by Hitachi High-Technologies Corporation. Further, for comparison, the glass transition point of Comparative Compound C2 was measured. Further, Comparative Compound C2 is represented by the following Chemical Formula C2. Com-

parative Compound C2 is a Comparative Example. The measurement results are described in Table 2.

TABLE 2

	Glass transition point (° C.)
Compound 1-2	116
Compound 1-5	128
Compound 1-7	105
Compound 1-10	126
Compound 1-16	132
Compound 1-36	137
Comparative Compound C2	90



C2

ozone (O_3). Further, the thickness of the ITO film (first electrode) was about 150 nm. After ozone treatment, the substrate was washed. The washed substrate was set on a glass bell jar-type deposition apparatus for forming an organic layer, and a hole injection layer, a HTL (hole transport layer), an emission layer, and an electron transport layer were sequentially deposited under a degree of vacuum of about 10^{-4} to 10^{-5} Pa. The material of the hole injection layer was 2-TNATA and the thickness was set to about 60 nm. The materials of the HTL were those described in Table 3, and the thickness was set to about 30 nm. Further, the thickness of the emission layer was set to about 25 nm. The host of the emission material was 9,10-di(2-naphthyl)anthracene (ADN). The dopant was 2,5,8,11-tetra-t-butylperylene (TBP). A doping amount of the dopant was set to about 3 mass % based on the mass of the host. The material of the electron transport layer was Alq_3 and the thickness was set to about 25 nm. Continuously, the substrate was moved by the glass bell jar-type deposition apparatus for forming the metal film, and the electron injection layer and the negative electrode material were deposited under the degree of vacuum of about 10^{-4} to 10^{-5} Pa. The material of the electron injection layer was LiF and the thickness was set to about 1.0 nm. The material of the second electrode was Al and the thickness was set to about 100 nm.

TABLE 3

Device manufacturing example	HTL	Current density (A/cm^2)	Driving voltage (V)	Emission efficiency (cd/A)	Emission life (LT50(hr))
Example 1	Compound 1-2	10	6.5	6.7	1,600
Example 2	Compound 1-5	10	6.3	7.2	2,100
Example 3	Compound 1-7	10	6.4	6.9	1,900
Example 4	Compound 1-10	10	6.2	7.4	1,800
Example 5	Compound 1-16	10	6.1	7.3	1,600
Example 6	Compound 1-36	10	6.3	7.1	1,900
Comparative Example 1	Comparative Compound C1	10	8.1	5.3	1,100
Comparative Example 2	Comparative Compound C2	10	6.6	6.0	1,300

[0089] As may be seen in Table 2, the glass transition points of Compounds 1-2, 1-5, 1-7, 1-10, 1-16, and 1-36 were higher than the glass transition point of Comparative Compound C2. Accordingly, it may be seen that, in the organic electroluminescence device using Compounds 1-2, 1-5, 1-7, 1-10, 1-16, and 1-36 as the hole transport material, thermal stability of Compounds 1-2, 1-5, 1-7, 1-10, 1-16, and 1-36 may be increased and a film quality in the device may be improved.

[0090] (Manufacturing of Organic Electroluminescence Device)

[0091] Next, the organic electroluminescence device was manufactured by the following manufacturing method. First, an ITO-glass substrate patterned in advance and subjected to washing treatment was subjected to surface treatment by

[0092] (Property Evaluation)

[0093] Next, the driving voltage, emission efficiency, and the emission life of the manufactured organic electroluminescence device were measured. Further, in evaluation of the electroluminescence property of the manufactured organic EL device **100**, the brightness orientation property measurement apparatus C9920-11 manufactured by HAMAMATSU Photonics K. K. was used. Further, in Table 3, the current density was measured to be about 10 (mA/cm^2) and the half-life was measured to be about 1,000 (cd/m^2). The results are described in Table 3.

[0094] According to Table 3, in Examples 1 to 6, the driving voltage was low, efficiency was high, and the life was long, compared to Comparative Examples 1 and 2. For example, in Examples 1 to 6, as compared to Comparative Example 1, the driving voltage and emission efficiency were significantly

improved. The reason may be considered to be because in Examples 1 to 6, the HOMO level of the material for an organic electroluminescence device was low, and an appropriate value with respect to the organic electroluminescence device. Further, in Examples 1 to 6, as compared to Comparative Example 2, efficiency was high and the emission life was significantly improved. The reason may be considered to be because in Examples 1 to 6, the glass transition point of the material for an organic electroluminescence device was increased, stability of the molecules was improved, and the film quality was improved. Further, the reason may be considered to be because the substituent on nitrogen was substituted from the phenyl group to the biphenyl group, the dibenzohetero group, or the like, and thus stability of the cationic radical was improved. As described above, in the Examples, particularly, in the blue region, the driving voltage, emission efficiency, and the emission life of the organic electroluminescence device may be significantly improved. Further, in the Examples, the compound group may have a wide energy gap corresponding to the blue region, and the compound group can be applied even to the green to red regions.

[0095] According to an embodiment, the material for an organic electroluminescence device may have the configuration of Chemical Formula 1, and the driving voltage, emission efficiency, and the emission life of the organic electroluminescence device using the same may be significantly improved. Accordingly, the material for an organic electroluminescence device of the present embodiment may be useful for commercialization of various purposes.

[0096] By way of summation and review, a p-phenylenediamine derivative is a hole transport material that may be used in the hole transport layer, and an o-phenylenediamine derivative is an electric charge transport material that may be used in an electrophotographic photoreceptor.

[0097] In an organic electroluminescence device using a p-phenylenediamine derivative as a hole transport material, it may not be possible to obtain a satisfactory value with respect to a driving voltage, emission efficiency, and an emission life. Further, an organic electroluminescence device may be manufactured by using an o-phenylenediamine derivative as a hole transport material, but even in this organic electroluminescence device, it may not be possible to obtain a satisfactory value with respect to a driving voltage, emission efficiency, and an emission life. As described above, in the compounds, it may be impossible to obtain a satisfactory value with respect to the driving voltage, emission efficiency, and the emission life of the organic electroluminescence device.

[0098] The embodiments may provide a compound for an organic electroluminescence device that helps improve driving voltage, emission efficiency, and emission life of the organic electroluminescence device.

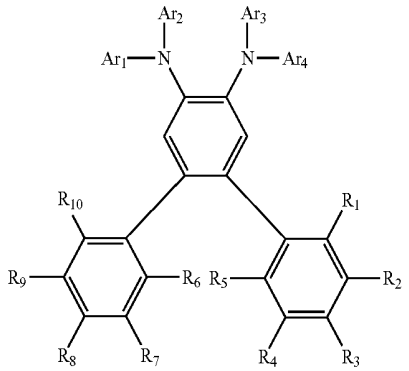
[0099] As described above, a compound for an organic electroluminescence device according to an embodiment may have a low HOMO level and a high glass transition point, and a driving voltage, emission efficiency, and an emission life of the organic electroluminescence device may be improved by using the compound in the organic electroluminescence device.

[0100] Example embodiments have been disclosed herein, and although specific terms are employed, they are used and are to be interpreted in a generic and descriptive sense only and not for purpose of limitation. In some instances, as would be apparent to one of ordinary skill in the art as of the filing of the present application, features, characteristics, and/or elements described in connection with a particular embodiment may be used singly or in combination with features, characteristics, and/or elements described in connection with other embodiments unless otherwise specifically indicated. Accordingly, it will be understood by those of skill in the art that various changes in form and details may be made without departing from the spirit and scope of the present invention as set forth in the following claims.

What is claimed is:

1. A compound for an organic electroluminescence device, the compound being represented by the following Chemical Formula 1:

[Chemical Formula 1]



wherein, in Chemical Formula 1,

Ar_1 to Ar_4 are each independently a substituted or unsubstituted aryl group or a substituted or unsubstituted heteroaryl group,

at least one of Ar_1 to Ar_4 is a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms.

R_1 to R_{10} are each independently a hydrogen atom, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkoxy group, a halogen atom, an electron suction group, or a deuterium atom, and

adjacent ones of R_1 to R_{10} are separate or are combined to each other to form a saturated or unsaturated ring.

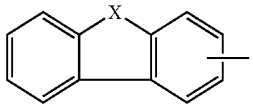
2. The compound for an organic electroluminescence device as claimed in claim **1**, wherein the aryl group having 10 or more ring carbon atoms includes a biphenyl group, a naphthyl group, a phenanthrenyl group, or a triphenylenyl group.

3. The compound for an organic electroluminescence device as claimed in claim **2**, wherein the aryl group having 10 or more ring carbon atoms includes the biphenyl group.

4. The compound for an organic electroluminescence device as claimed in claim **1**, wherein the heteroaryl group having 10 or more ring carbon atoms includes a dibenzohetero group.

5. The compound for an organic electroluminescence device as claimed in claim **4**, wherein the dibenzohetero group is a group represented by the following Chemical Formula 2:

[Chemical Formula 2]



wherein, in Chemical Formula 2,

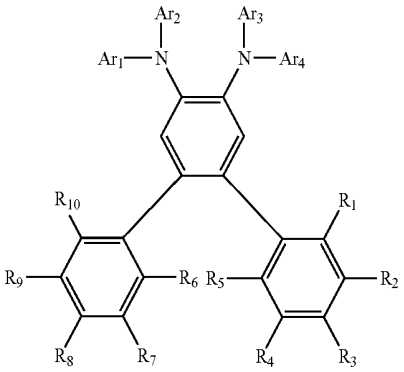
X is O, S, or $Si(R_{11})_2$, and

R_{11} is a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

6. The compound for an organic electroluminescence device as claimed in claim **1**, wherein Ar_1 to Ar_4 are each independently a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms.

7. An organic electroluminescence device, comprising a compound for an organic electroluminescence device, the compound being represented by the following Chemical Formula 1:

[Chemical Formula 1]



wherein, in Chemical Formula 1,

Ar_1 to Ar_4 are each independently a substituted or unsubstituted aryl group or a substituted or unsubstituted heteroaryl group,

at least one of Ar_1 to Ar_4 is a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms.

R_1 to R_{10} are each independently a hydrogen atom, a substituted or unsubstituted aryl group, a substituted or unsubstituted heteroaryl group, a substituted or unsubstituted alkyl group, a substituted or unsubstituted alkoxy group, a halogen atom, an electron withdrawing group, or a deuterium atom, and

adjacent ones of R_1 to R_{10} are separate or are combined to each other to form a saturated or unsaturated ring.

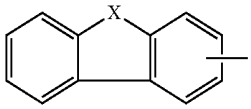
8. The organic electroluminescence device as claimed in claim **7**, wherein the aryl group having 10 or more ring carbon atoms includes a biphenyl group, a naphthyl group, a phenanthrenyl group, or a triphenylenyl group.

9. The organic electroluminescence device as claimed in claim **8**, wherein the aryl group having 10 or more ring carbon atoms includes a biphenyl group.

10. The organic electroluminescence device as claimed in claim **7**, wherein the heteroaryl group having 10 or more ring carbon atoms includes a dibenzohetero group.

11. The organic electroluminescence device as claimed in claim **10**, wherein the dibenzohetero group is a group represented by the following Chemical Formula 2:

[Chemical Formula 2]



wherein, in Chemical Formula 2,

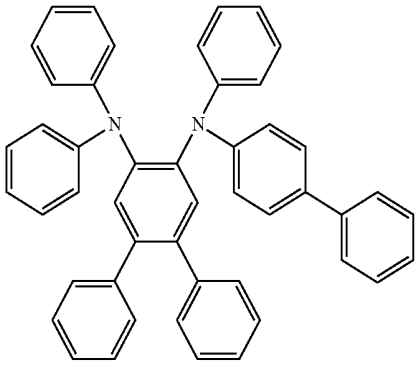
X is O, S, or $Si(R_{11})_2$, and

R_{11} is a substituted or unsubstituted alkyl group or a substituted or unsubstituted aryl group.

12. The organic electroluminescence device as claimed in claim **7**, wherein Ar_1 to Ar_4 are each independently a substituted or unsubstituted aryl group having 10 or more ring carbon atoms or a substituted or unsubstituted heteroaryl group having 10 or more ring carbon atoms.

13. The organic electroluminescence device as claimed in claim **7**, wherein the compound for an organic electroluminescence device includes one of the following Compounds 1-1 to 1-24:

1-1



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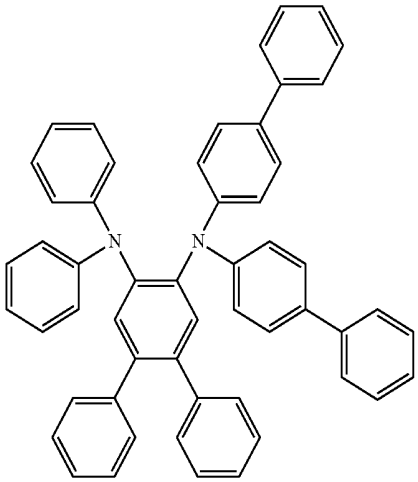

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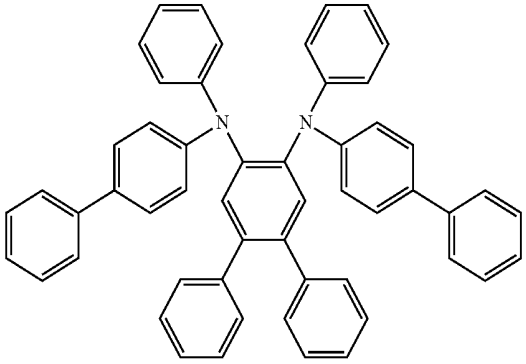
1-3



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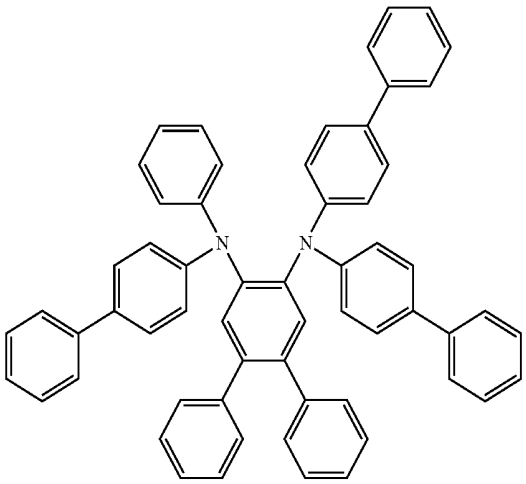

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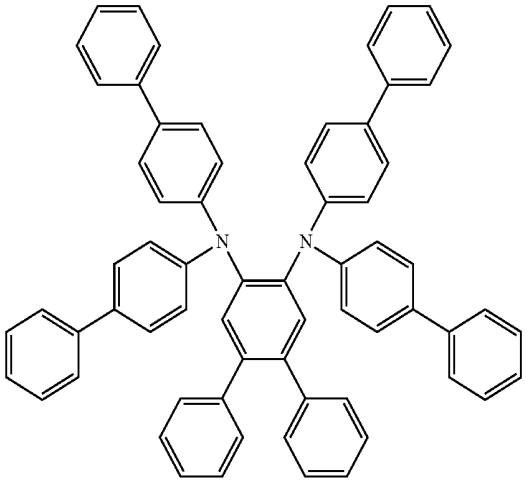

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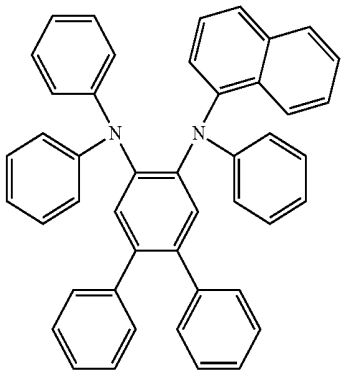

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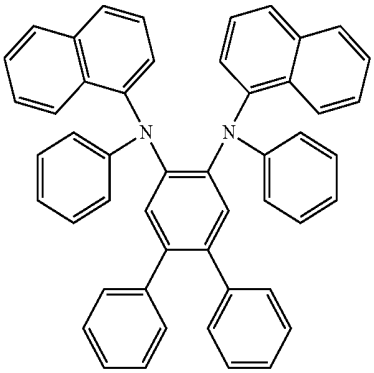

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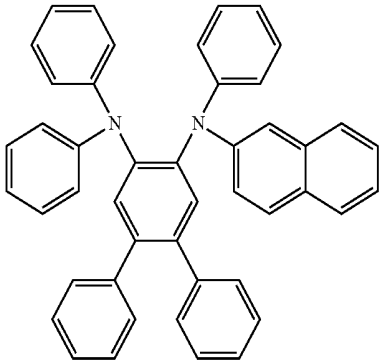

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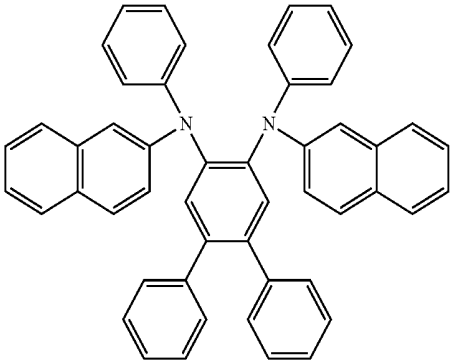

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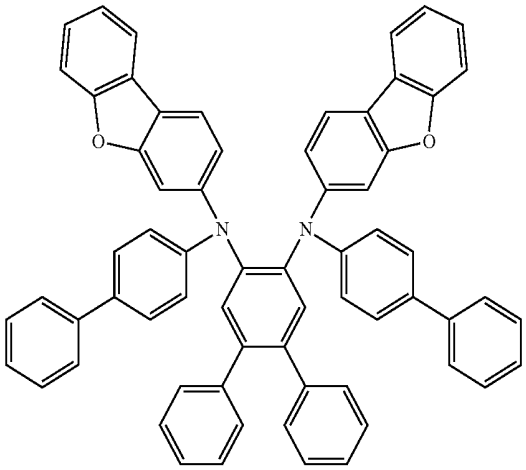

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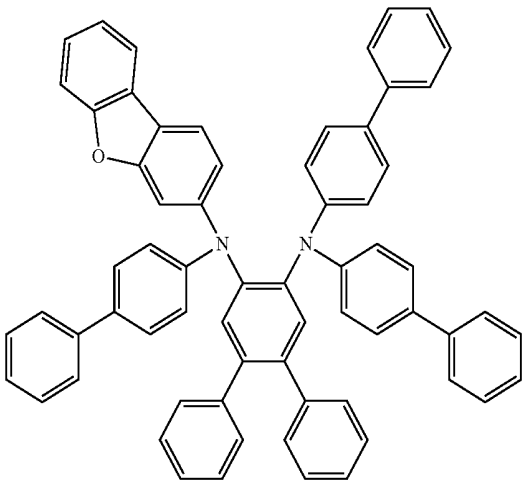

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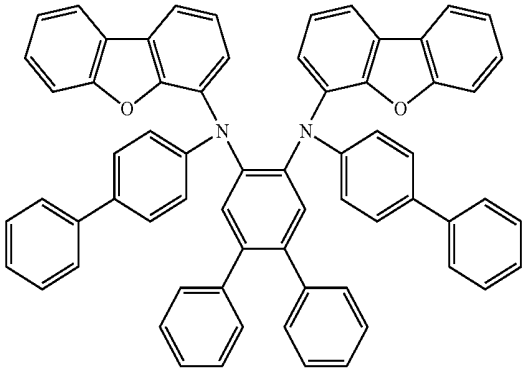

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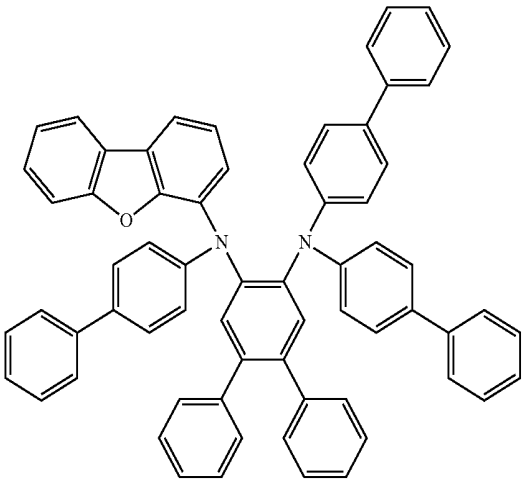

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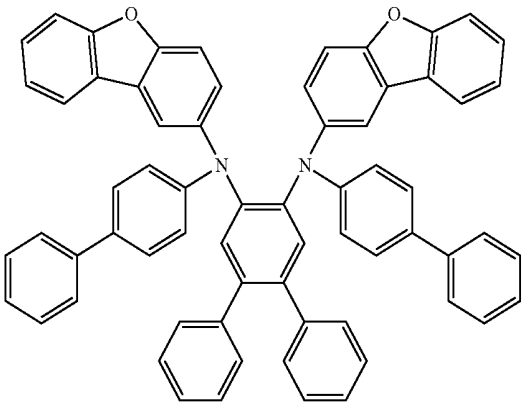

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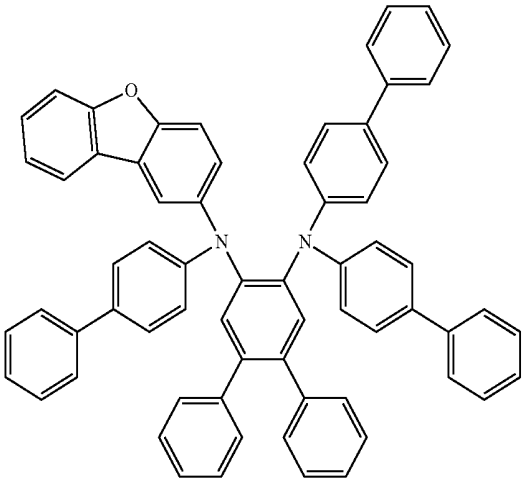

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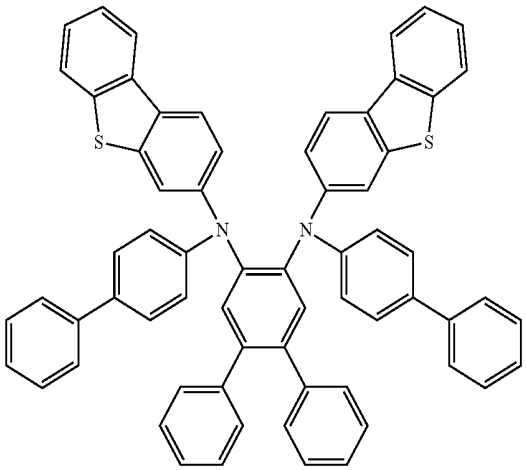

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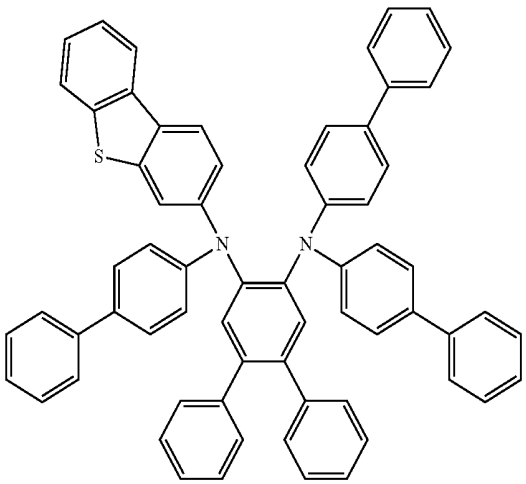

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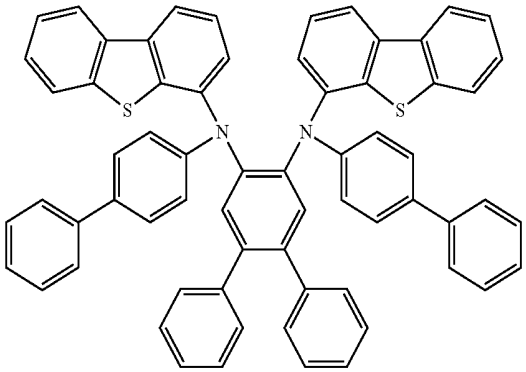

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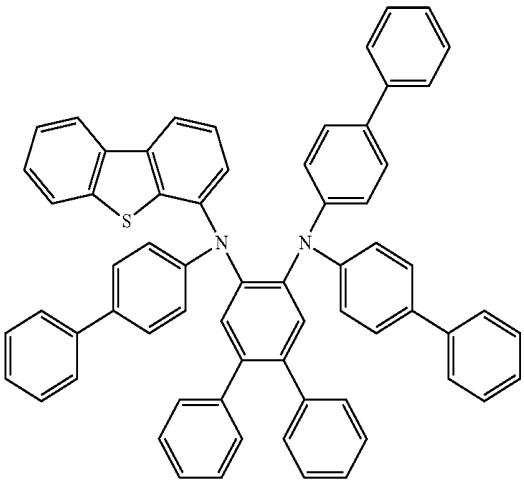

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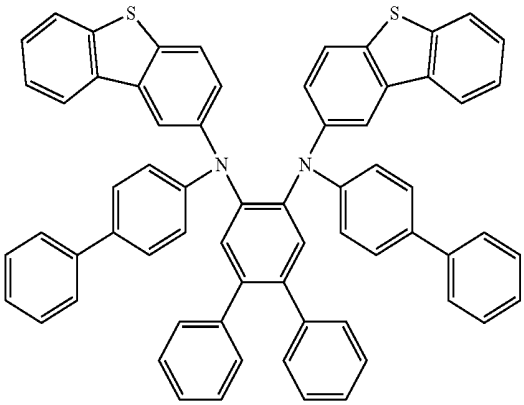

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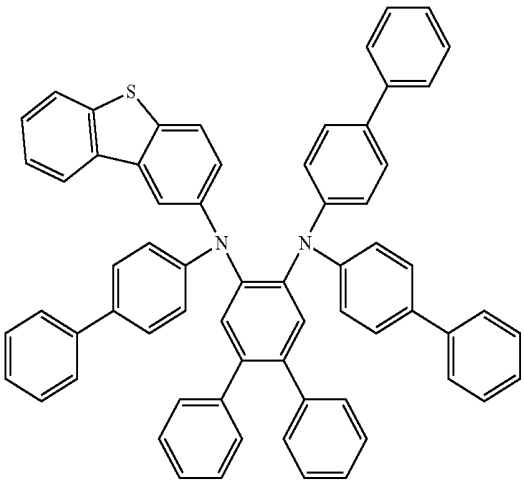

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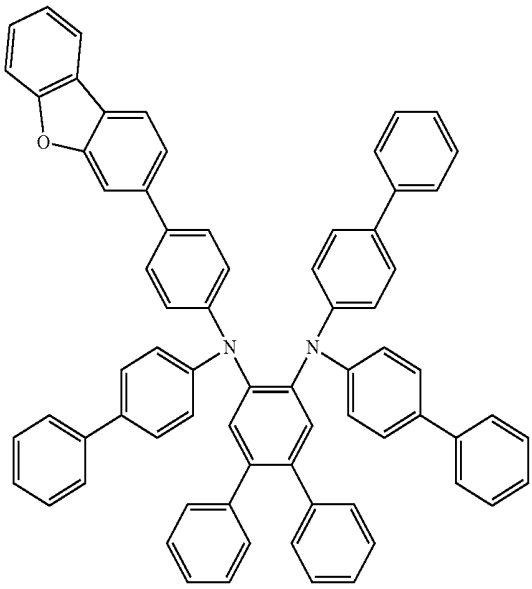

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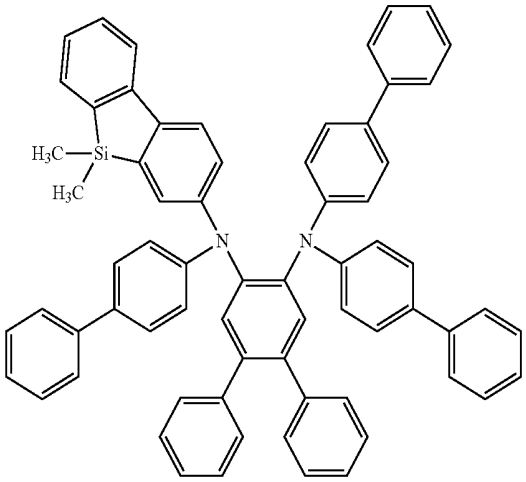

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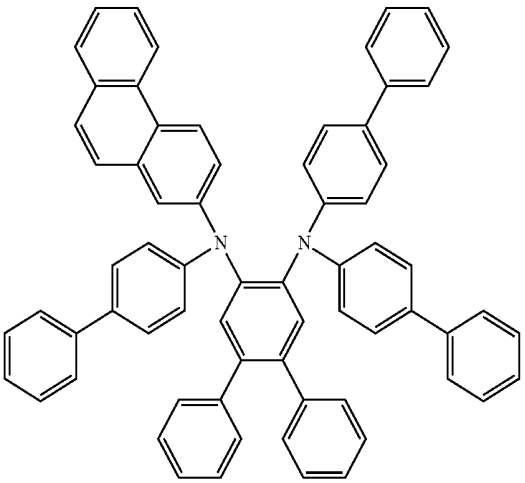
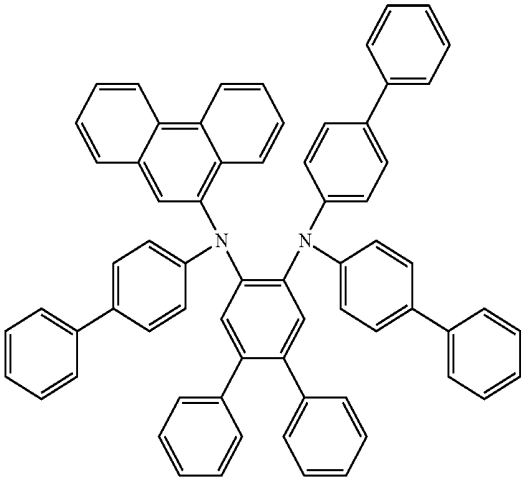


14. The organic electroluminescence device as claimed in claim **7**, wherein the compound for an organic electroluminescence device includes one of the following Compounds 1-25 to 1-44:

1-25



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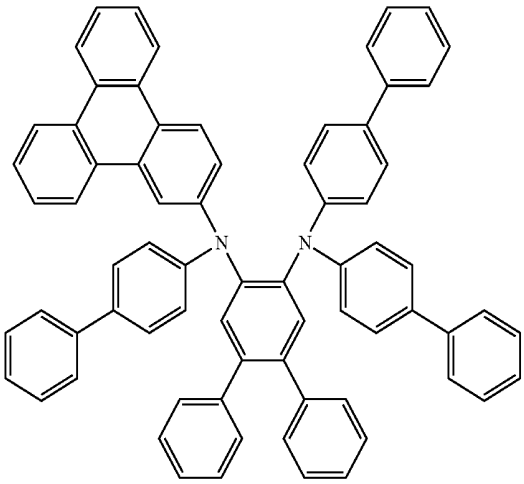

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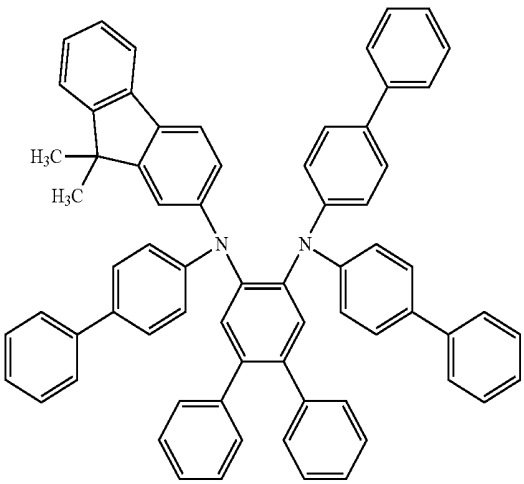

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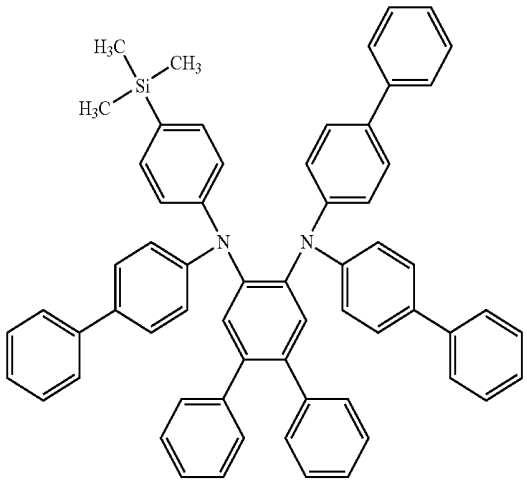
1-28



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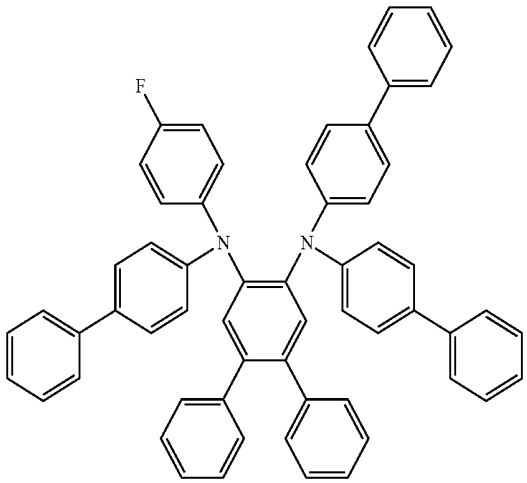

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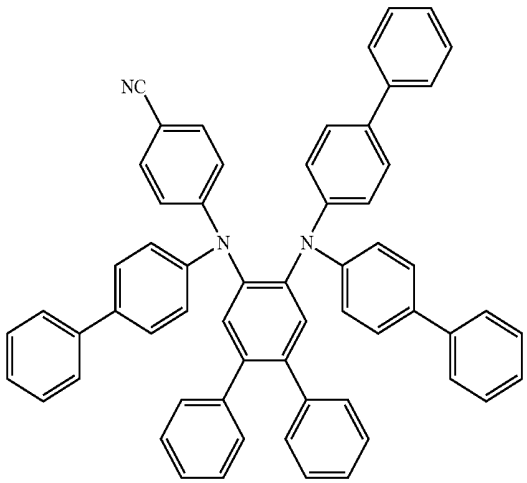

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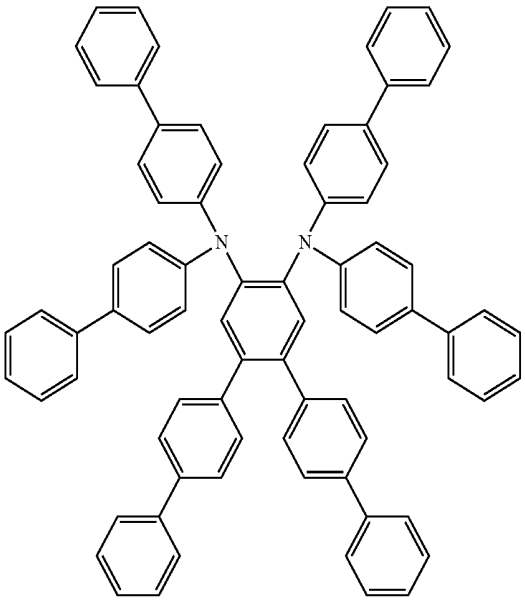

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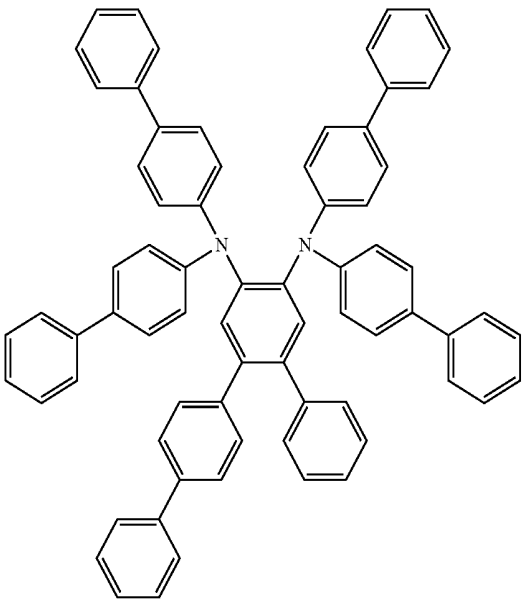

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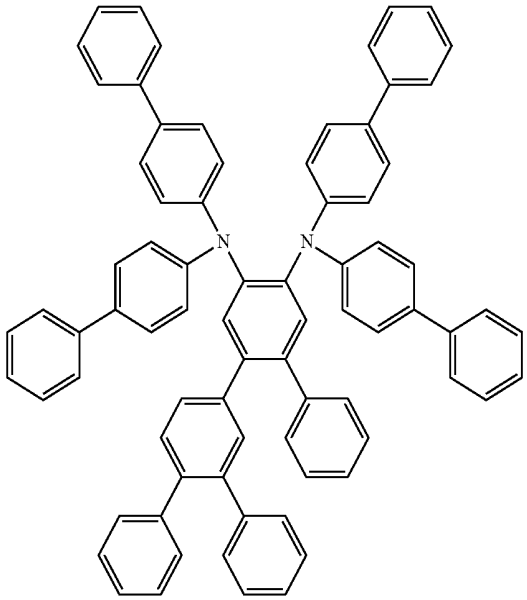

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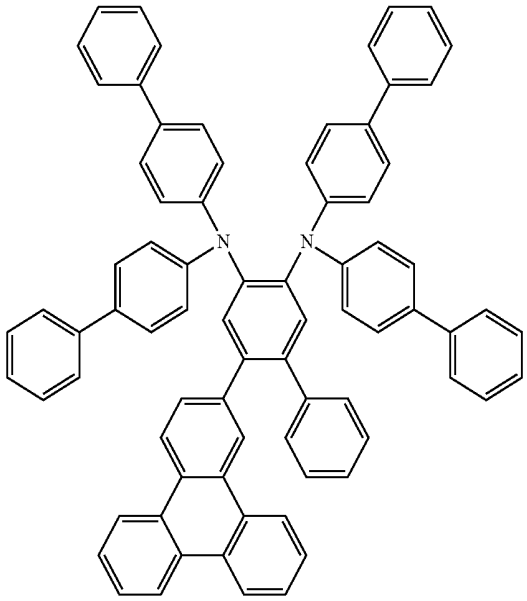

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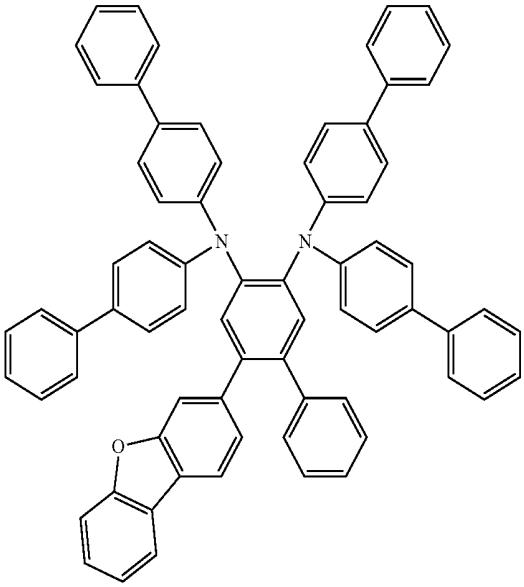

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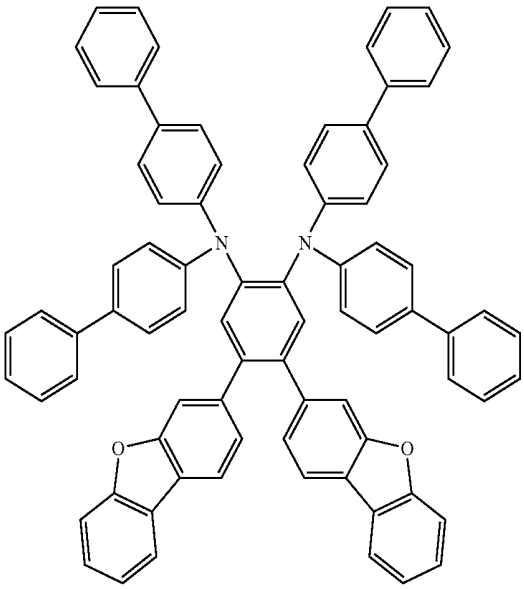

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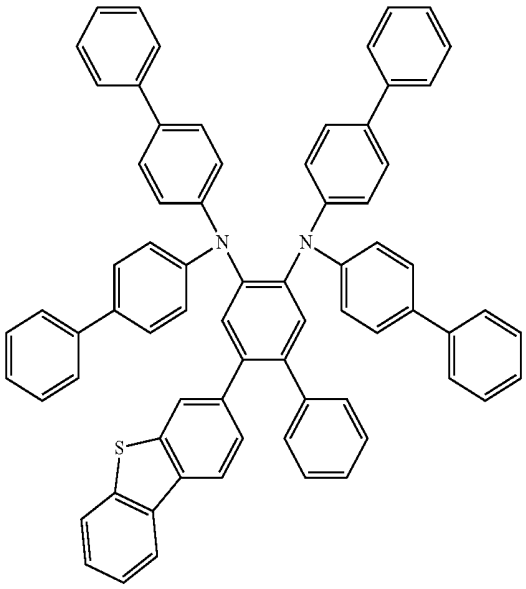

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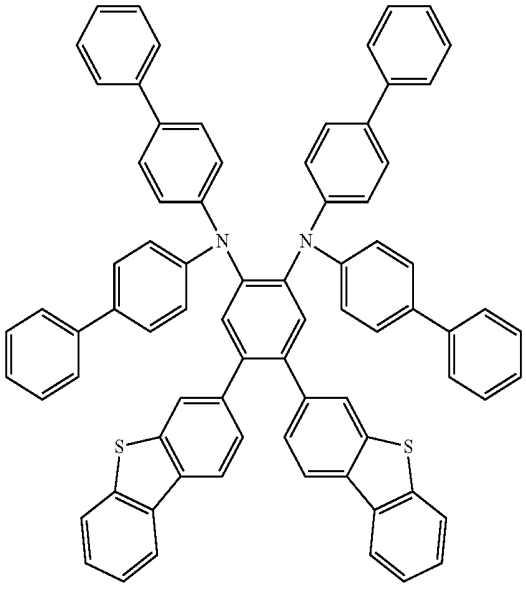

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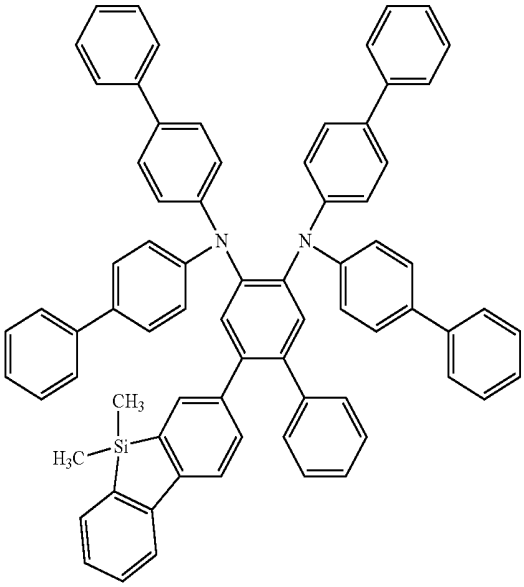

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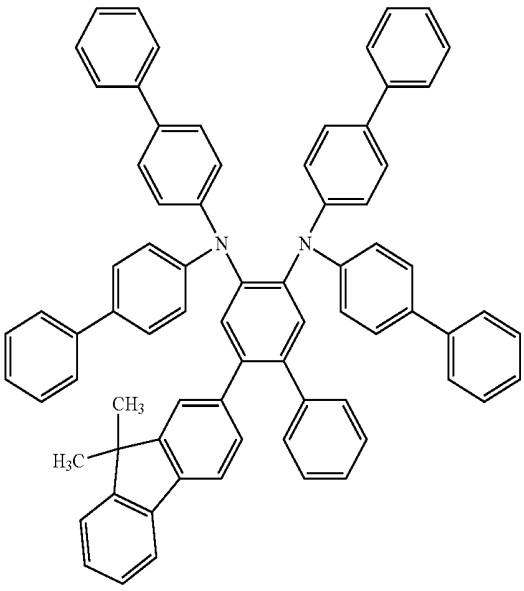

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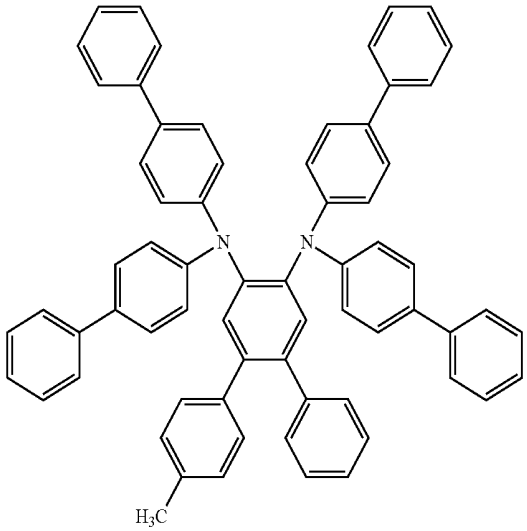

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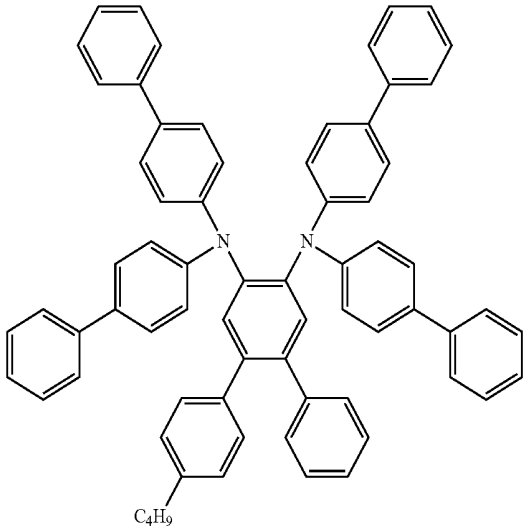

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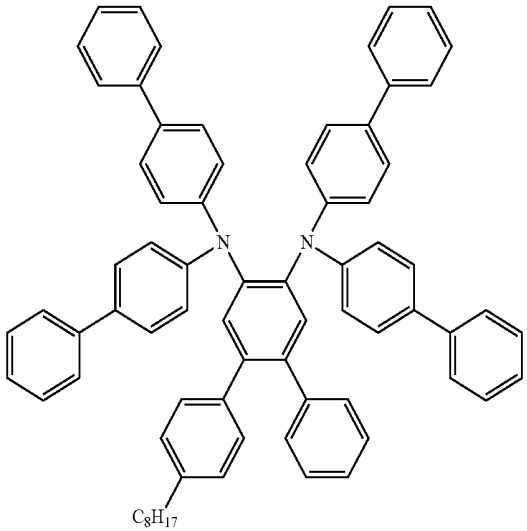

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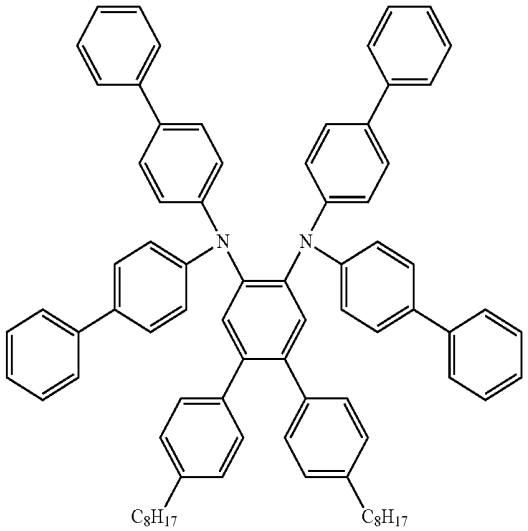
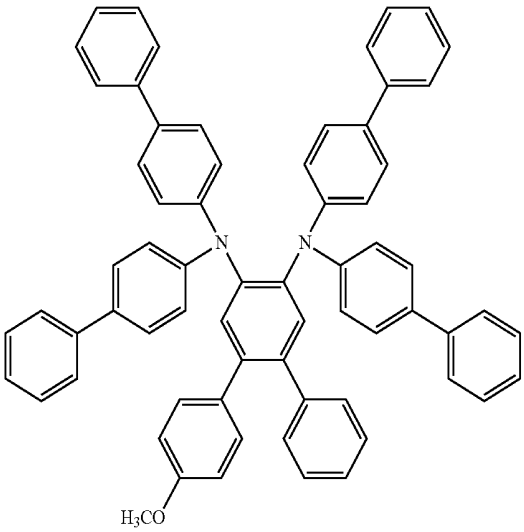


15. The organic electroluminescence device as claimed in claim **7**, wherein the compound for an organic electroluminescence device includes one of the following Compounds 1-45 to 1-58:

1-45



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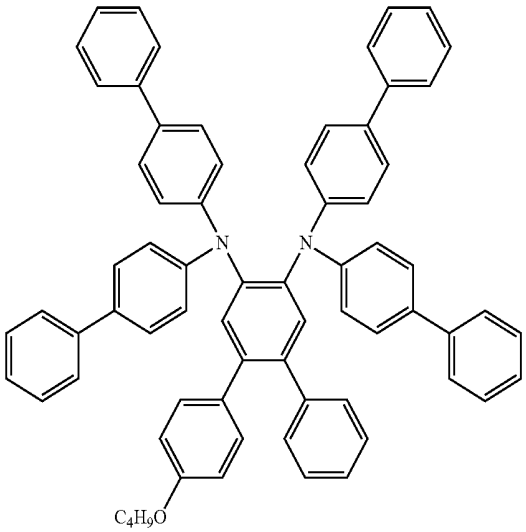

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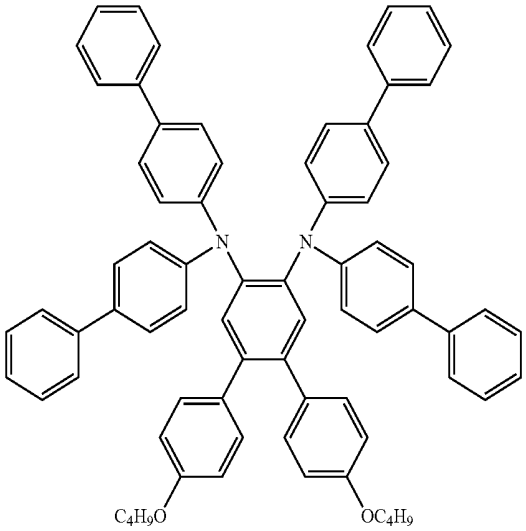

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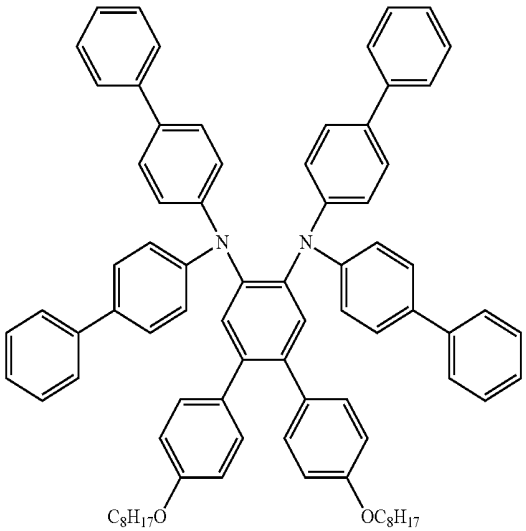

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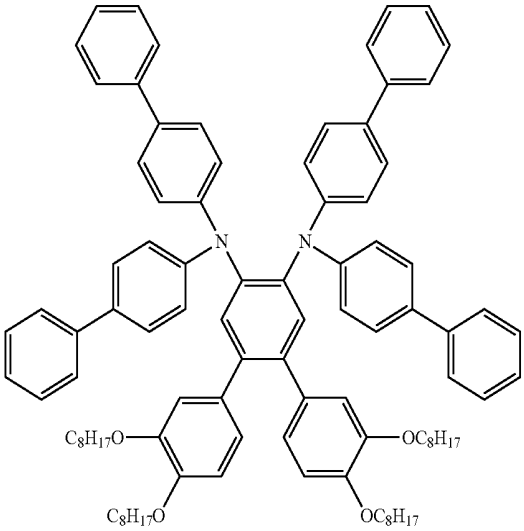

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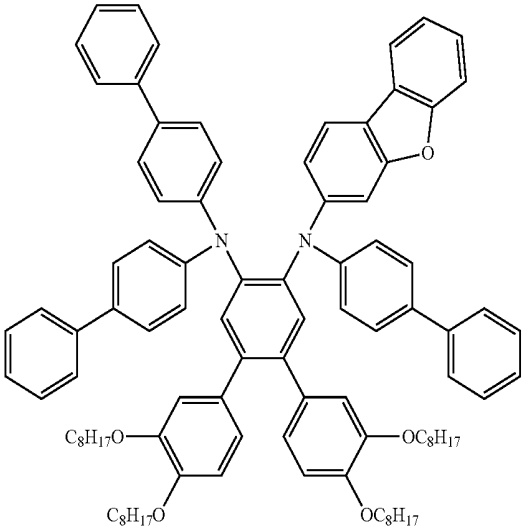

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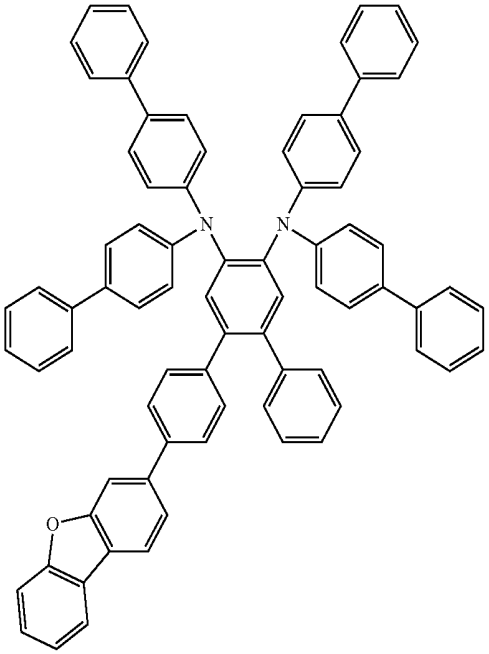

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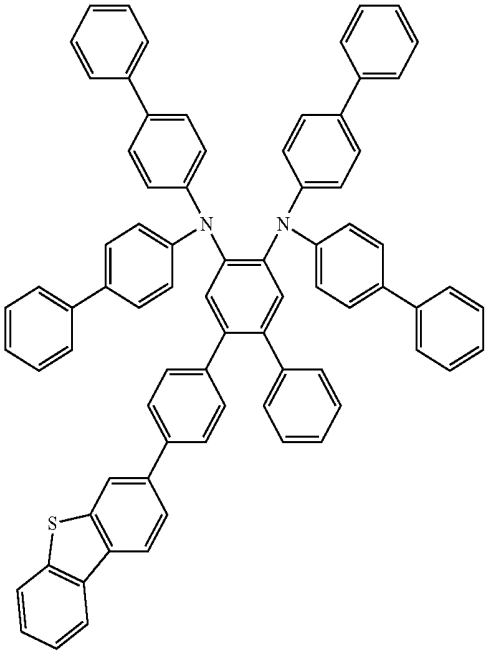

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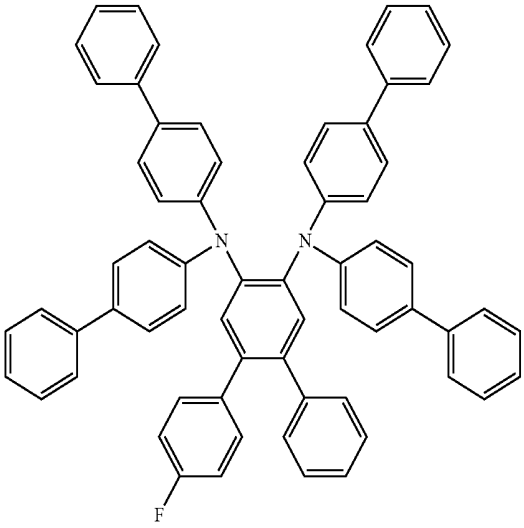

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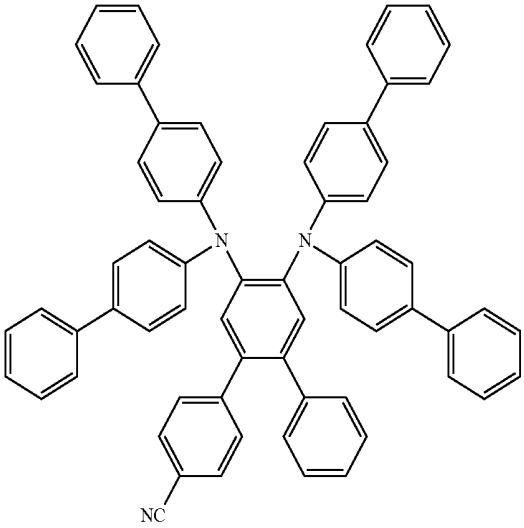

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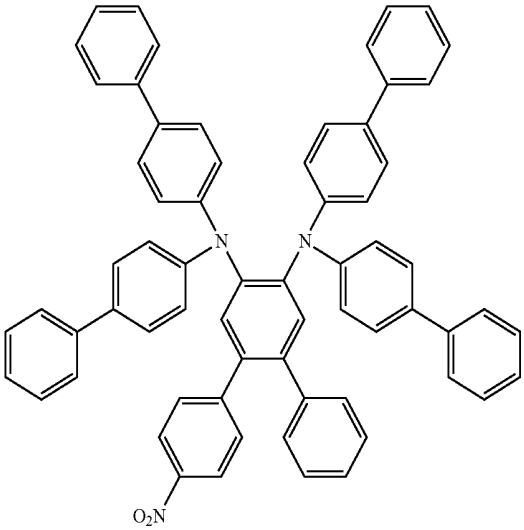

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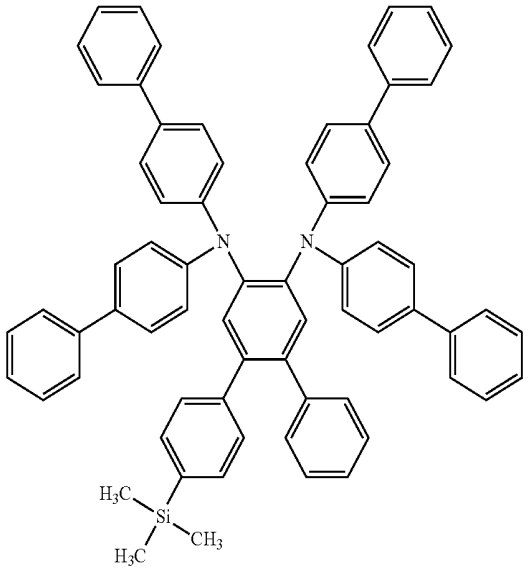
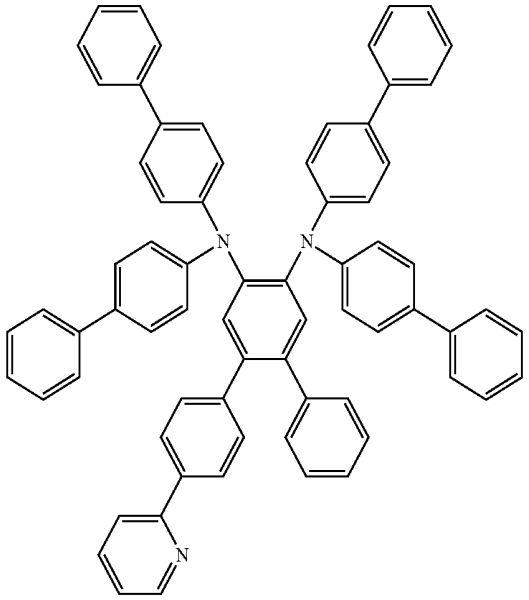
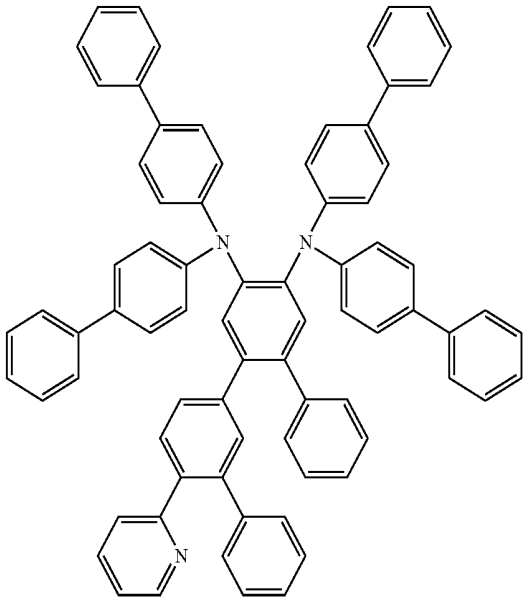


1-57



-continued

1-58



16. The organic electroluminescence device as claimed in claim **7**, wherein:

the organic electroluminescence device includes a hole transport layer, and

the compound for an organic electroluminescence device is included in the hole transport layer.

* * * * *

专利名称(译)	用于有机电致发光器件的材料和使用其的有机电致发光器件		
公开(公告)号	US20150380656A1	公开(公告)日	2015-12-31
申请号	US14/706171	申请日	2015-05-07
[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DISPLAY CO.，LTD.		
当前申请(专利权)人(译)	三星DISPLAY CO.，LTD.		
[标]发明人	SAKAMOTO NAOYA		
发明人	SAKAMOTO, NAOYA		
IPC分类号	H01L51/00 C07C211/58 C07D307/91 C07D333/76 C09K11/06 C07C211/61 C07C211/56 C07C255/58 C07C217/80 C07D213/36 C07C211/54 C07F7/08		
CPC分类号	H01L51/0059 C07F7/081 C07C211/58 C07D307/91 C07D333/76 C07C211/61 C07C211/56 C07C255/58 C07C217/80 C07D213/36 C09K11/06 H01L51/006 H01L51/0061 C09K2211/1014 C09K2211/1007 C09K2211/1011 C09K2211/1088 C09K2211/1092 C09K2211/1029 H01L51/0073 H01L51/0074 H01L51/5056 H01L51/0081 C07C2603/18 C07C2603/26 C07C2603/42 C07C211/54		
优先权	2014133854 2014-06-30 JP		
外部链接	Espacenet USPTO		

摘要(译)

用于有机电致发光器件的化合物和有机电致发光器件，该化合物由以下化学式1表示：

CPC ***H01L 51/0059*** (2013.01); ***C07C 211/54*** (2013.01); ***C07C 211/58*** (2013.01); ***C07D 307/91*** (2013.01); ***C07D 333/76*** (2013.01); ***C07F 7/081*** (2013.01); ***C07C 211/61*** (2013.01); ***C07C 211/56*** (2013.01); ***C07C 255/58*** (2013.01); ***C07C 217/80*** (2013.01); ***C07D 213/36*** (2013.01); ***C09K 11/06*** (2013.01); ***H01L 51/006*** (2013.01); ***H01L 51/0061*** (2013.01); ***H01L 51/0094*** (2013.01); ***H01L 51/0067*** (2013.01); *C09K 2211/1014* (2013.01); *C09K 2211/1007* (2013.01); *C09K 2211/1011* (2013.01); *C09K 2211/1088* (2013.01); *C09K 2211/1092* (2013.01); *C09K 2211/1029* (2013.01); *H01L 51/0073* (2013.01); *H01L 51/0074* (2013.01); *H01L 51/0052* (2013.01); *H01L 51/0054* (2013.01); *H01L 2251/308* (2013.01); *H01L 51/5206* (2013.01)