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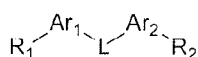
AL BA RS(30) Priority: **05.12.2008 KR 20080123276**(71) Applicant: **Gracel Display Inc.****Seoul 133-833 (KR)**

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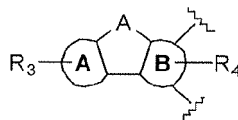
(57) Provided are novel organic electroluminescent compounds, and organic electroluminescent devices and organic solar cells including the same. The organic electroluminescent compound is represented by Chemical Formula 1:



(1)

wherein

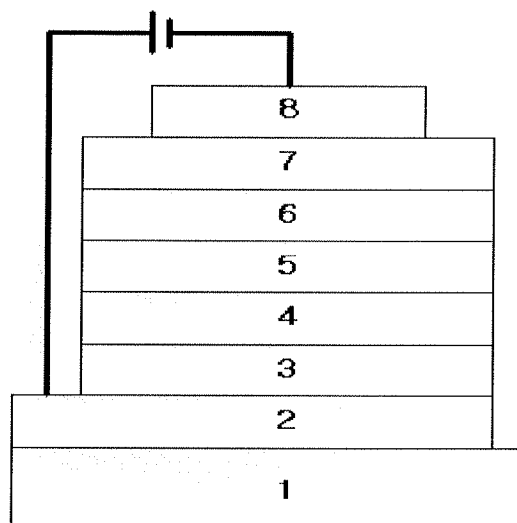
L is a substituent represented by the following structural formula:



ring A represents a monocyclic or polycyclic (C6-C60) aromatic ring; and
ring B represents anthracene.

The organic electroluminescent compound provides superior luminous efficiency and excellent color purity of the material and life property. Therefore, it may be used to manufacture OLEDs having very good operation life.

FIG. 1



Description

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority to Korean Patent Application No. 10-2008-0123276, filed on December 5, 2008, and all the benefits accruing therefrom under 35 U.S.C. §119.

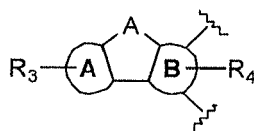
BACKGROUND**1. Field**

[0002] The present invention relates to novel organic electroluminescent compounds, and organic electroluminescent devices and organic solar cells comprising the same. Specifically, the organic electroluminescent compounds according to the present invention are **characterized in that** they are represented by Chemical Formula 1:



wherein

L is a substituent represented by the following structural formula:



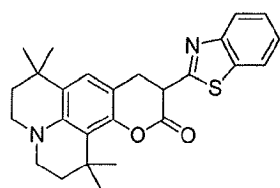
wherein

ring A represents a monocyclic or polycyclic (C6-C60) aromatic ring; and
ring B represents anthracene.

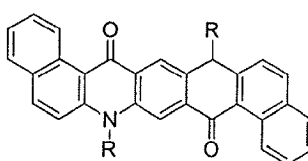
2. Description of the Related Art

[0003] In order to create a full-color organic light-emitting diode (OLED) display, electroluminescent materials of red, green and blue (RGB) colors are used. The development of RGB electroluminescent materials with high efficiency and long operation life is the most important task in improving the overall organic electroluminescence (EL) characteristics. Electroluminescent materials can be classified into host materials and dopant materials depending on their functions. In general, it is known that an electroluminescent layer created by doping a dopant into a host has the most superior EL characteristics. Recently, the development of organic EL devices having high efficiency and long operation life is emerging as an imminent task. Especially, considering the EL characteristics required by medium-to-large sized OLED panels, the development materials having much superior characteristics as compared to existing electroluminescent materials is highly required.

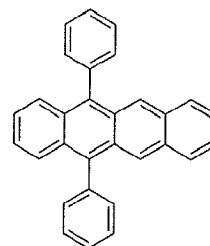
[0004] For green fluorescent materials, a system of doping a dopant such as a coumarin derivative (Compound a, C545T), a quinacridone derivative (Compound b), DPT (Compound c), etc. to the Alq host to several to dozen % has been developed and is widely used. Although these existing electroluminescent materials exhibit high initial luminous efficiency as to be commercially applicable, the efficiency decreases markedly with time and operation life is severely problematic. As a result, they are limited in use for large-sized, high-performance panels.



Compound a

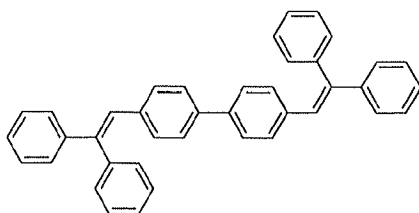


Compound b

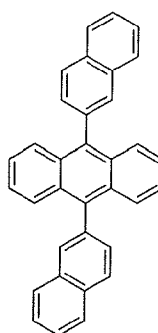


Compound c

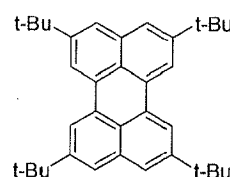
[0005] For blue fluorescent materials, a lot of materials have been commercialized following Idemitsu Kosan's DPVBi (Compound d). Idemitsu Kosan's blue material system and Kodak's dinaphthylanthracene (Compound e) and tetra(t-butyl)perylene (Compound f) are known, but much more research and development are demanded. Until now, Idemitsu Kosan's distyryl compound system is known to have the best efficiency. It exhibits a power efficiency of 6 lm/W and operation life of 30,000 hours or more. However, its color is sky-blue, which is inadequate for full-color displays. In general, blue electroluminescence is advantageous in luminous efficiency if the electroluminescence wavelength shifts a little toward the longer wavelength. But, it is not applicable to high-quality displays because pure blue color is not attained. Therefore, researches and developments to improve color purity, efficiency and thermal stability are highly required.



Compound d



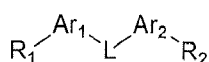
Compound e



Compound f

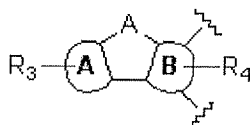
SUMMARY

[0006] The present invention relates to an organic electroluminescent compound represented by Chemical Formula 1 and an organic electroluminescent device comprising the same. The organic electroluminescent compound according to the present invention has good luminous efficiency and excellent color purity and life property. Therefore, OLEDs having very good operation life can be manufactured therefrom.



(1)

In Chemical Formula 1,
L is a substituent represented by the following structural formula:



wherein

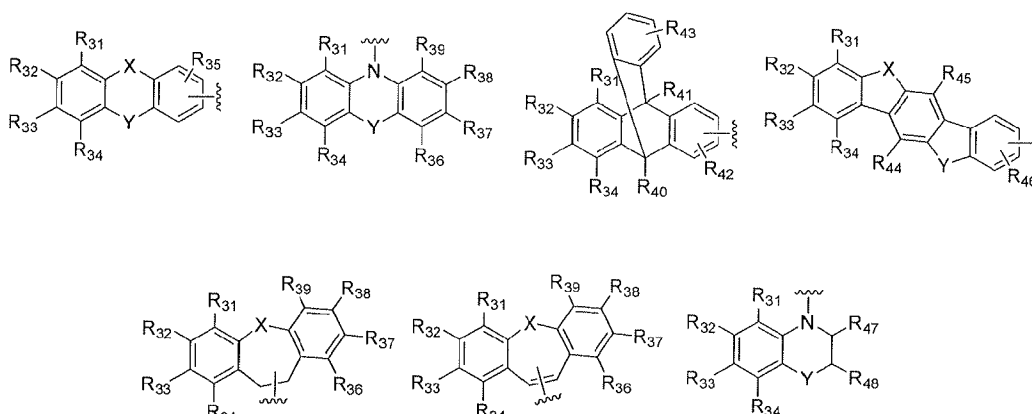
A represents $-N(R_{71})-$, $-S-$, $-O-$, $-Si(R_{72})(R_{73})-$, $-P(R_{74})-$, $-C(=O)-$, $-B(R_{75})-$, $-In(R_{76})-$, $-Se-$, $-Ge(R_{77})(R_{78})-$, $-Sn(R_{79})(R_{80})-$ or $-Ga(R_{81})-$;

ring A represents a monocyclic or polycyclic (C6-C60)aromatic ring;

ring B represents anthracene;

Ar_1 and Ar_2 independently represent a chemical bond, (C6-C60)arylene, (C3-C60)heteroarylene containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkylene containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkylene, (C2-C60)alkenylene, (C2-C60)alkynylene, (C1-C60)alkylenoxy, (C6-C60)arylenoxy or (C6-C60)arylenethio;

R_1 and R_2 independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylearbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or a substituent selected from the following structures:



wherein

X and Y independently represent a chemical bond, $-(CR_{51}R_{52})_m-$, $-N(R_{53})-$, $-S-$, $-O-$, $-Si(R_{54})(R_{55})-$, $-P(R_{56})-$, $-C(=O)-$, $-B(R_{57})-$, $-In(R_{58})-$, $-Se-$, $-Ge(R_{59})(R_{60})-$, $-Sn(R_{61})(R_{62})-$, $-Ga(R_{63})-$ or $-(R_{64})C=C(R_{65})-$, excluding the case where both X and Y are chemical bonds at the same time;

R_3 , R_4 and R_{31} through R_{48} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or each of R_{31} through R_{43} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

R_{51} through R_{65} and R_{71} through R_{81} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar

(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R_{51} and R_{52} , R_{54} and R_{55} , R_{59} and R_{60} , R_{61} and R_{62} , R_{64} and R_{65} , R_{72} and R_{73} , R_{77} and R_{78} and R_{79} and R_{80} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

the arylene, heteroarylene, heterocycloalkylene, cycloalkylene or alkenylene of Ar_1 and Ar_2 or the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, alkenyl, alkynyl, amino, alkylamino or arylamino of R_1 , R_2 , R_3 , R_4 , R_{31} through R_{48} , R_{51} through R_{65} and R_{71} through R_{81} may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl; and

m represents an integer from 1 to 4.

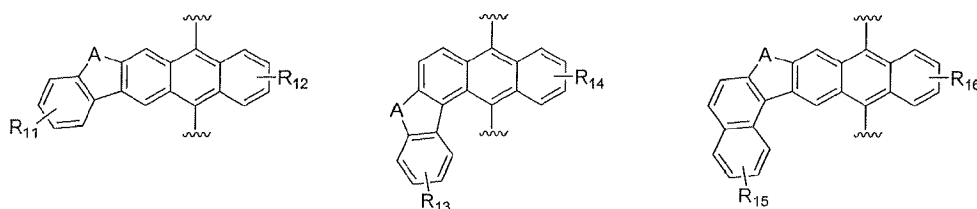
[0007] In the present invention, "alkyl", "alkoxy" and other substituents including "alkyl" moiety may be either linear or branched.

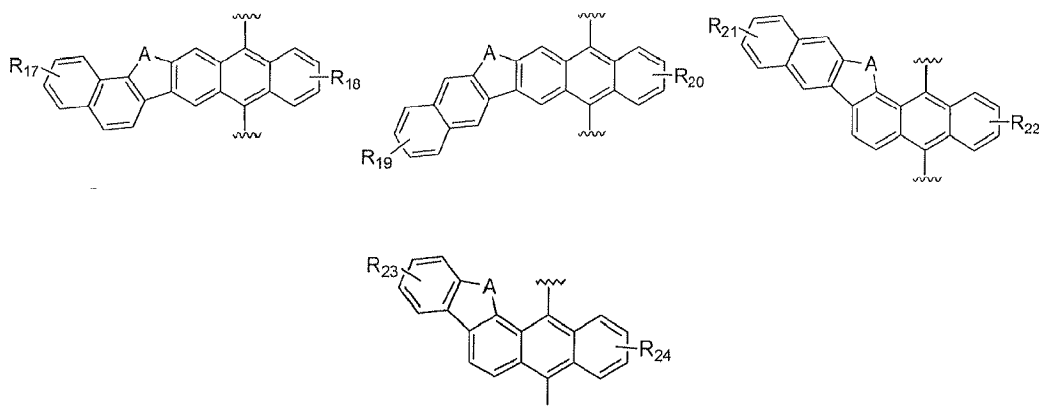
[0008] In the present invention, "aryl" means an organic radical derived from an aromatic hydrocarbon by the removal of one hydrogen, and may include a 4- to 7-membered, particularly 5- or 6-membered, single ring or fused ring. Specific examples include phenyl, naphthyl, biphenyl, anthryl, indenyl, fluorenyl, phenanthryl, triphenylenyl, pyrenyl, perylenyl, chrysenyl, naphthacenyl, fluoranthenyl, etc., but not limited thereto. The naphthyl includes 1-naphthyl and 2-naphthyl, the anthryl includes 1-anthryl, 2-anthryl and 9-anthryl, and the fluorenyl includes all of 1-fluorenyl, 2-fluorenyl, 3-fluorenyl, 4-fluorenyl and 9-fluorenyl.

[0009] In the present invention, "heteroaryl" means aryl group containing 1 to 4 heteroatom(s) selected from N, O, S and Si as aromatic ring backbone atom(s), remaining aromatic ring backbone atoms being carbon. It may be 5- or 6-membered monocyclic heteroaryl or polycyclic heteroaryl resulting from condensation with a benzene ring, and may be partially saturated. The heteroaryl includes a divalent aryl group wherein the heteroatom(s) in the ring may be oxidized or quaternized to form, for example, N-oxide or quaternary salt. Specific examples include monocyclic heteroaryl such as furyl, thiophenyl, pyrrolyl, imidazolyl, pyrazolyl, thiazolyl, thiadiazolyl, isothiazolyl, isoxazolyl, oxazolyl, oxadiazolyl, triazinyl, tetrazinyl, triazolyl, tetrazolyl, furazanyl, pyridyl, pyrazinyl, pyrimidinyl, pyridazinyl, etc., polycyclic heteroaryl such as benzofuranyl, benzothiophenyl, isobenzofuranyl, benzoimidazolyl, benzothiazolyl, benzoisothiazolyl, benzoisoxazolyl, benzoxazolyl, isoindolyl, indolyl, indazolyl, benzothiadiazolyl, quinolyl, isoquinolyl, cinnolinyl, quinazolinyl, quinoxalyl, carbazolyl, phenanthridinyl, benzodioxolyl, etc., N-oxide thereof (e.g., pyridyl N-oxide, quinolyl N-oxide, etc.), quaternary salt thereof, etc., but not limited thereto.

[0010] And, in the present invention, the substituents including "(C1-C60)alkyl" moiety may have 1 to 60 carbon atoms, 1 to 20 carbon atoms, or 1 to 10 carbon atoms. The substituents including "(C6-C60)aryl" moiety may have 6 to 60 carbon atoms, 6 to 20 carbon atoms, or 6 to 12 carbon atoms. The substituents including "(C3-C60)heteroaryl" moiety may have 3 to 60 carbon atoms, 4 to 20 carbon atoms, or 4 to 12 carbon atoms. The substituents including "(C3-C60)cycloalkyl" moiety may have 3 to 60 carbon atoms, 3 to 20 carbon atoms, or 3 to 7 carbon atoms. The substituents including "(C2-C60)alkenyl or alkynyl" moiety may have 2 to 60 carbon atoms, 2 to 20 carbon atoms, or 2 to 10 carbon atoms.

[0011] In Chemical Formula 1, L may be selected from the following structures, but not limited thereto:





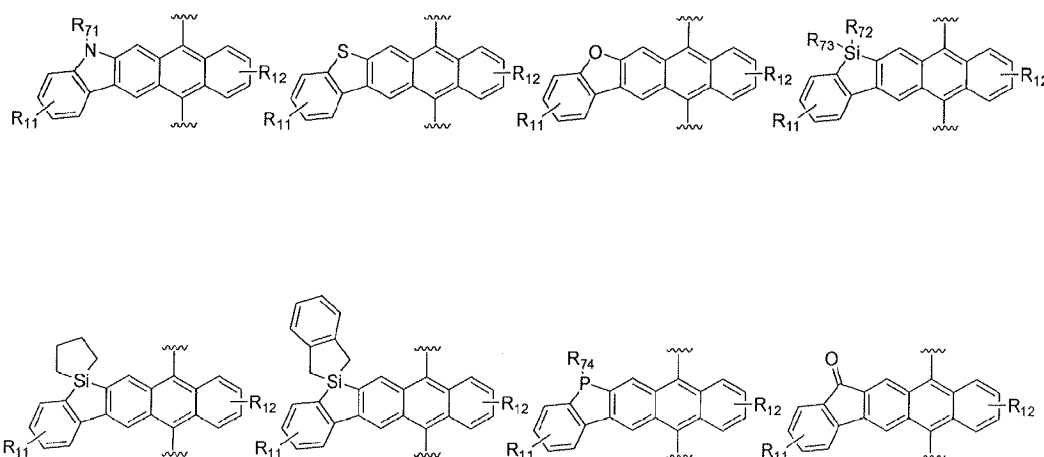
wherein

A is the same as defined in Chemical Formula 1;

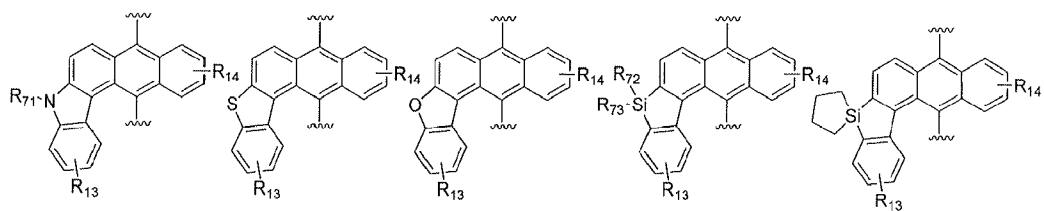
R₁₁ through R₂₄ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcabonyl, carboxyl, nitro or hydroxyl; and

the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, alkenyl, alkynyl, amino, alkylamino or arylamino of R₁₁ through R₂₄ may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcabonyl, carboxyl, nitro and hydroxyl.

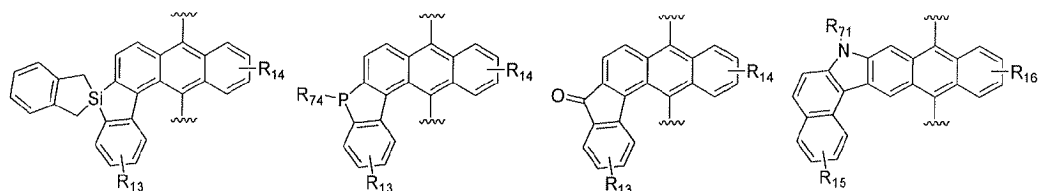
[0012] In Chemical Formula 1, L may be selected from the following structures, but not limited thereto:



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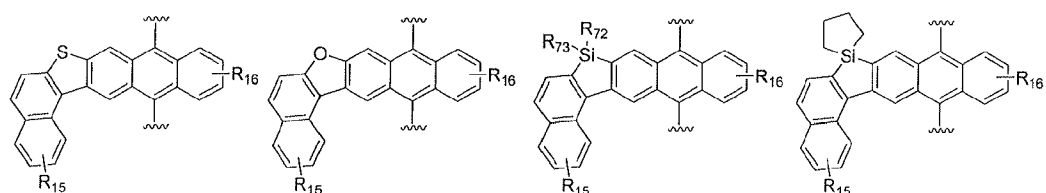


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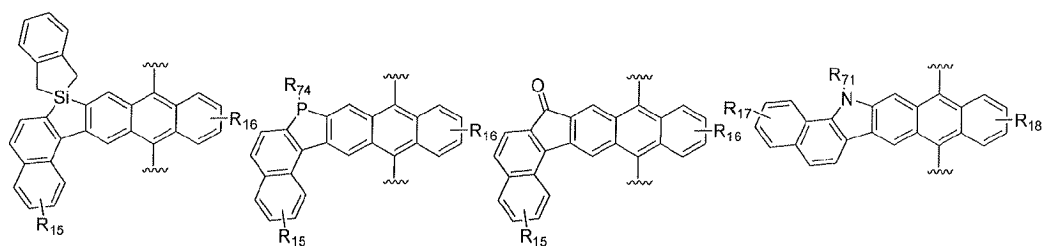
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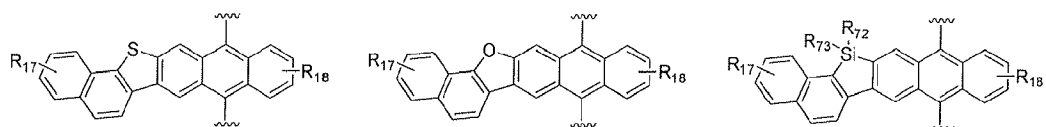


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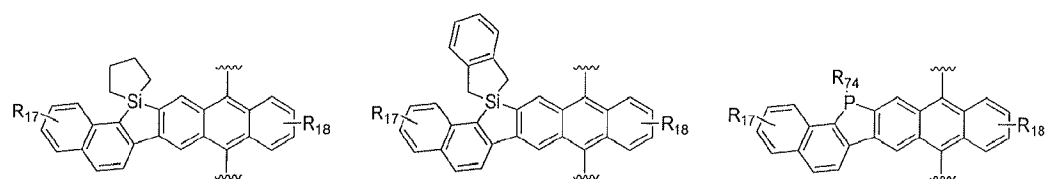
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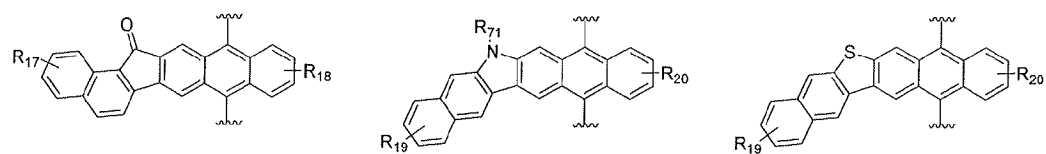


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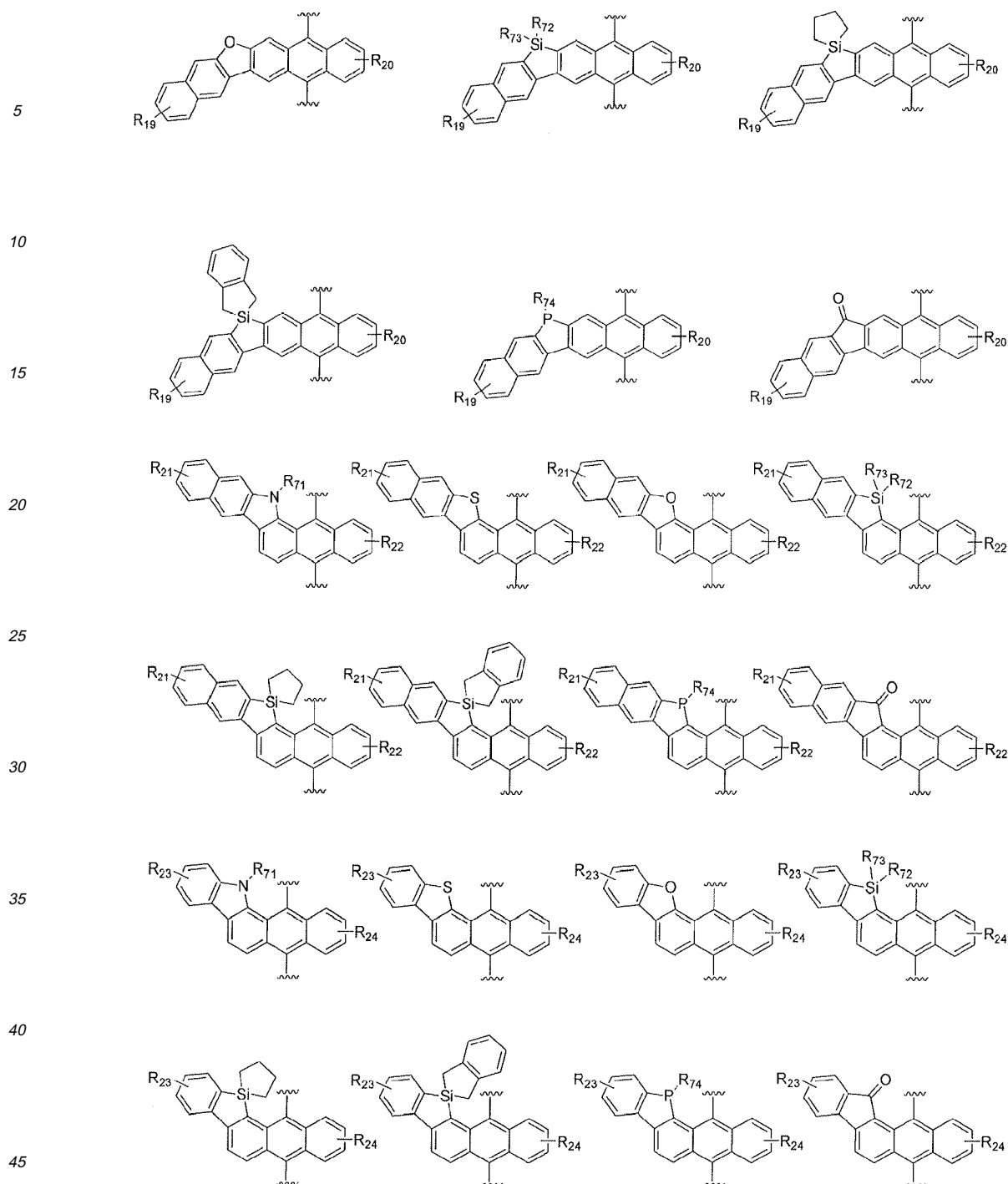


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wherein

R₁₁ through R₂₄ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl;

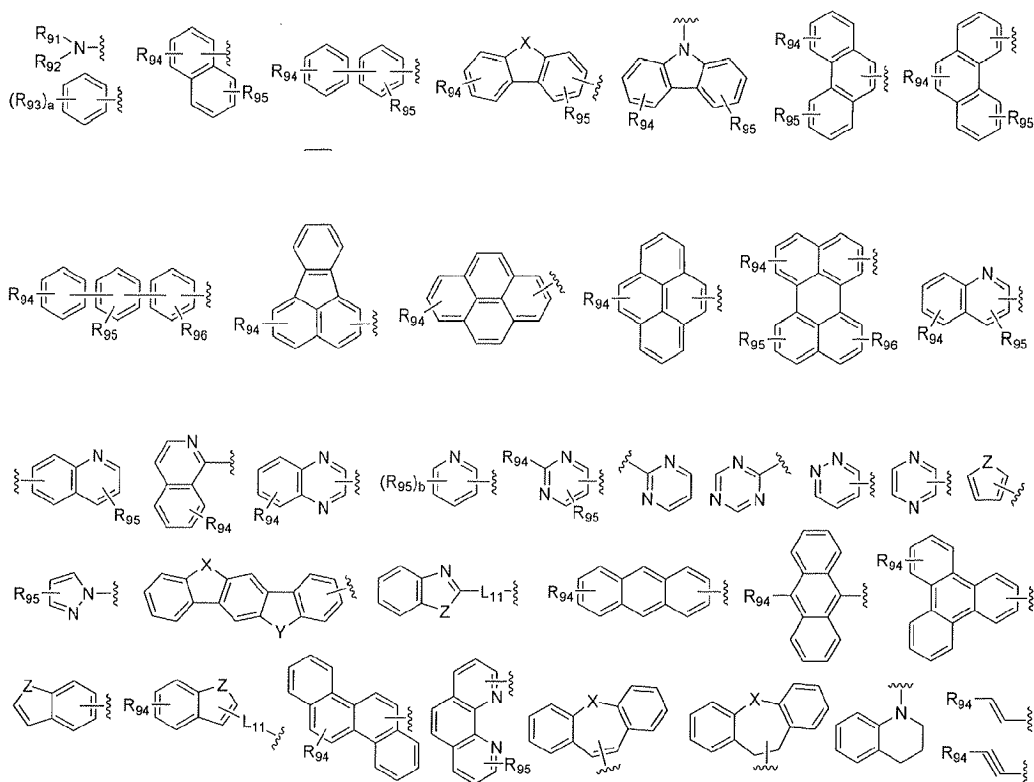
R₇₁ through R₇₄ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, adamantyl, (C7-

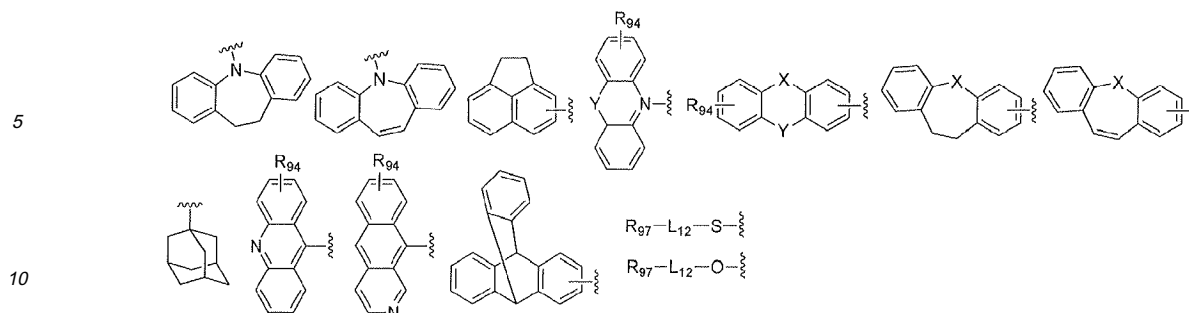
C60)bicycloalkyl, cyano, amino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl or hydroxyl; and

the alkyl, aryl heteroaryl, heterocycloalkyl, cycloalkyl or adamantyl of R₁₁ through R₂₄ and R₇₁ through R₇₄ may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl.



independently may be selected from the following structure, but not limited thereto:





wherein

R_{91} and R_{92} independently represent hydrogen, (C1-C60)alkyl, (C3-C60)cycloalkyl, (C6-C60)aryl or (C3-C60)heteroaryl, or may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

R_{93} through R_{95} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, carbazoyl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl;

R_{96} and R_{97} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl;

L_{11} and L_{12} independently represent a chemical bond, (C1-C60)alkylene, (C6-C60)arylene, (C3-C60)heteroarylene, 5- or 6-membered heterocycloalkylene containing one or more heteroatom(s) selected from N, O, S and Si, (C3-C60)cycloalkylene, adamantylene, (C7-C60)bicycloalkylene, (C2-C60)alkenylene, (C2-C60)alkynylene, (C6-C60)ar(C1-C60)alkylene, (C1-C60)alkylenethio, (C1-C60)alkylenoxy, (C6-C60)arylenoxy or (C6-C60)arylenethio;

the arylene, heteroarylene, heterocycloalkylene, cycloalkylene, adamantylene, bicycloalkylene, alkenylene, alkynylene, arylenoxy or arylenethio of L_{11} and L_{12} may be further substituted by one or more substituent(s) selected from deuterium, halogen, (C1-C60)alkyl, halo(C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl;

X and Y independently represent $-C(R_{51})(R_{52})-$, $-N(R_{53})-$, $-S-$, $-O-$, $-Si(R_{54})(R_{55})-$, $-P(R_{56})-$, $-C(=O)-$, $-B(R_{57})-$, $-In(R_{58})-$, $-Se-$, $-Ge(R_{59})(R_{60})-$, $-Sn(R_{61})(R_{62})-$, $-Ga(R_{63})-$ or $-(R_{64})C=C(R_{65})-$;

R_{51} through R_{65} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R_{51} and R_{52} , R_{54} and R_{55} , R_{59} and R_{60} , R_{61} and R_{62} and R_{64} and R_{65} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

Z represents O, S or NR_{98} ;

R_{98} represents hydrogen, deuterium, halogen, (C1-C60)alkyl, (C3-C60)cycloalkyl or (C6-C60)aryl;

the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, alkenyl, alkynyl,

amino, alkylamino or arylamino of R₅₁ through R₆₅ and R₉₁ through R₉₈ may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl;

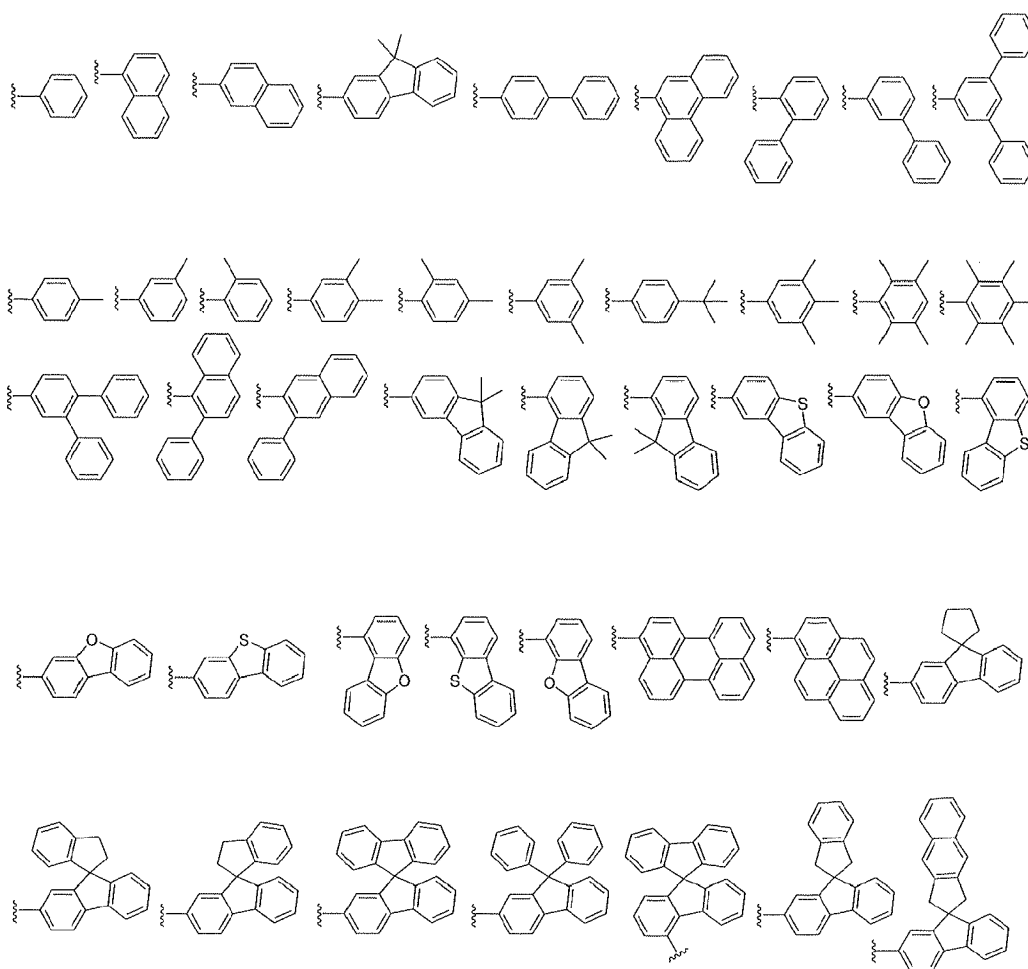
a represents an integer form 1 to 5; and

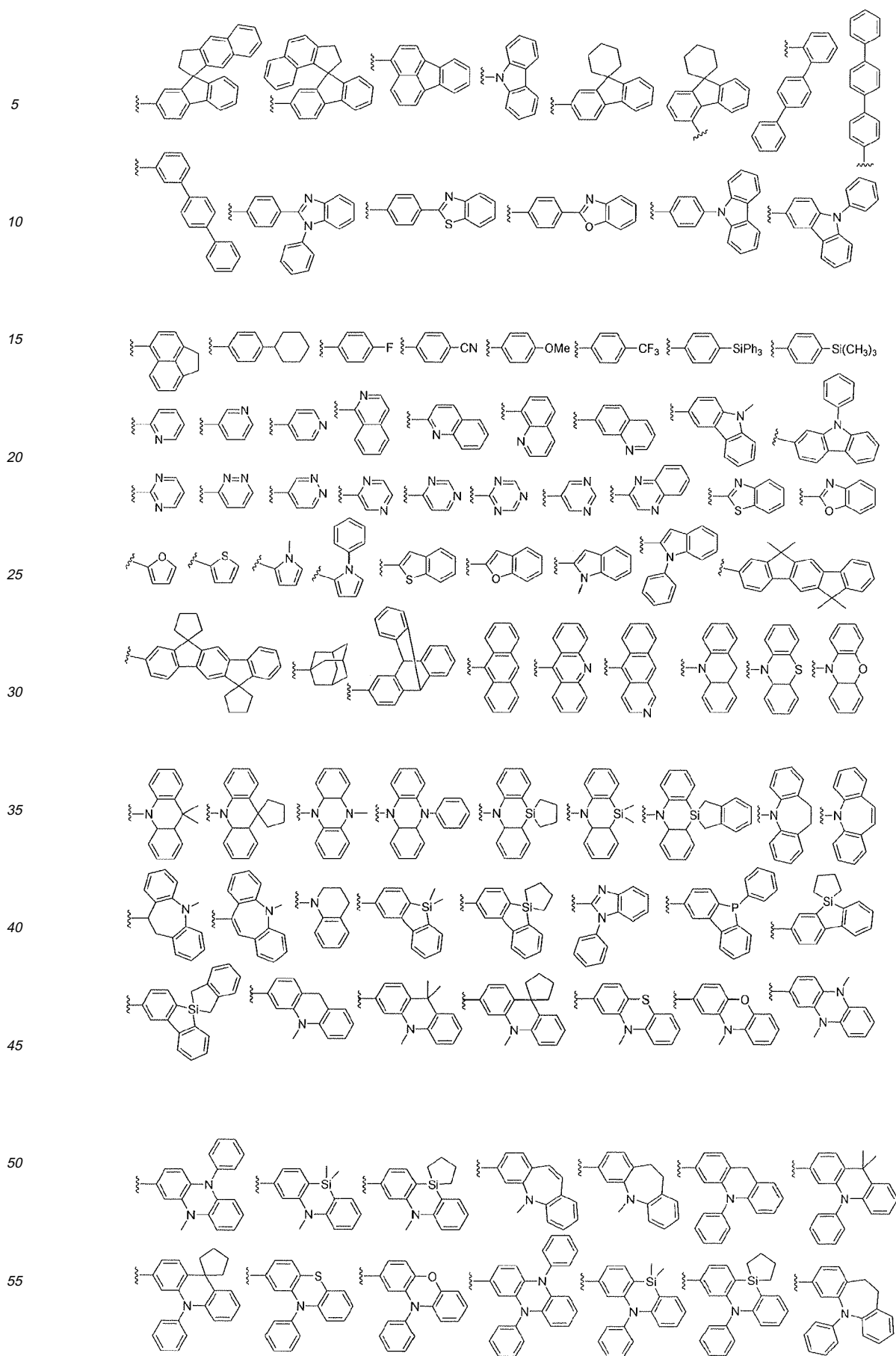
b represents an integer form 1 to 4.

[0013] More specifically,



may be independently selected from the following structures, but not limited thereto:





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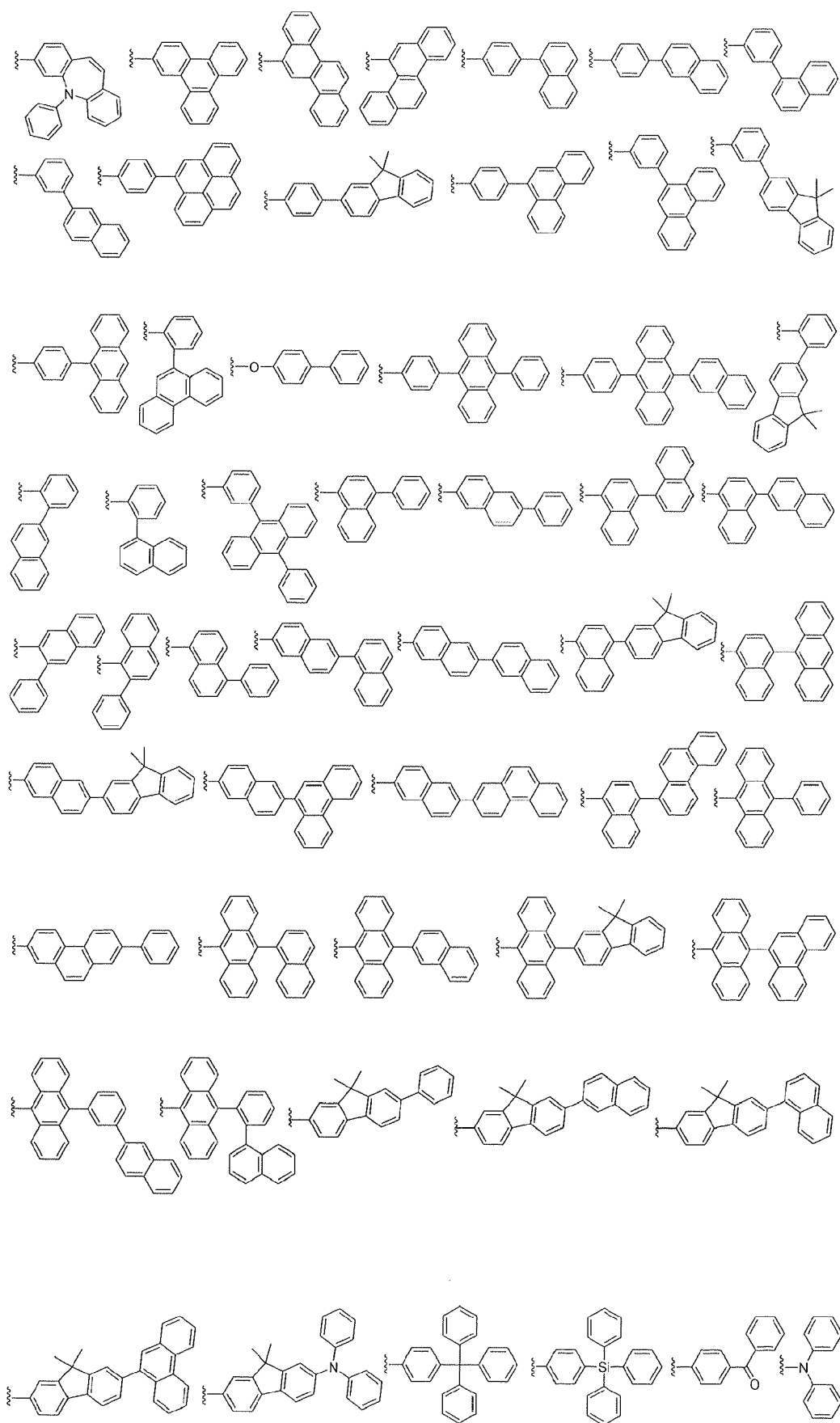
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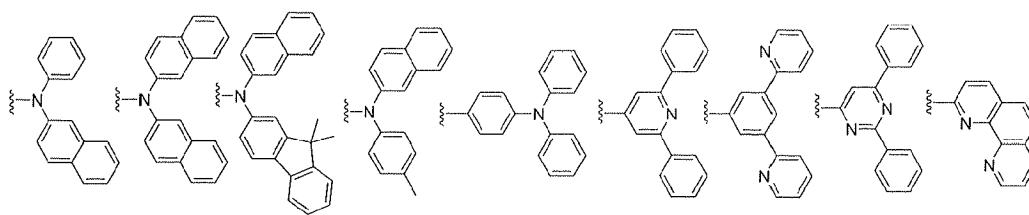
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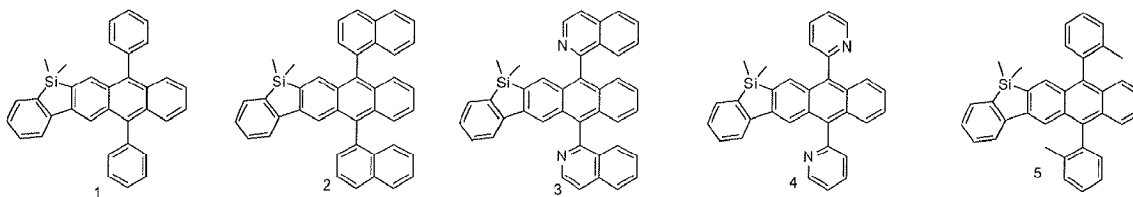


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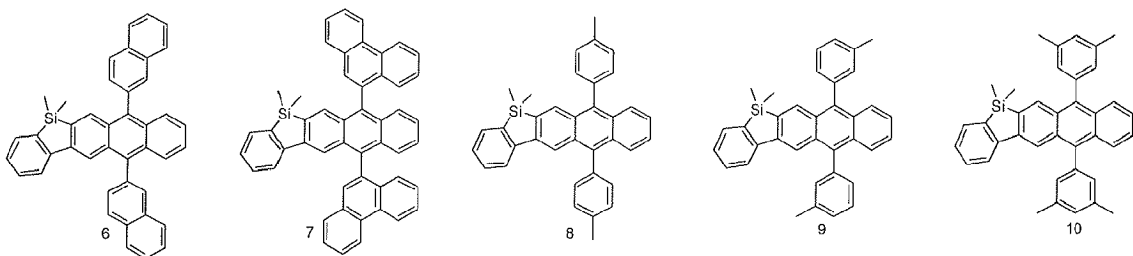
10 **[0014]** More specifically, the organic electroluminescent compound according to the present invention may be exemplified by the following compounds, but not limited thereto:

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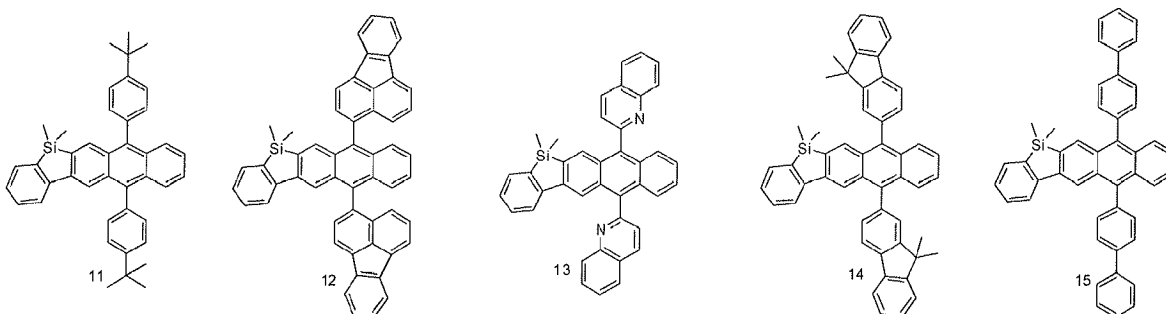
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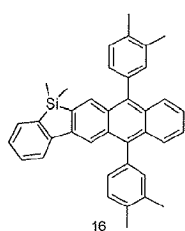
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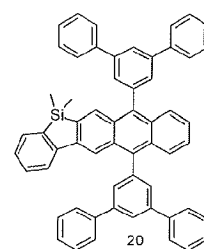
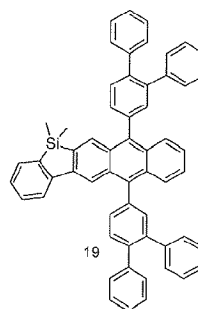
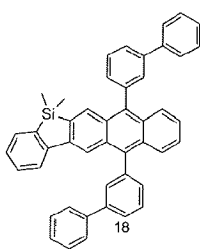
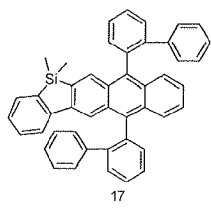
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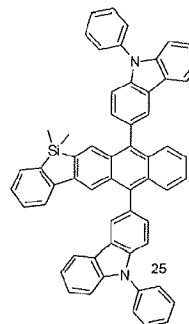
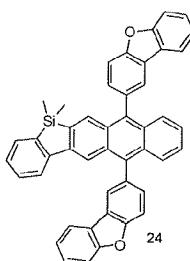
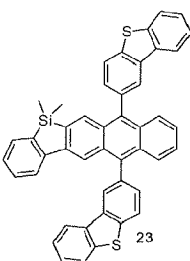
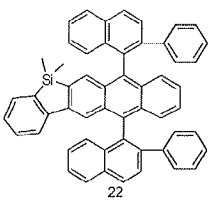
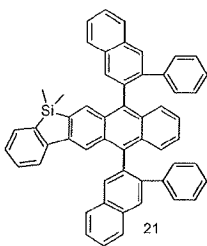
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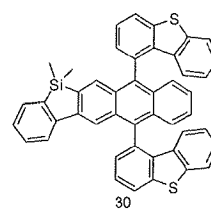
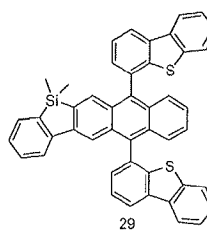
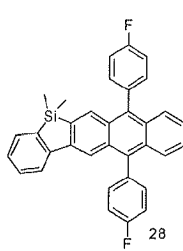
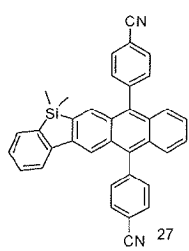
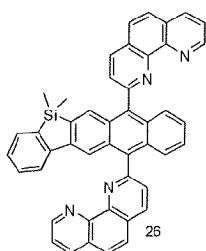


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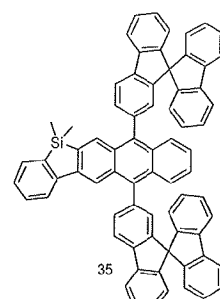
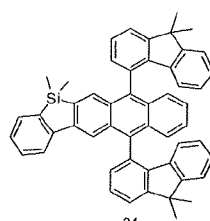
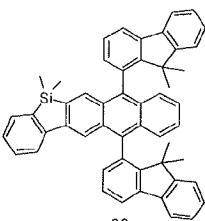
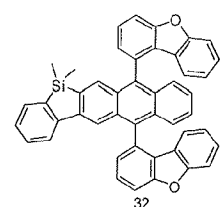
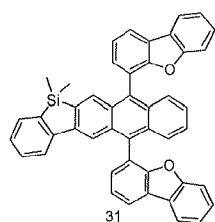
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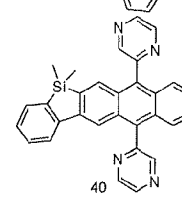
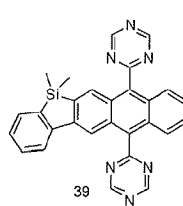
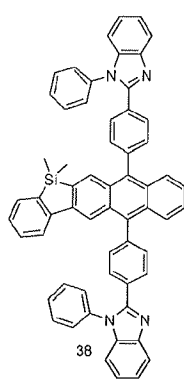
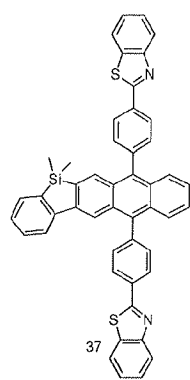
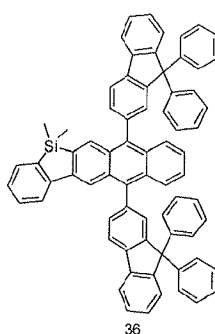
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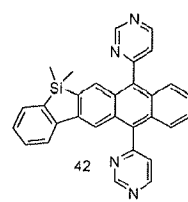
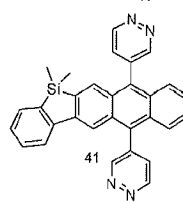


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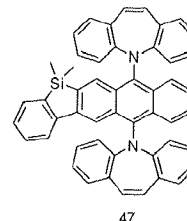
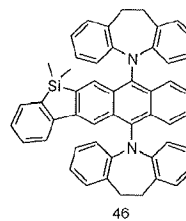
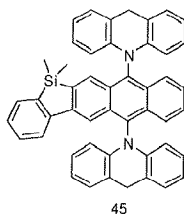
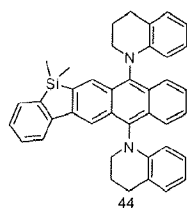
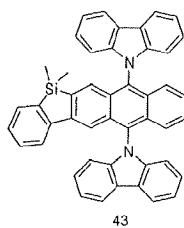


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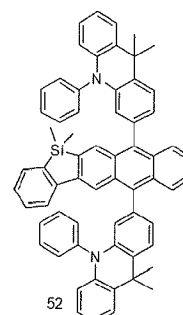
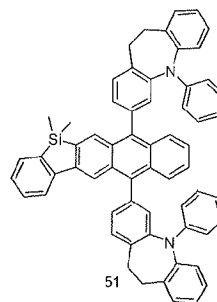
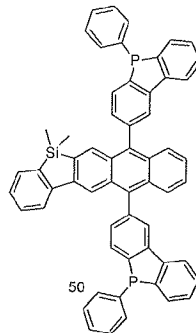
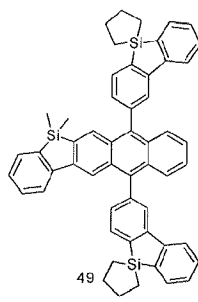
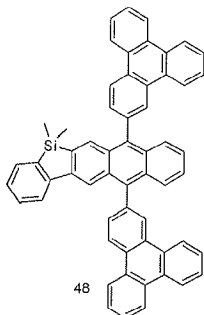


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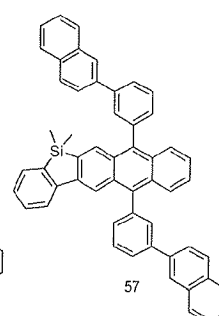
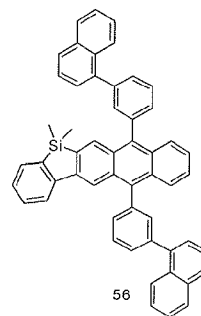
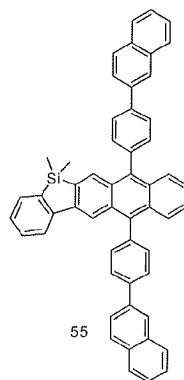
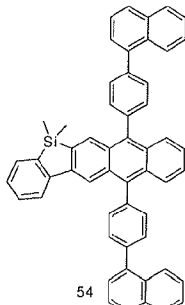
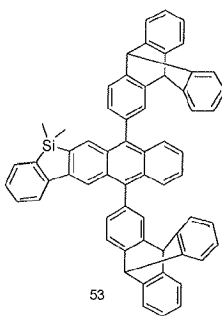


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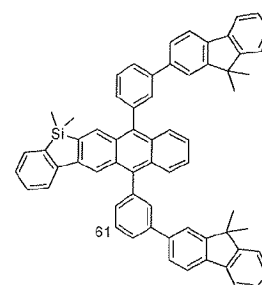
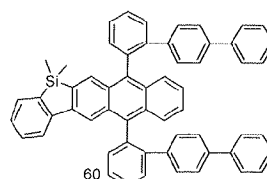
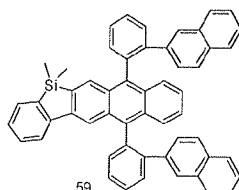
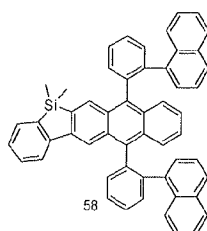
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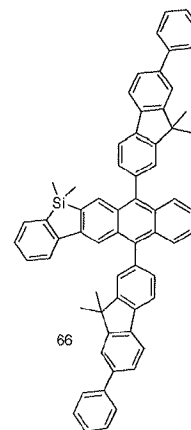
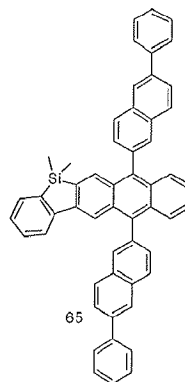
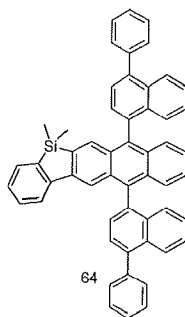
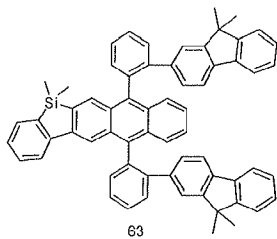
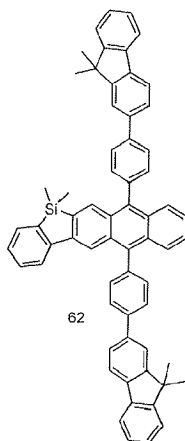
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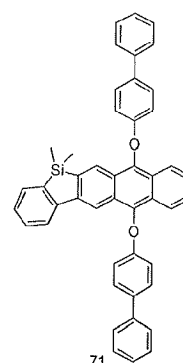
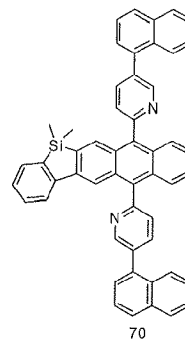
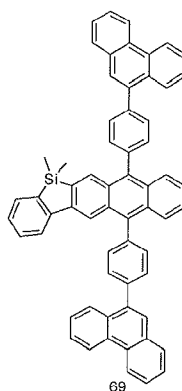
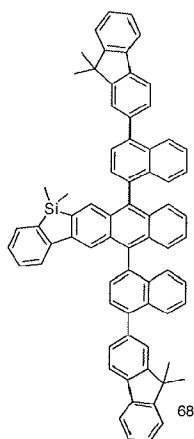
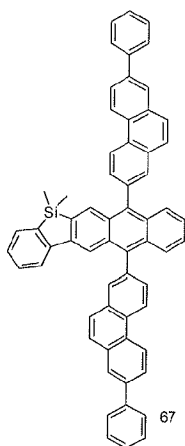
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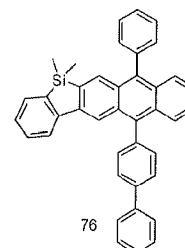
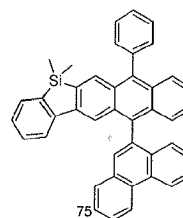
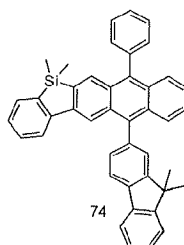
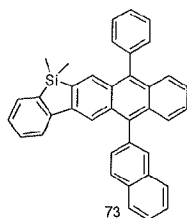
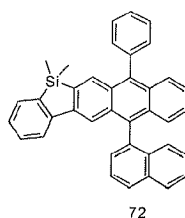
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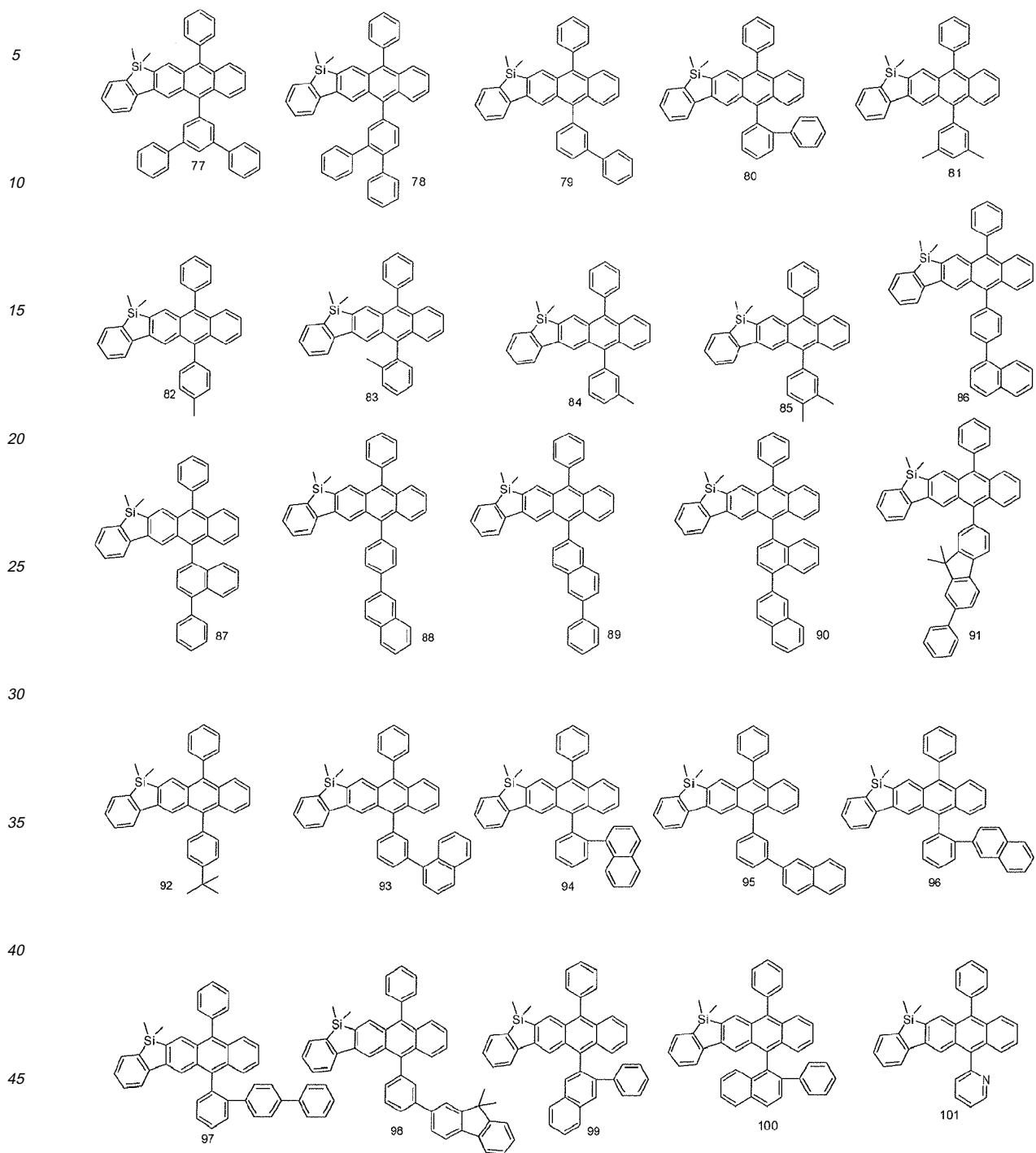
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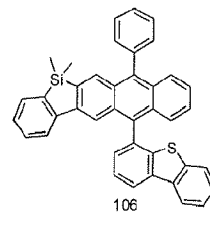
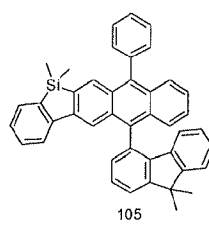
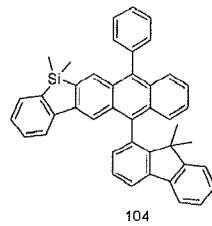
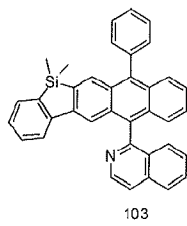
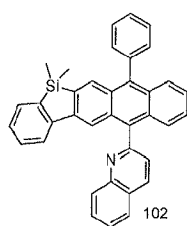
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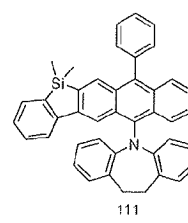
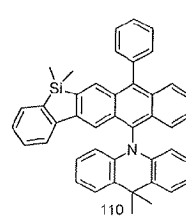
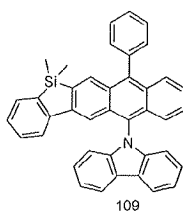
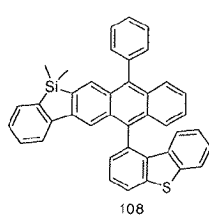
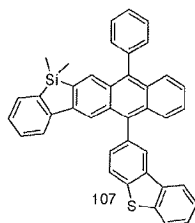


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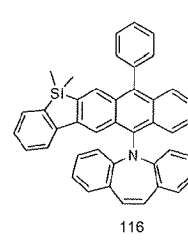
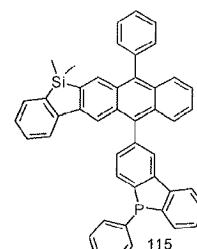
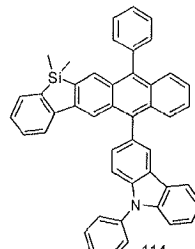
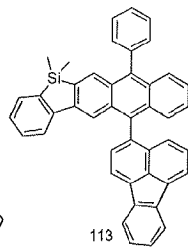
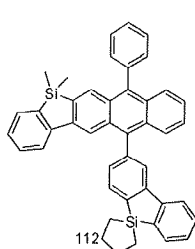
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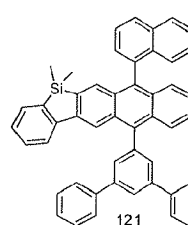
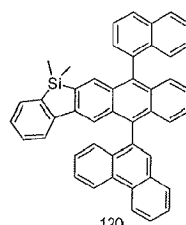
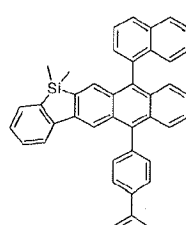
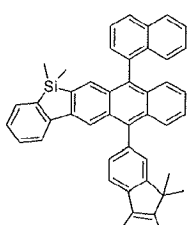
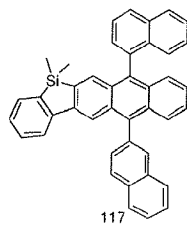
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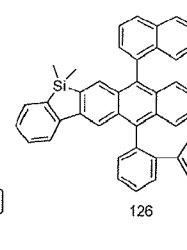
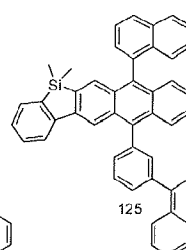
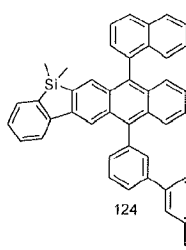
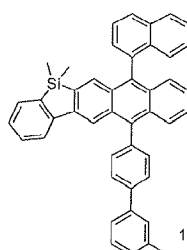
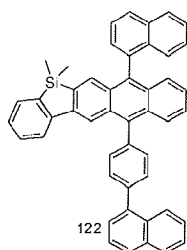
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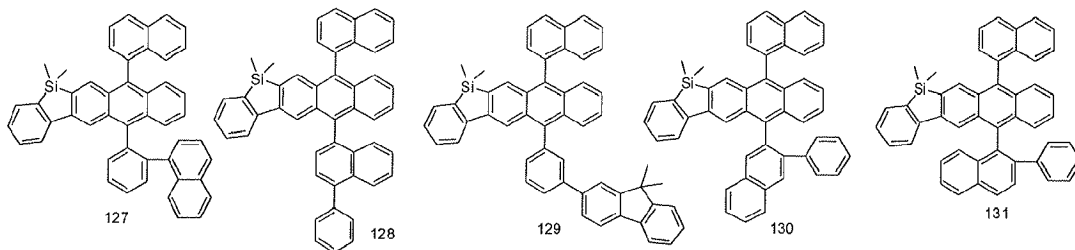
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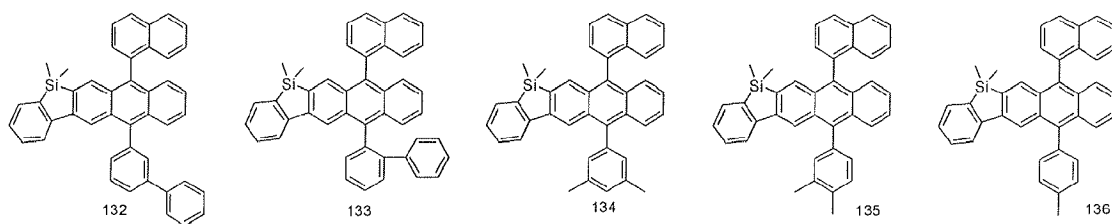
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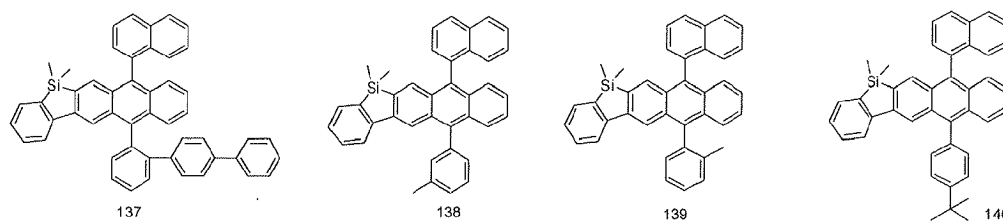
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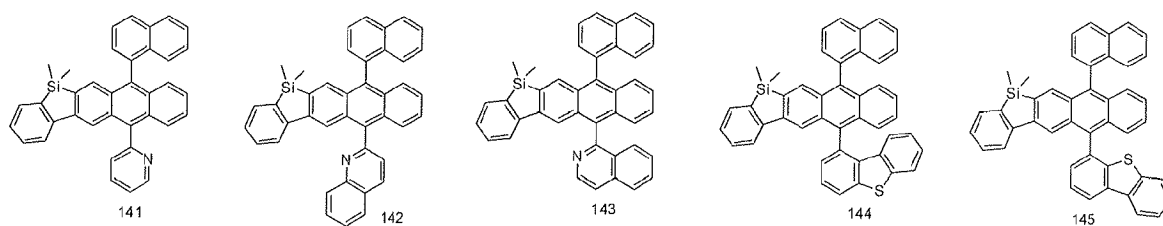
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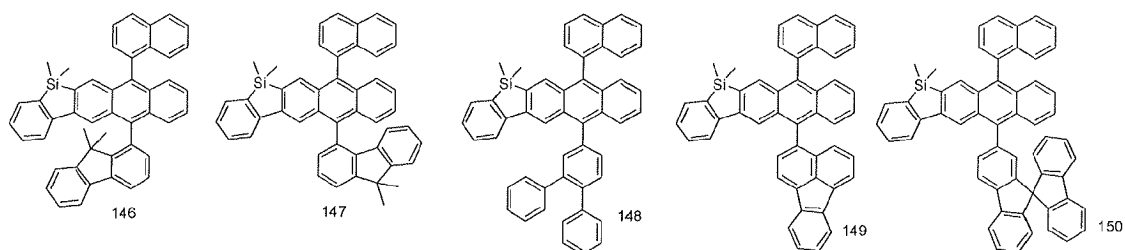
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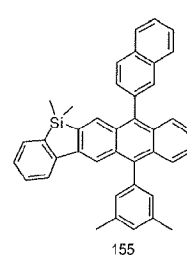
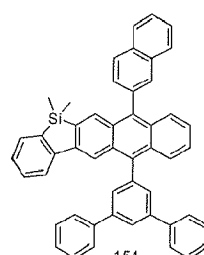
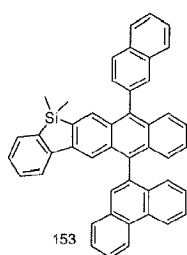
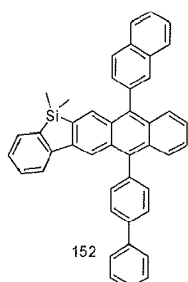
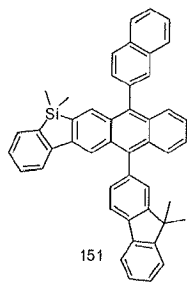
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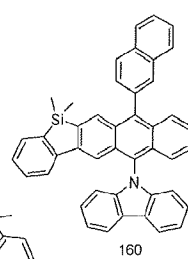
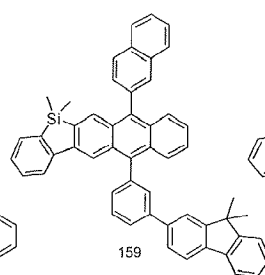
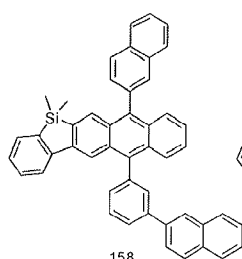
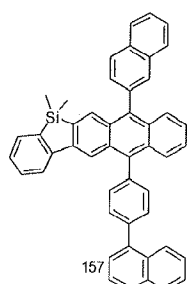
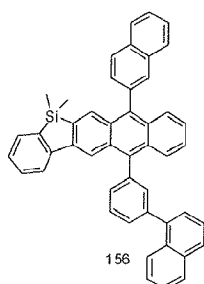
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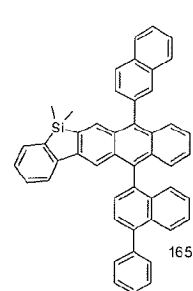
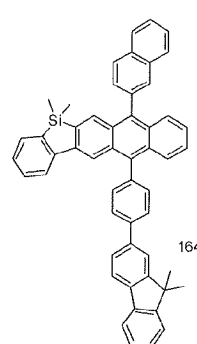
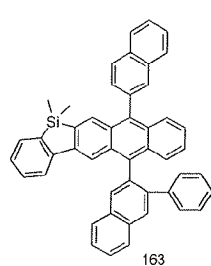
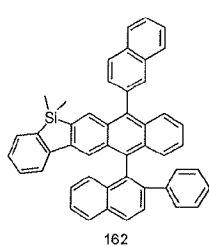
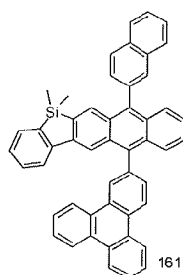
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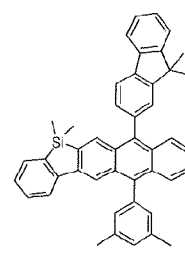
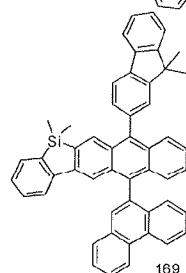
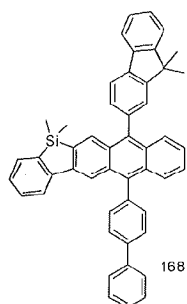
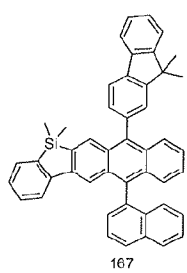
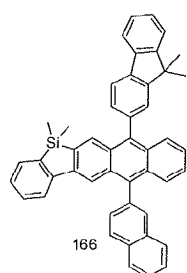
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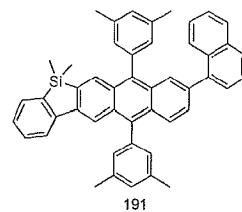
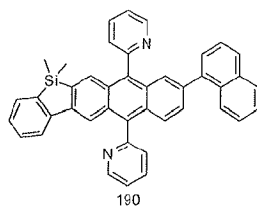
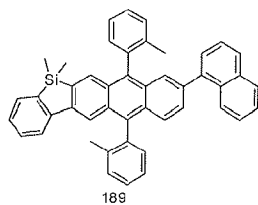
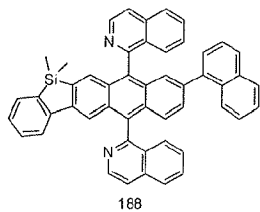
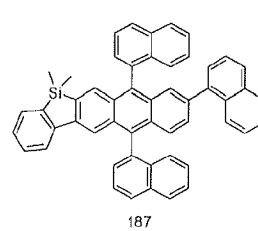
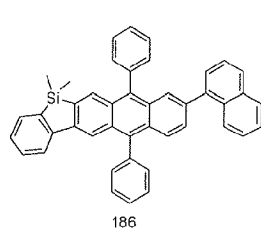
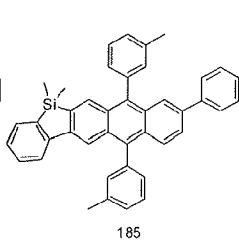
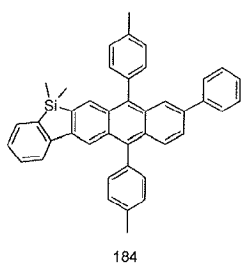
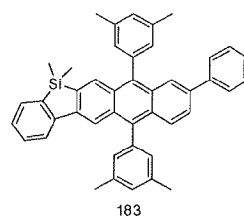
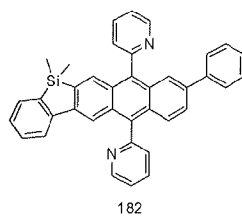
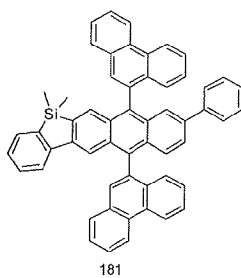
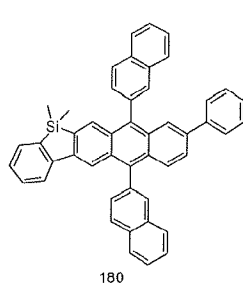
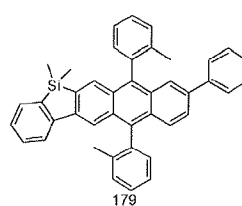
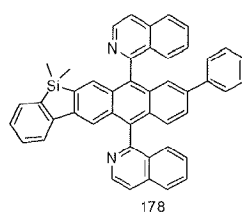
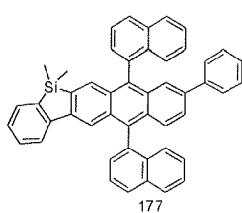
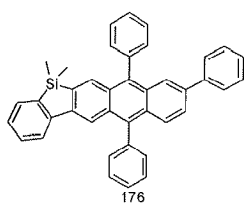
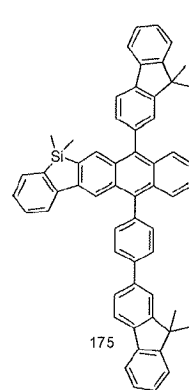
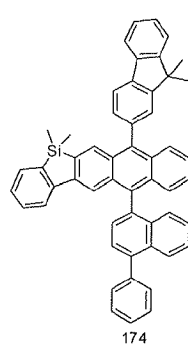
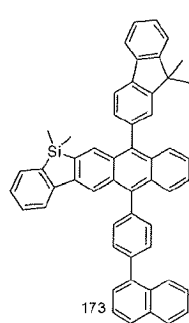
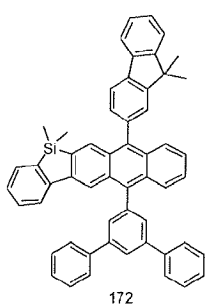
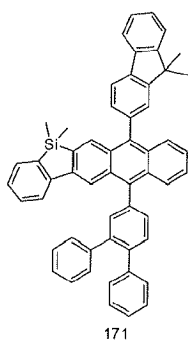
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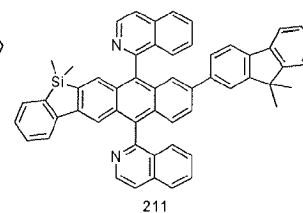
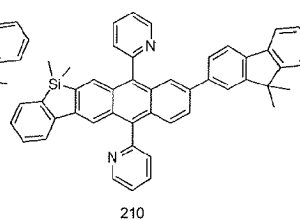
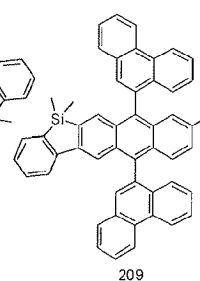
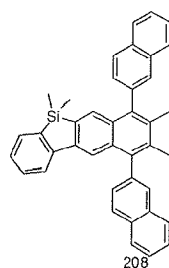
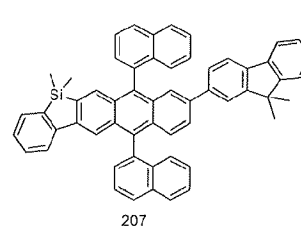
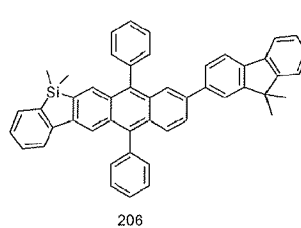
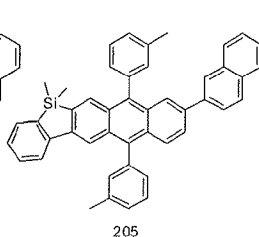
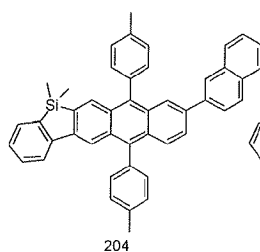
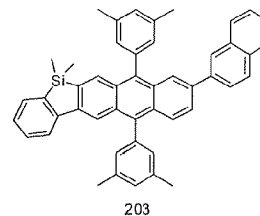
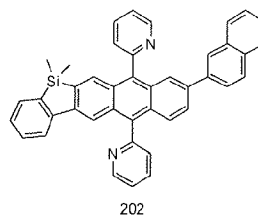
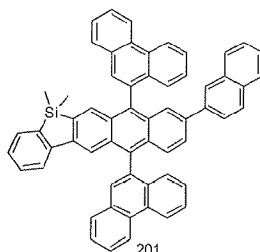
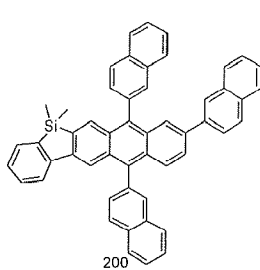
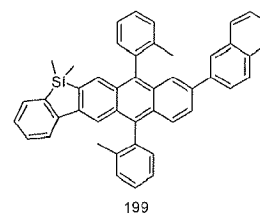
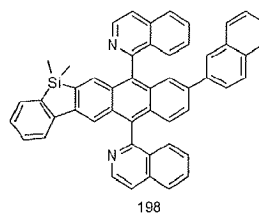
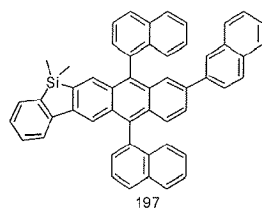
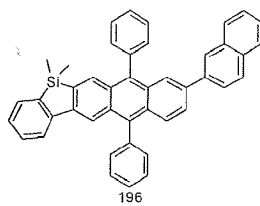
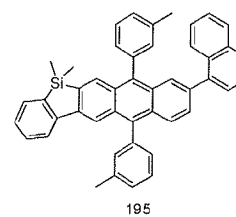
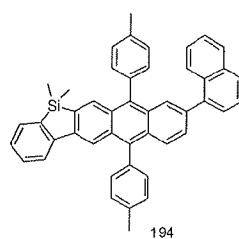
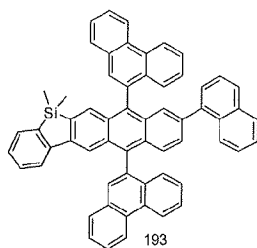
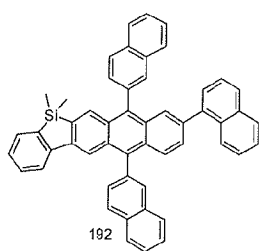
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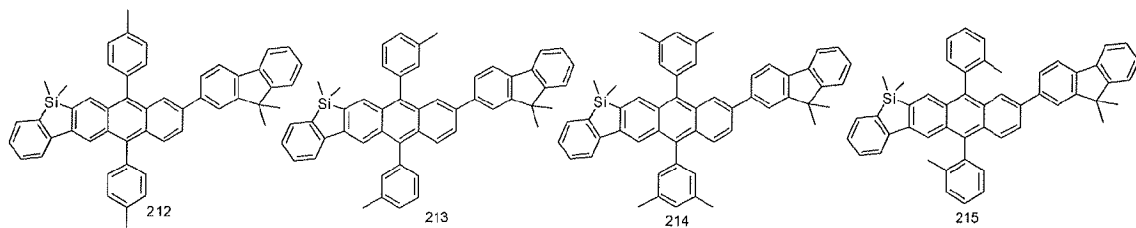
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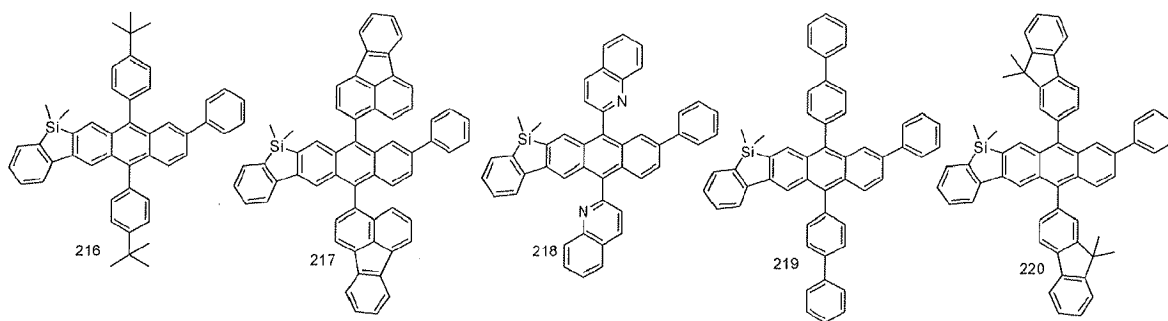


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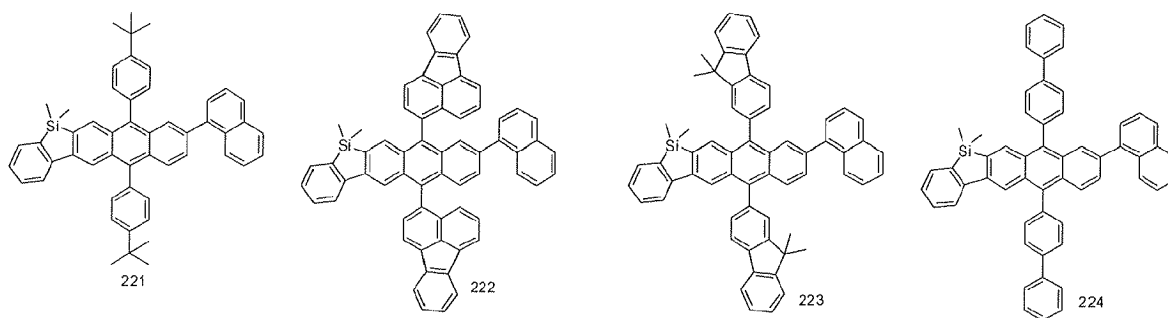
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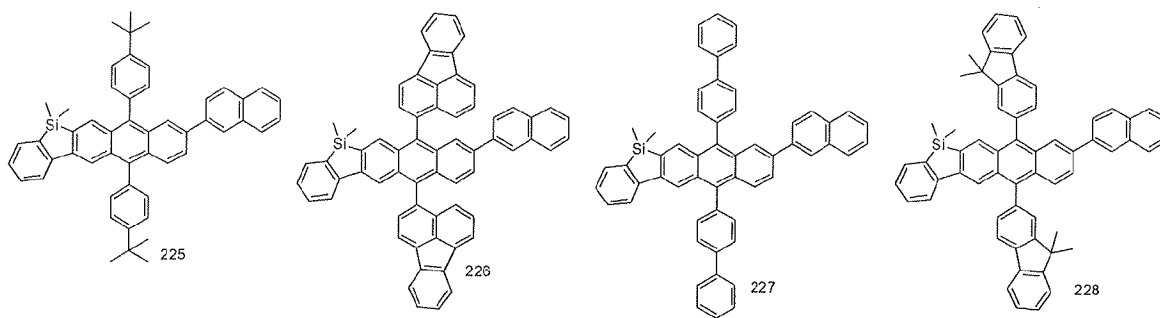
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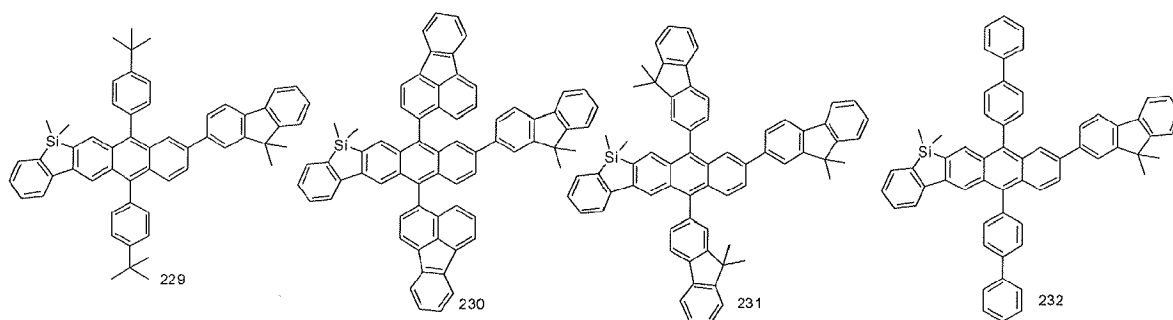
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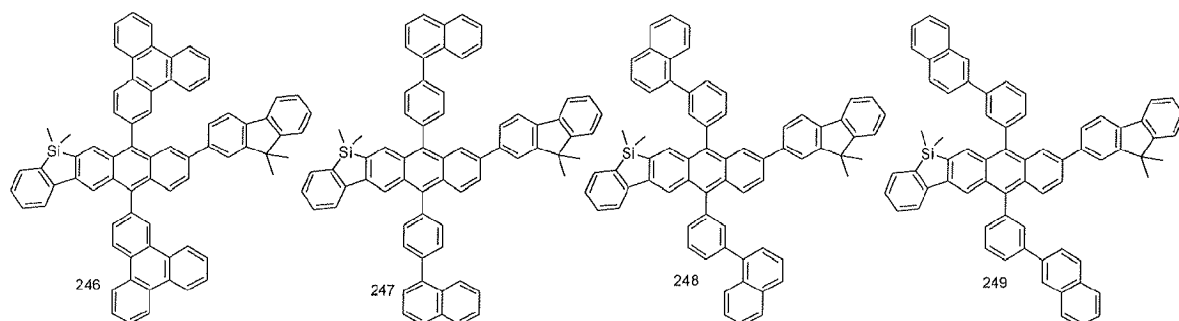
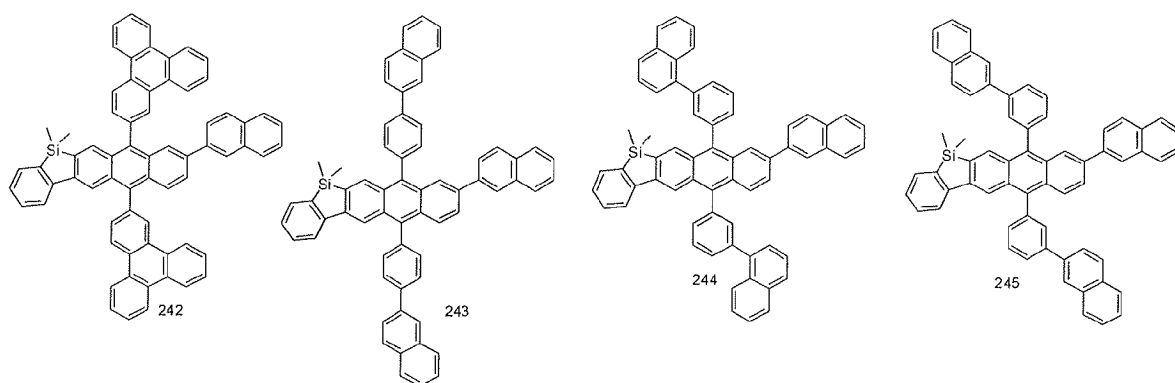
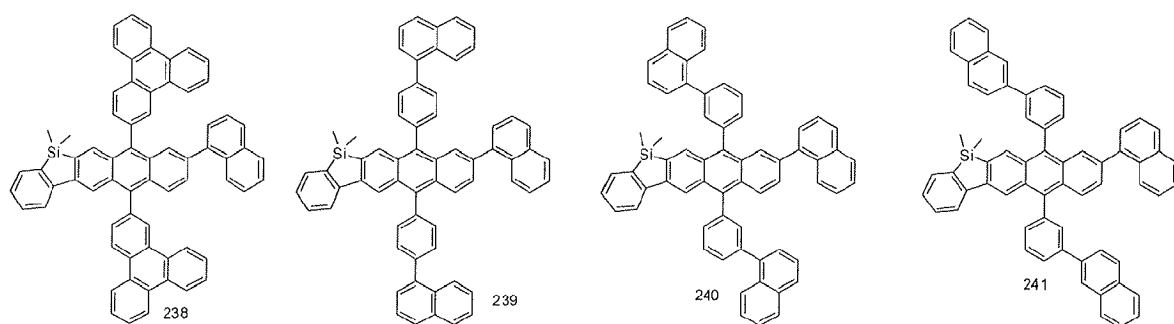
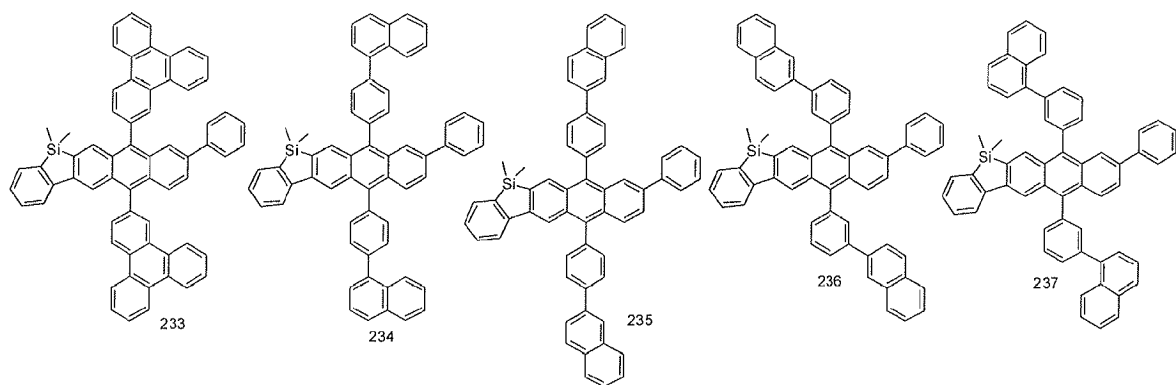
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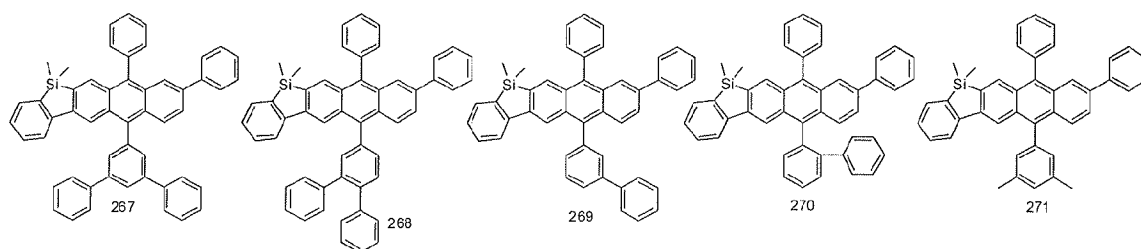
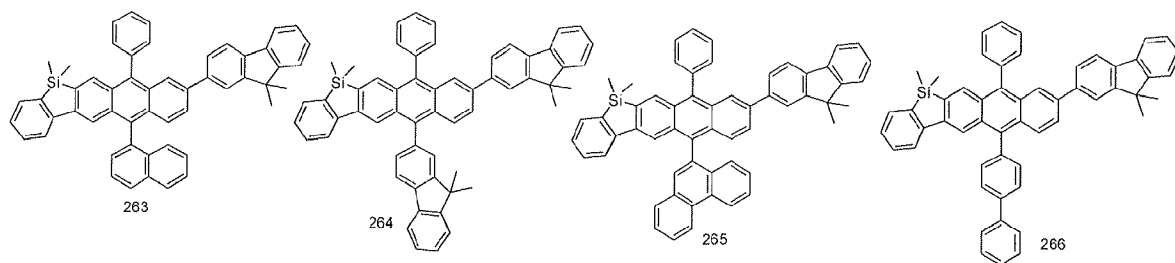
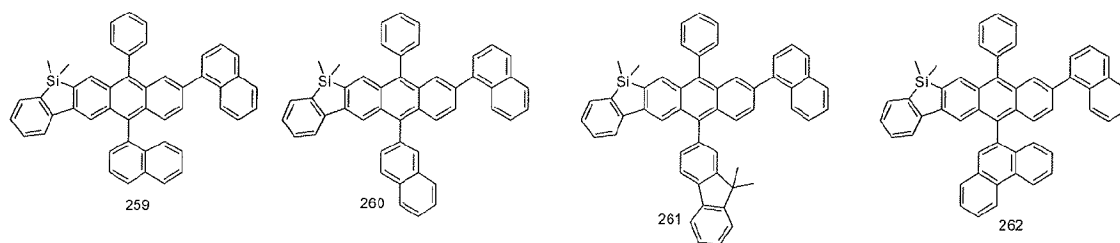
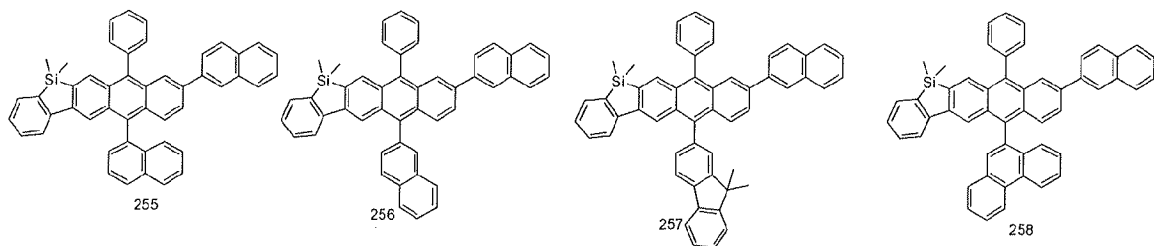
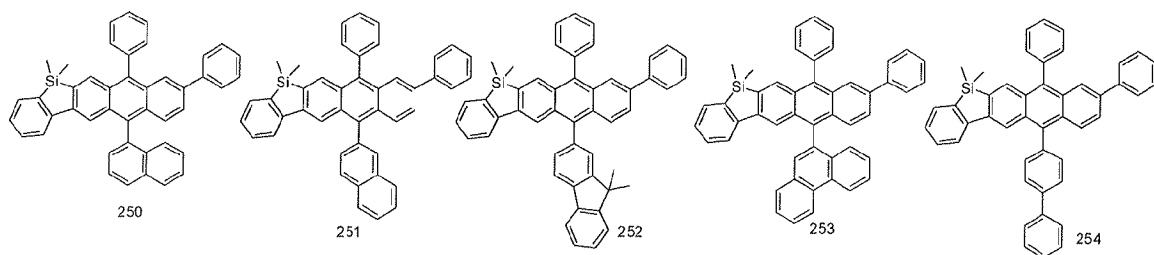


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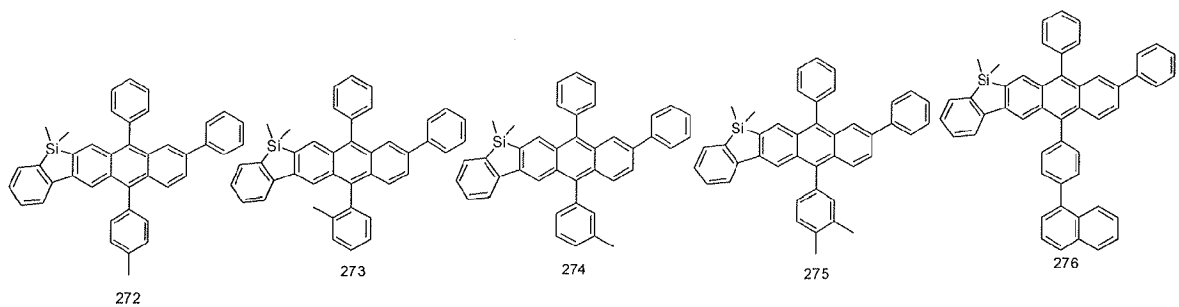
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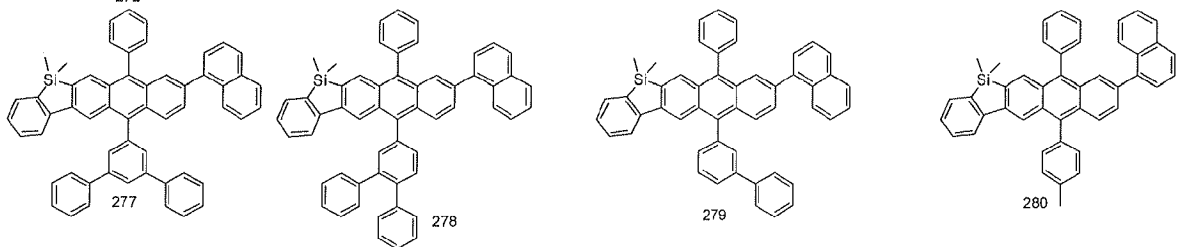


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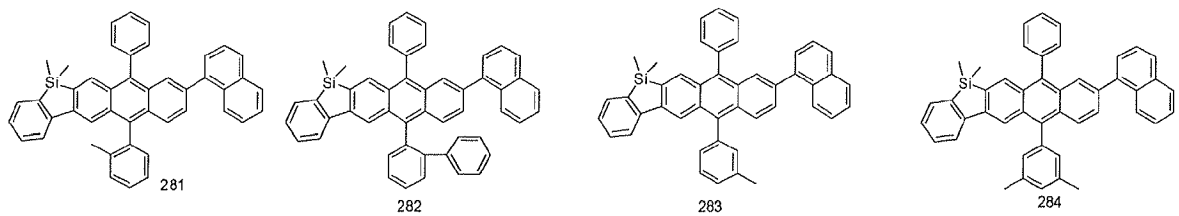
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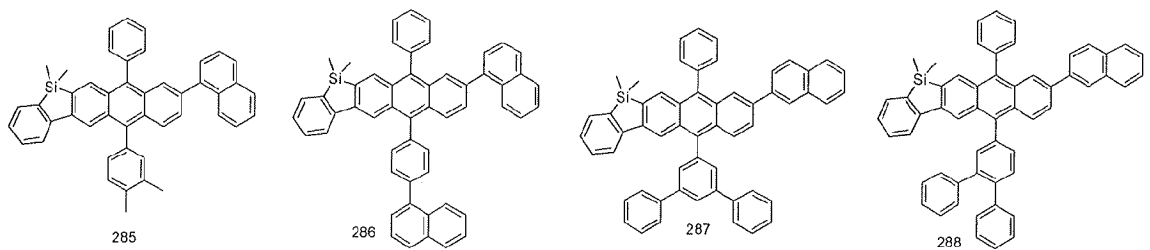
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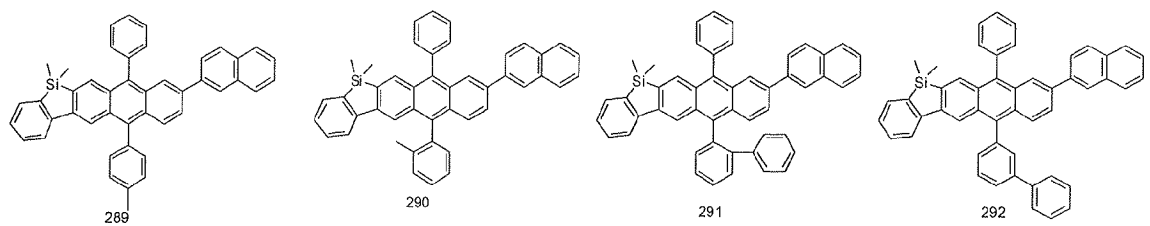
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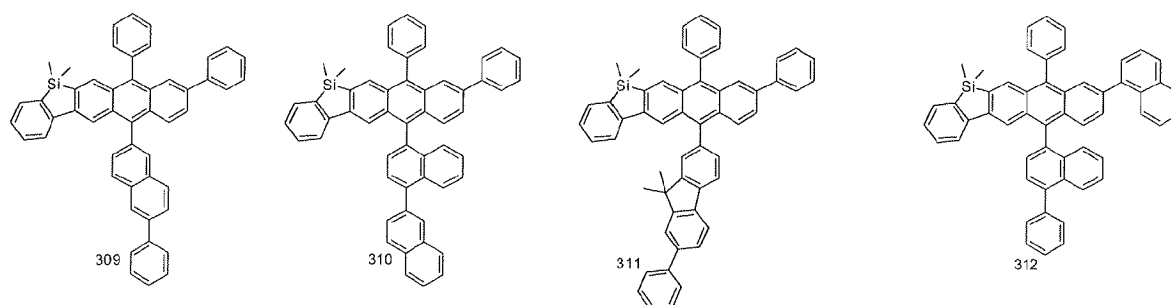
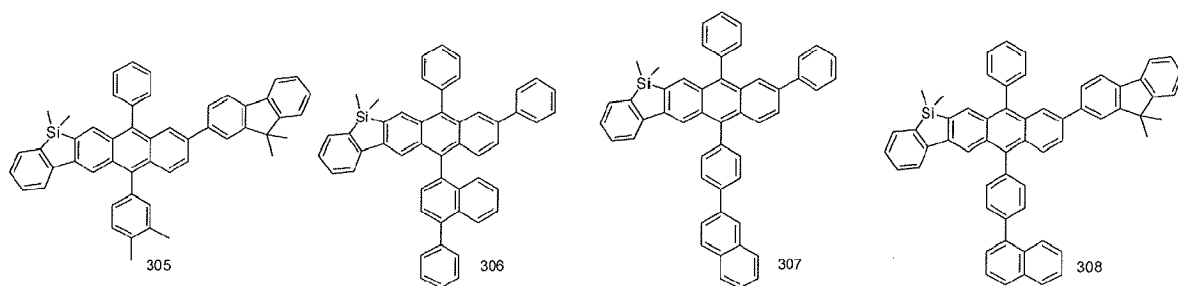
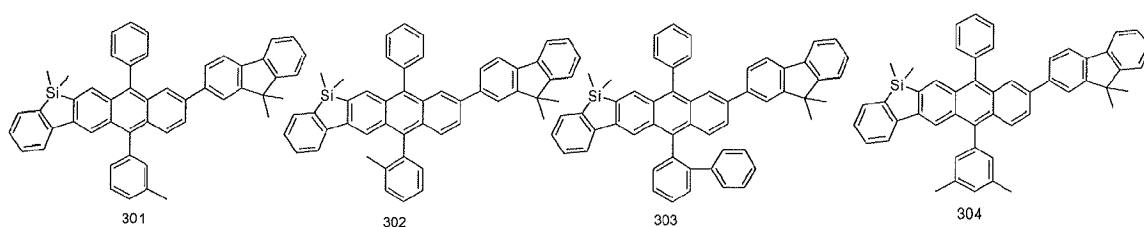
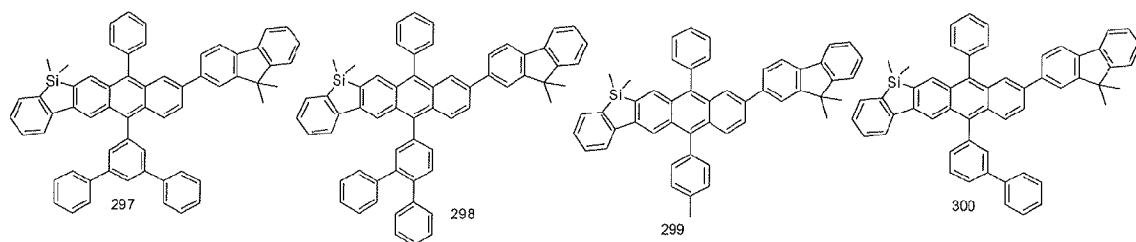
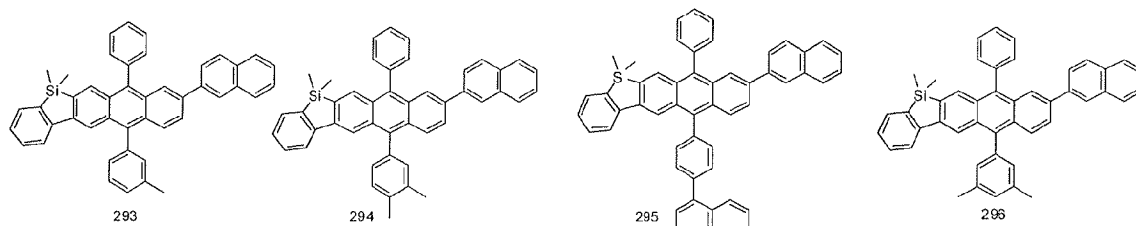
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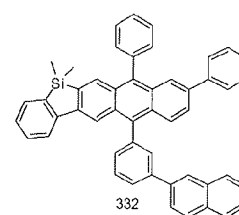
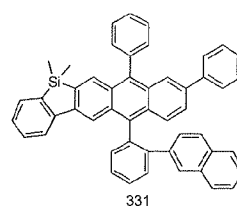
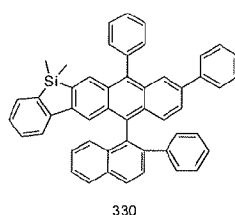
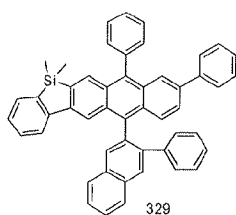
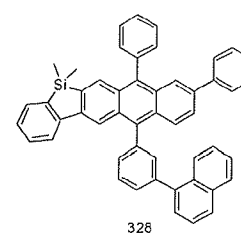
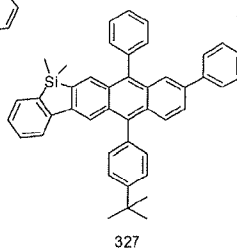
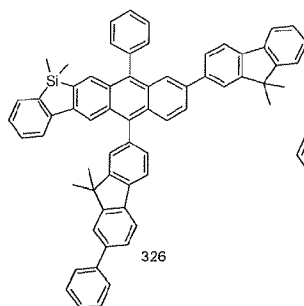
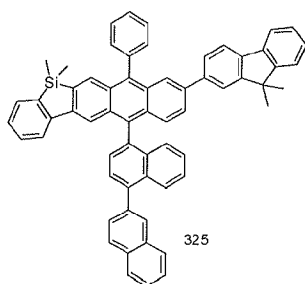
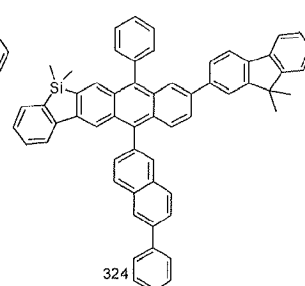
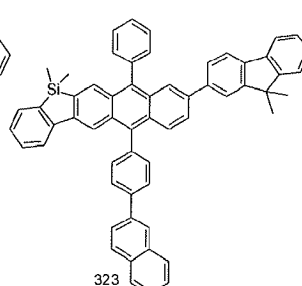
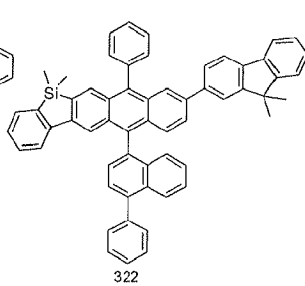
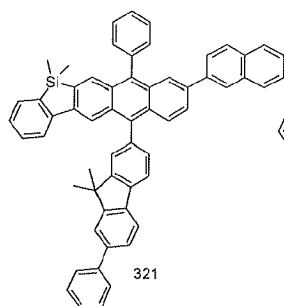
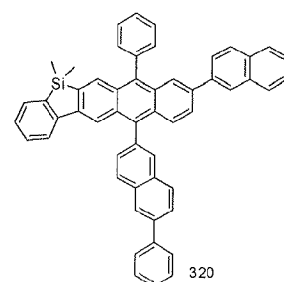
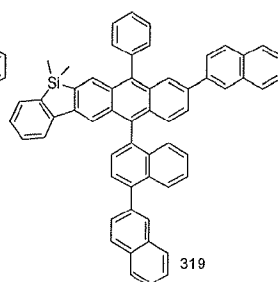
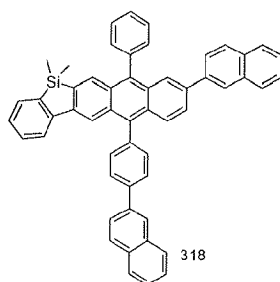
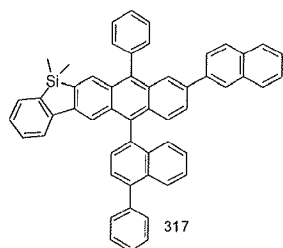
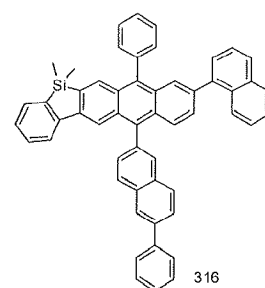
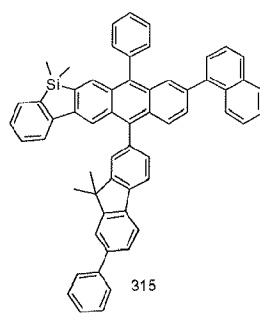
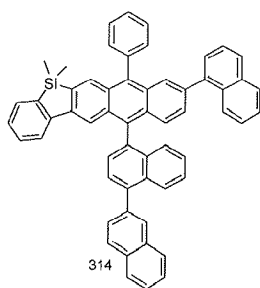
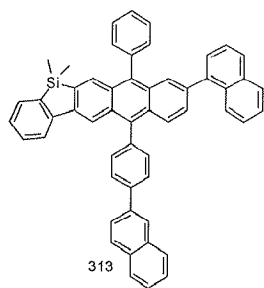
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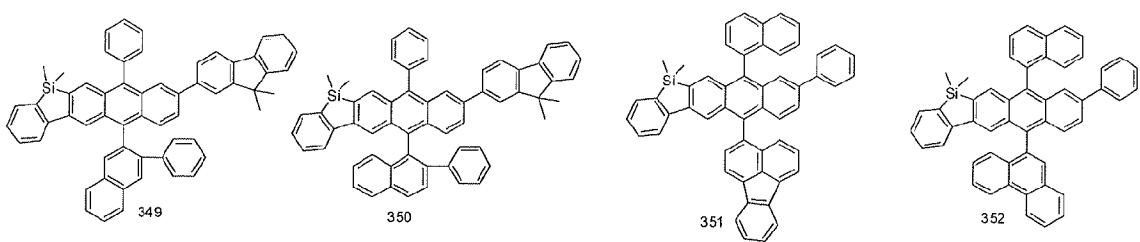
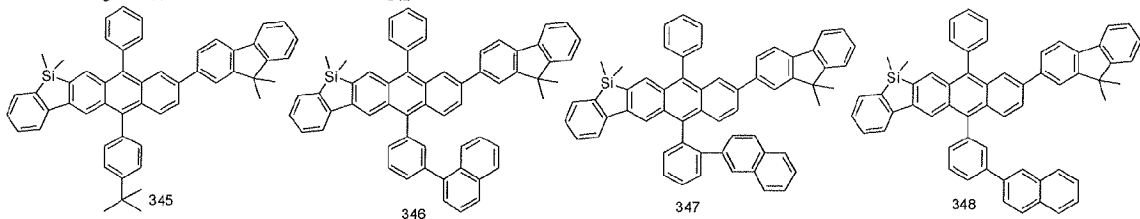
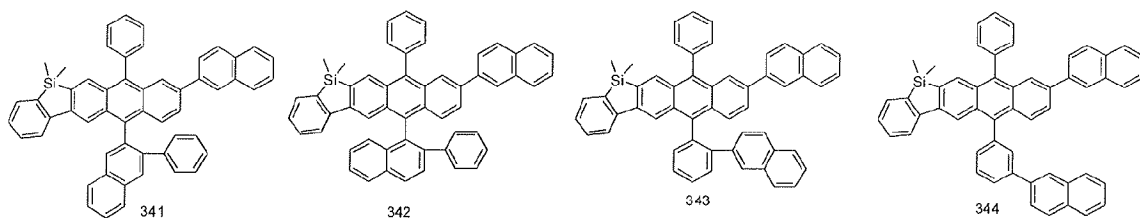
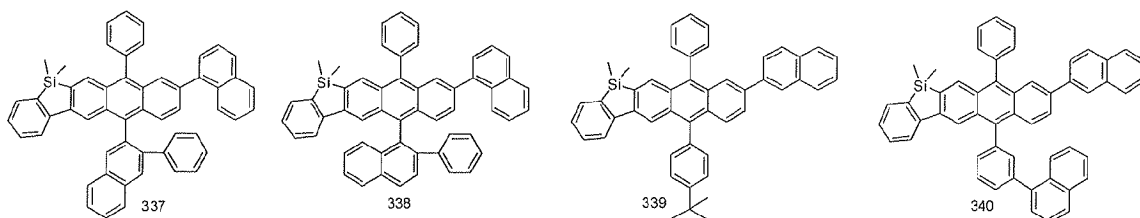
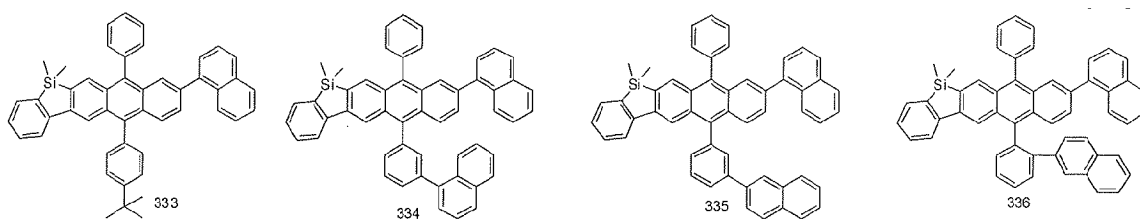


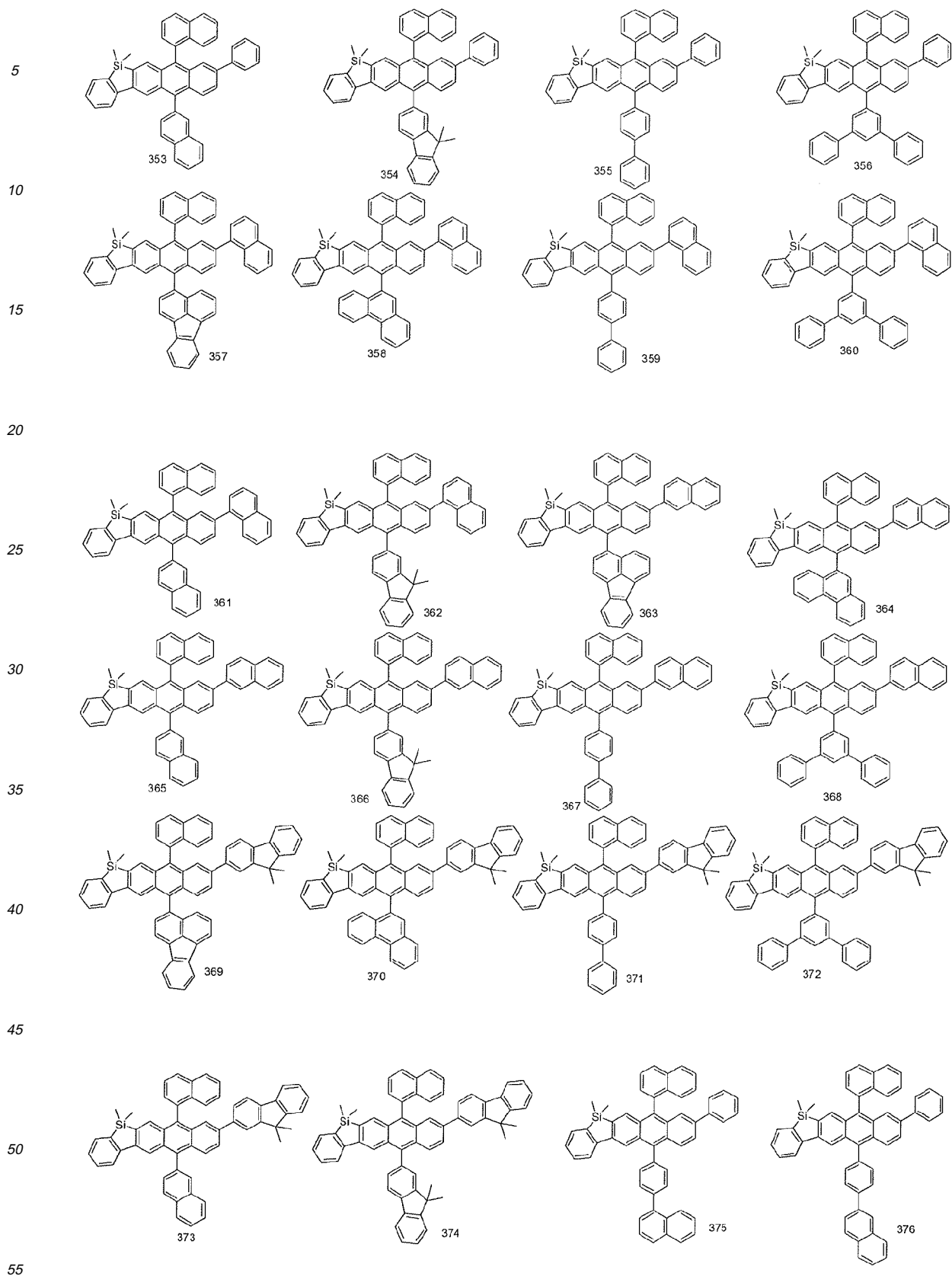
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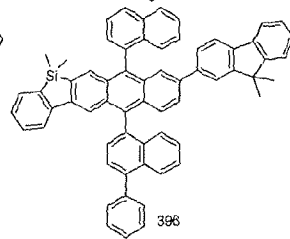
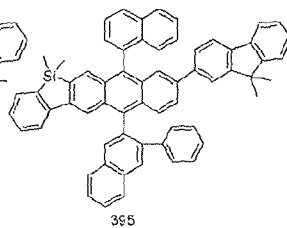
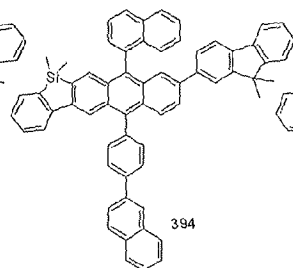
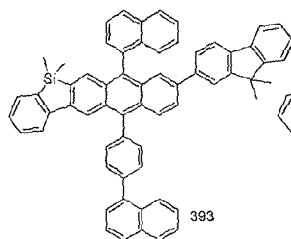
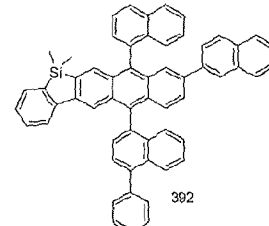
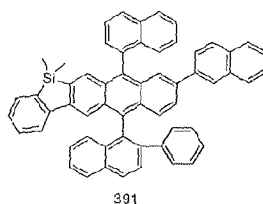
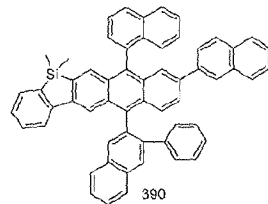
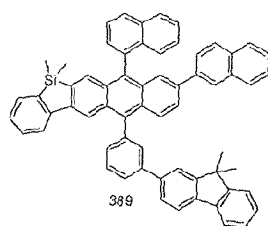
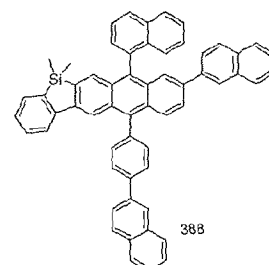
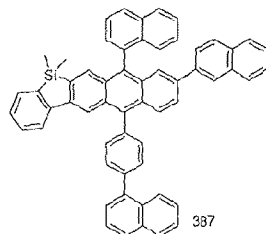
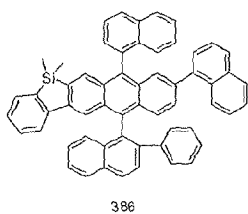
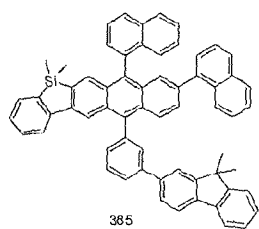
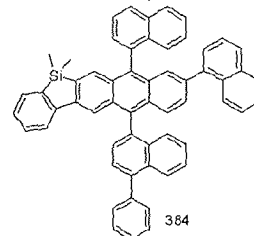
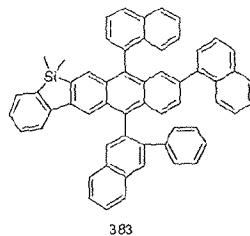
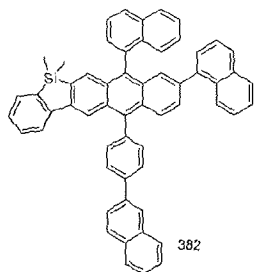
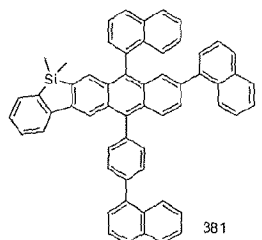
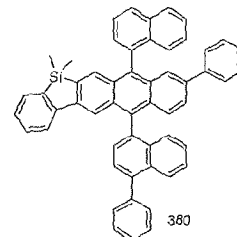
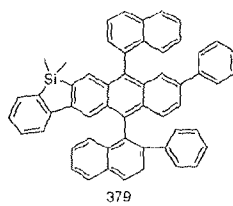
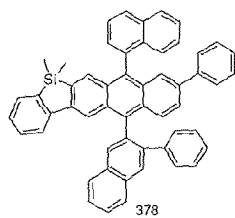
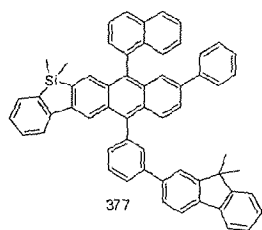
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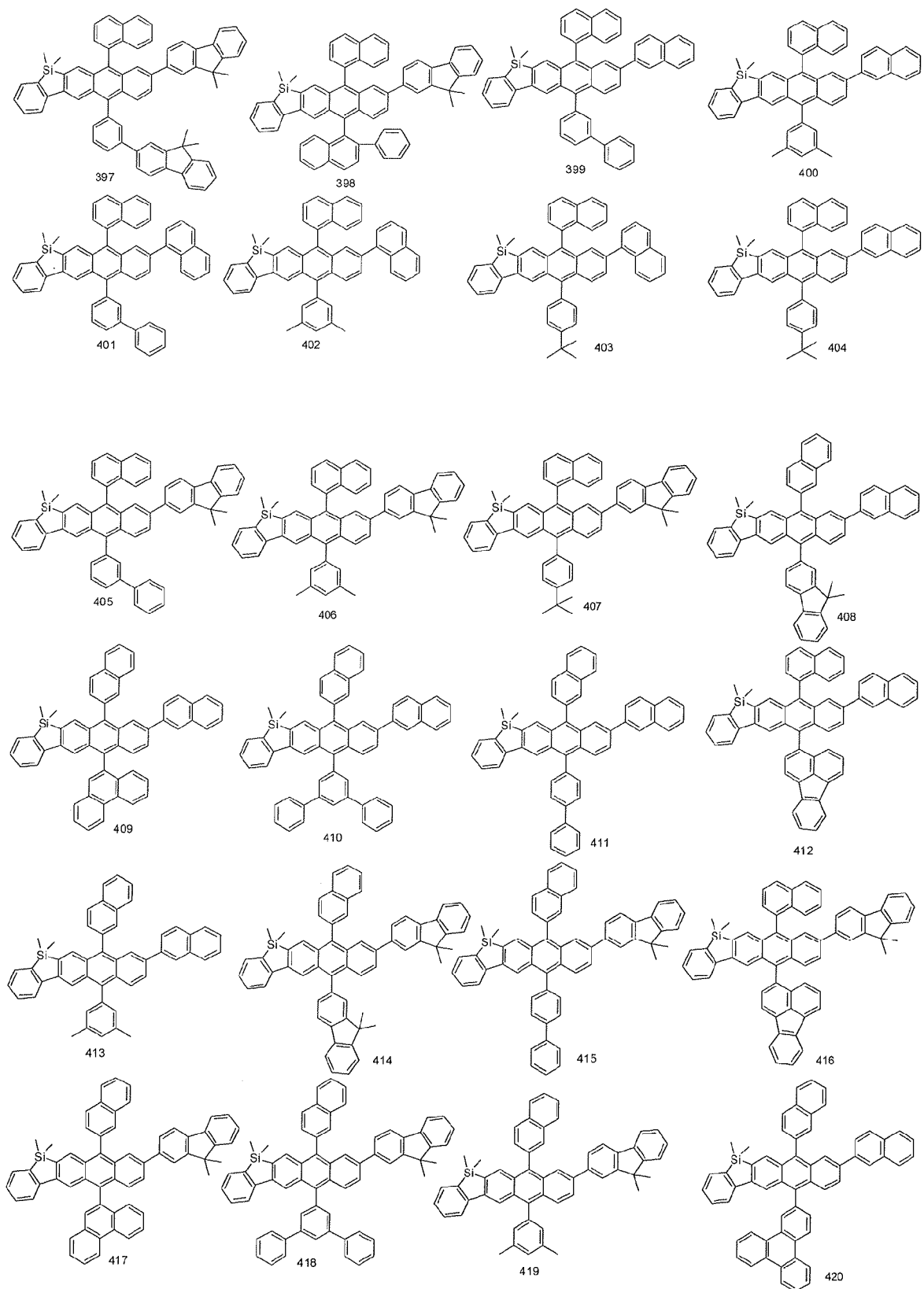


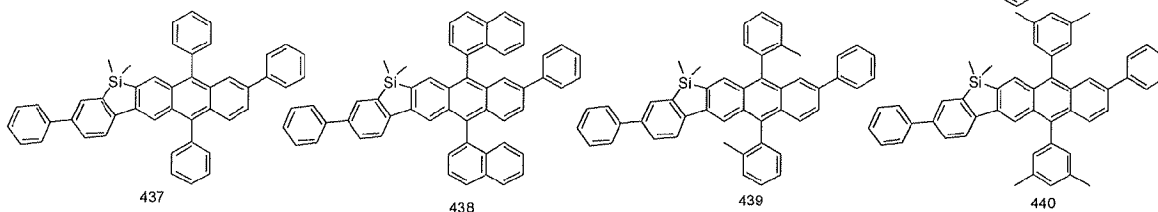
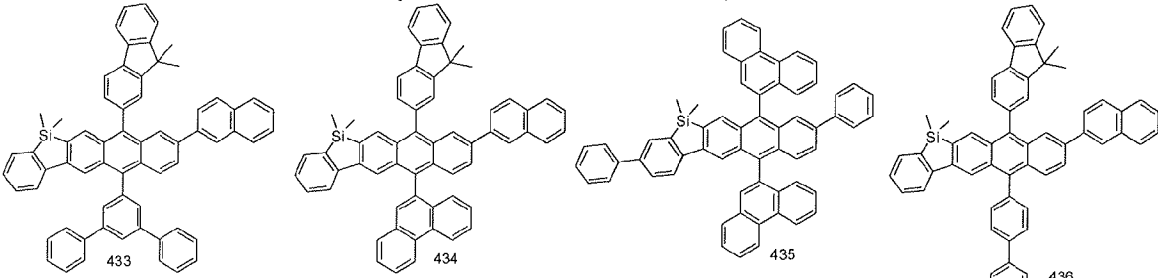
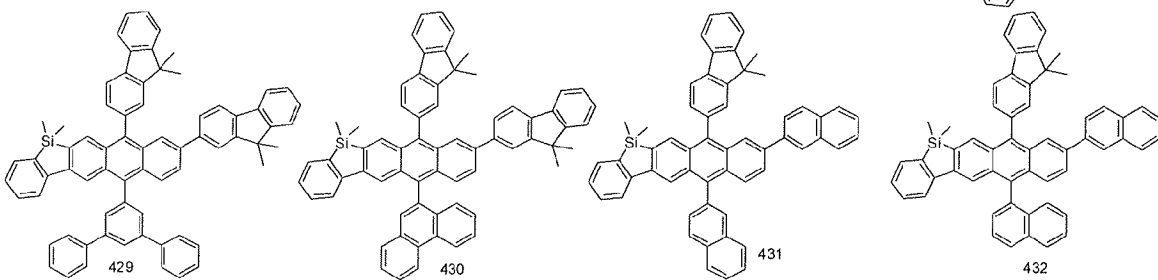
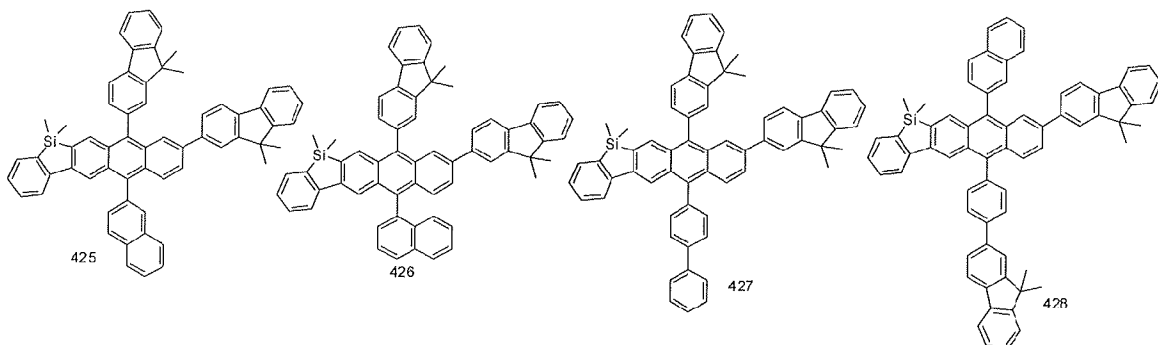
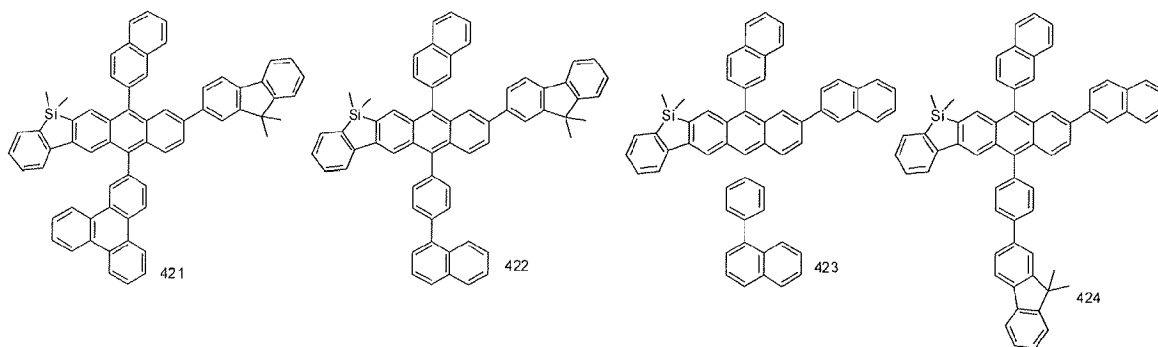




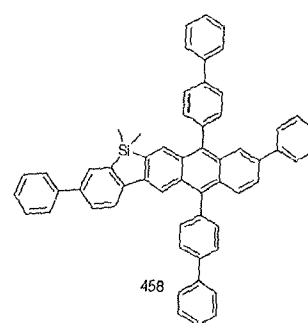
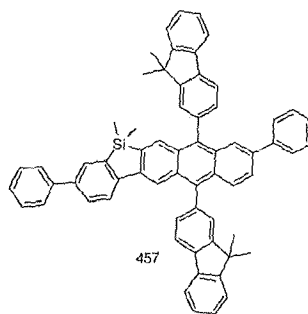
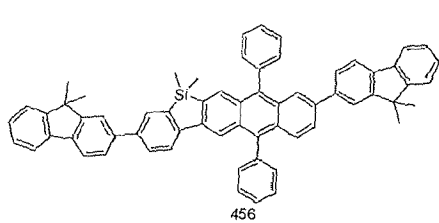
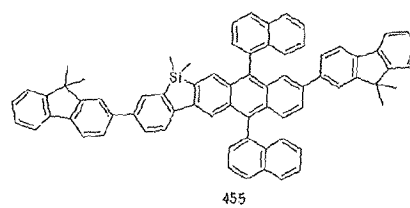
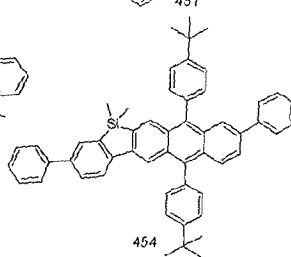
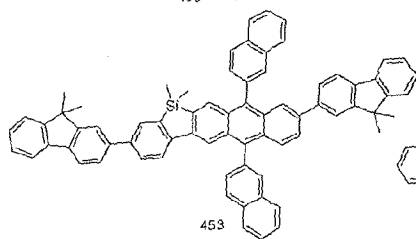
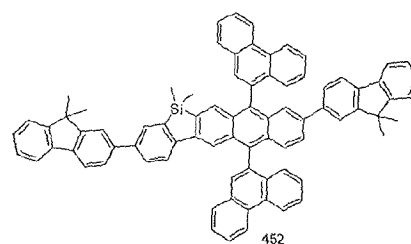
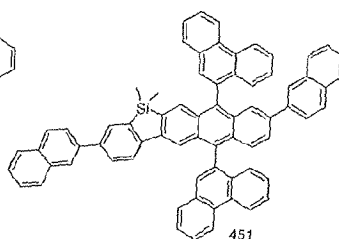
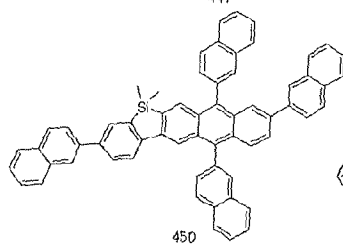
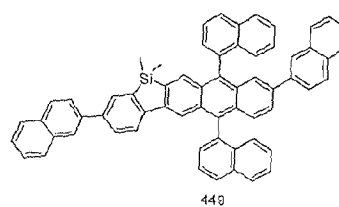
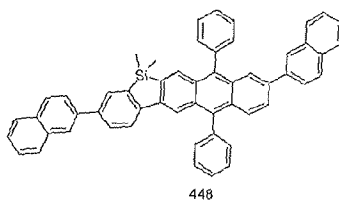
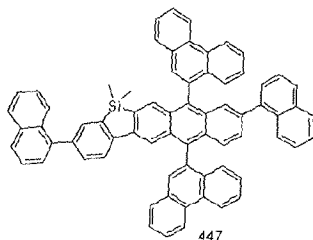
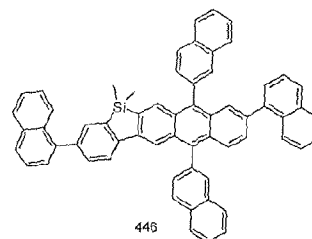
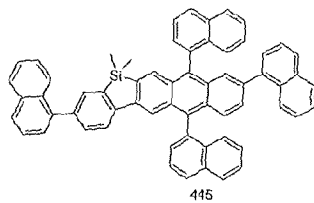
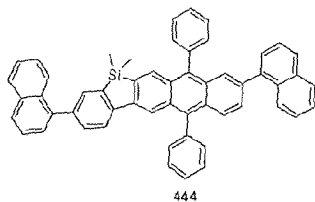
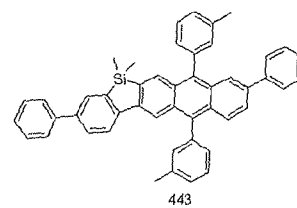
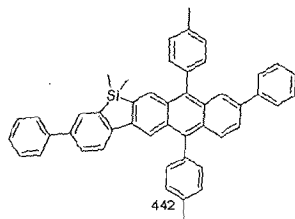
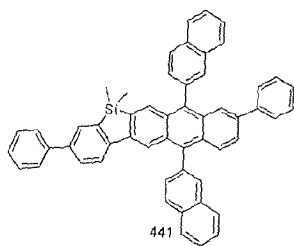


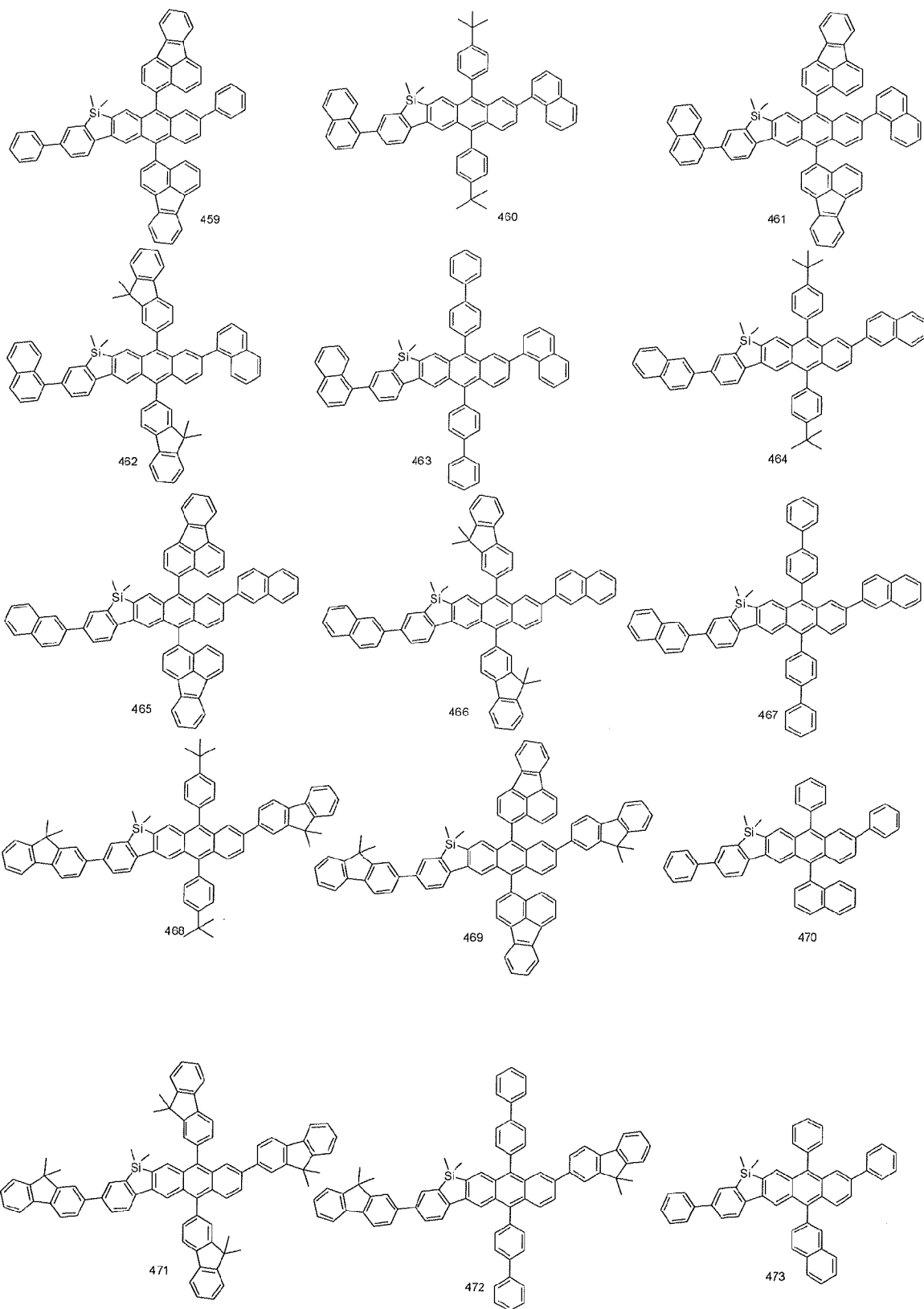
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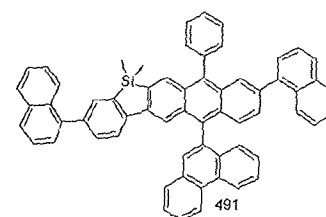
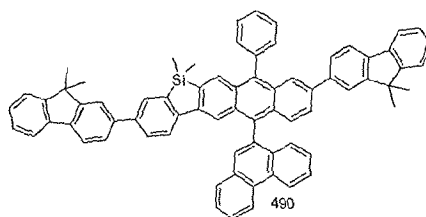
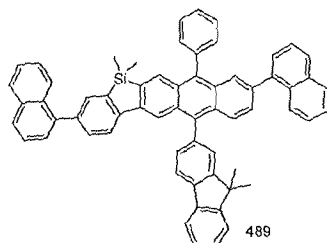
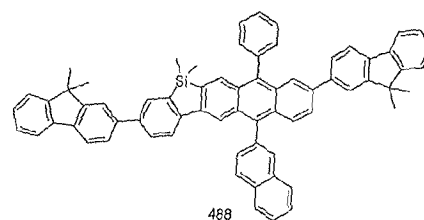
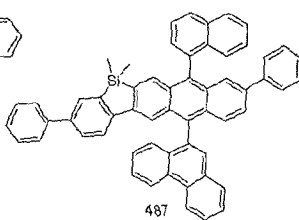
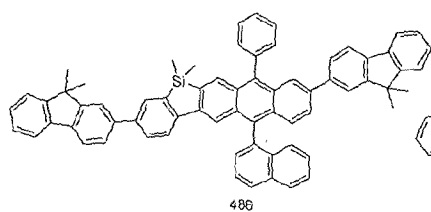
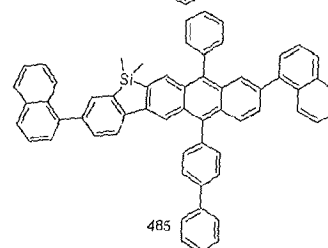
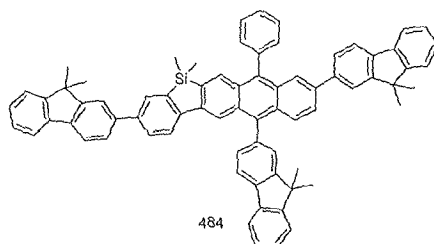
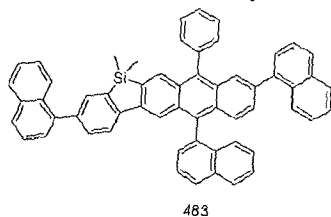
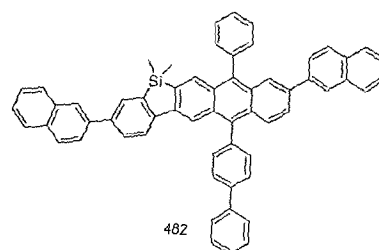
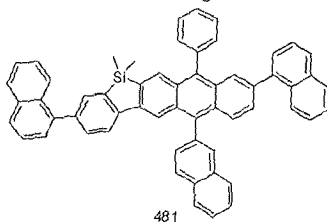
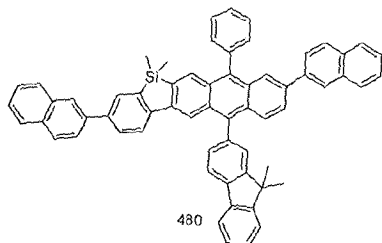
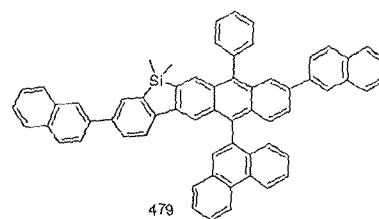
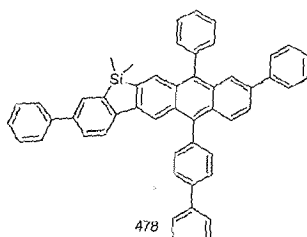
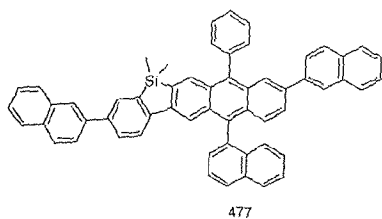
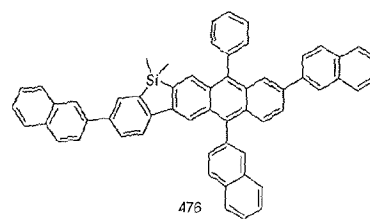
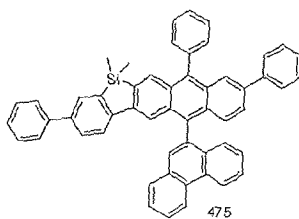
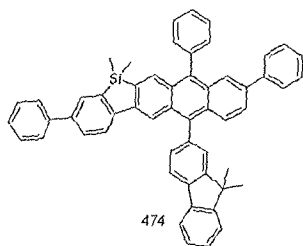


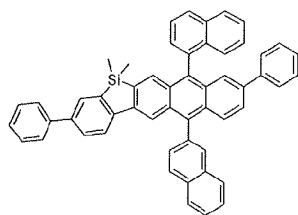


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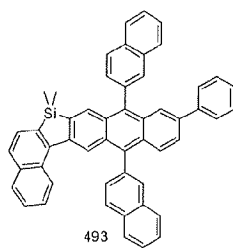




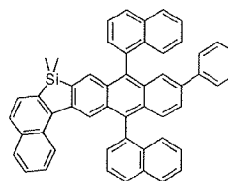




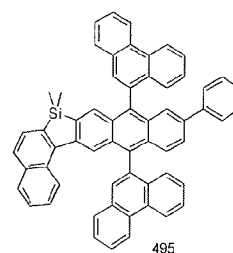
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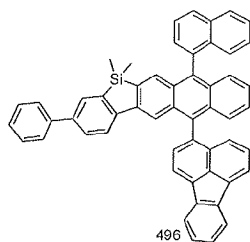
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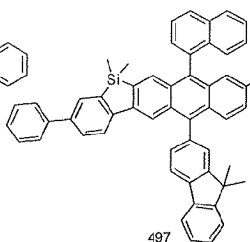
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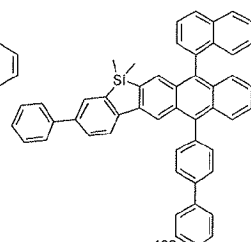
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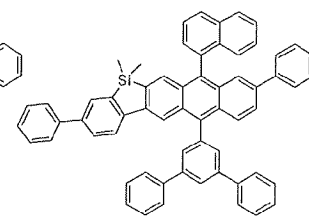
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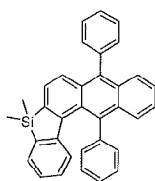
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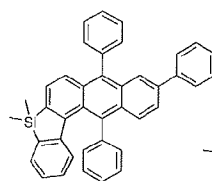
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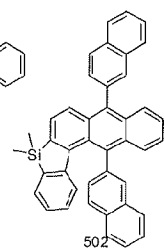
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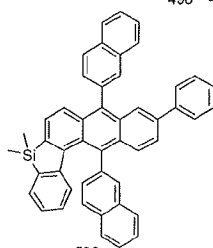
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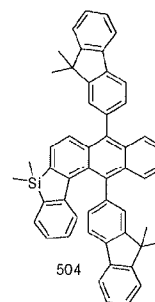
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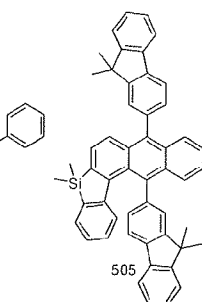
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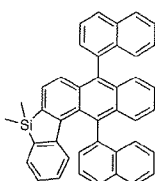
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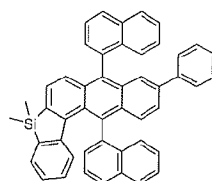
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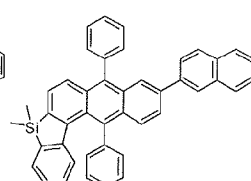
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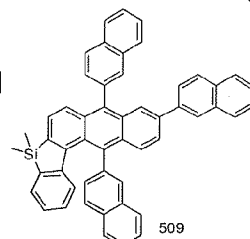
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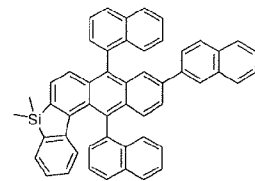
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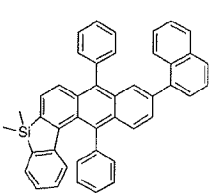
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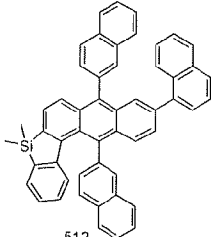
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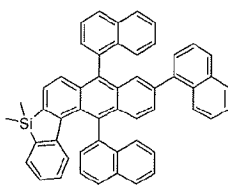
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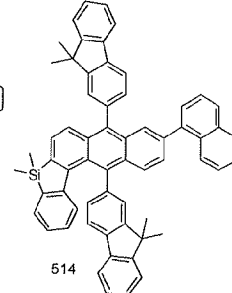
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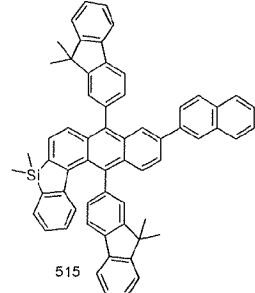
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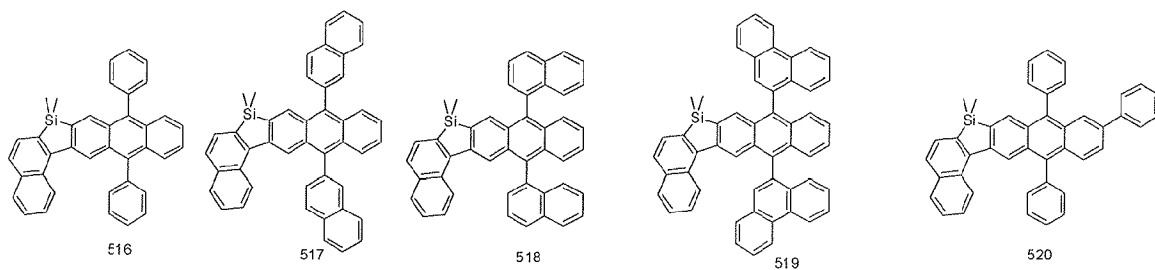


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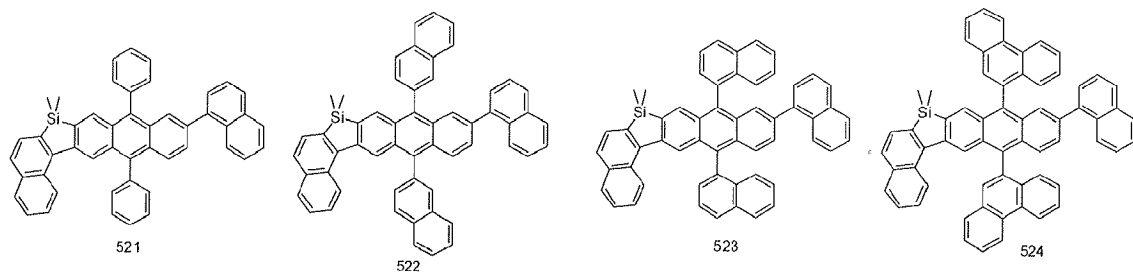
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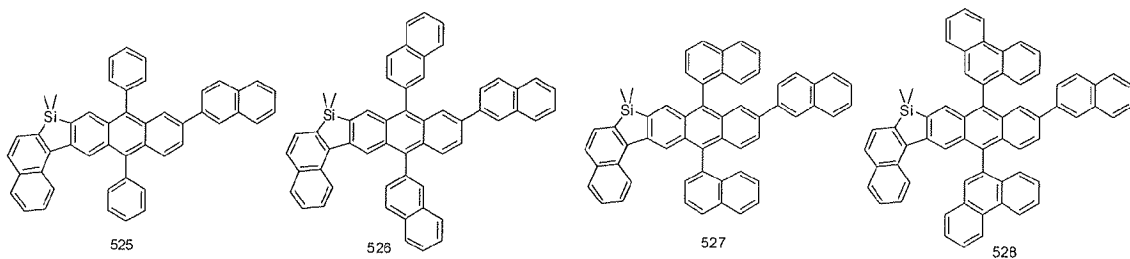
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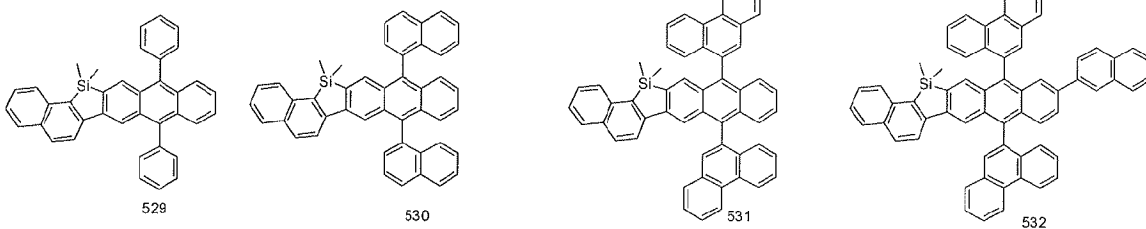
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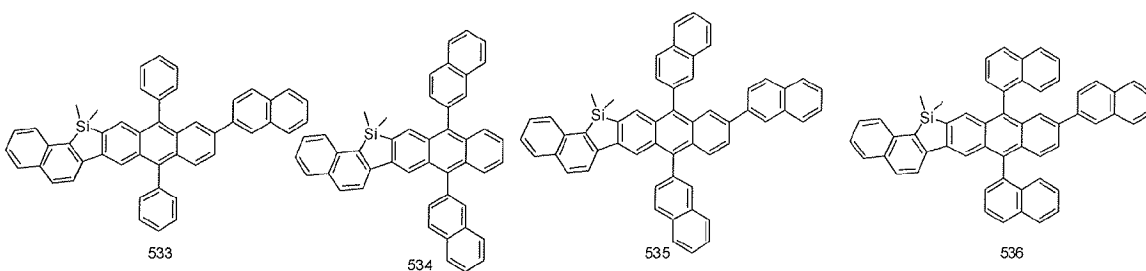
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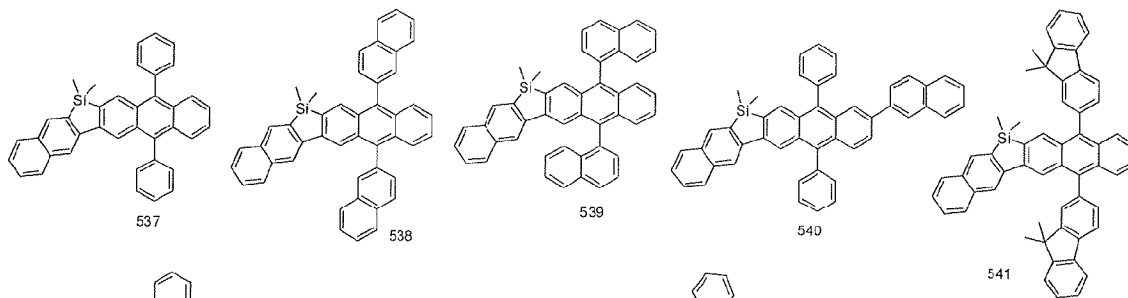
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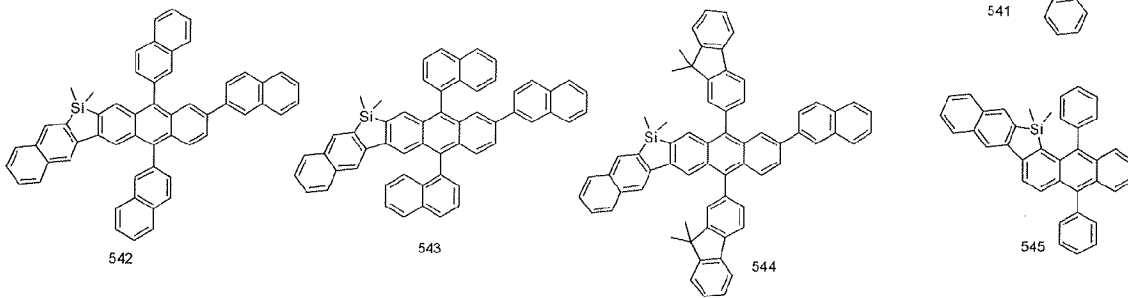
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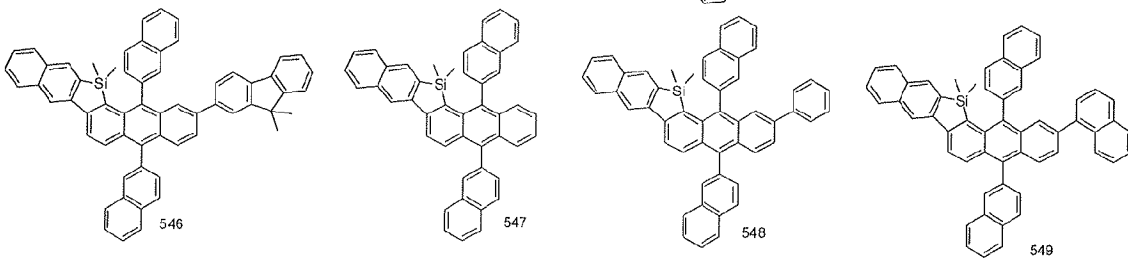


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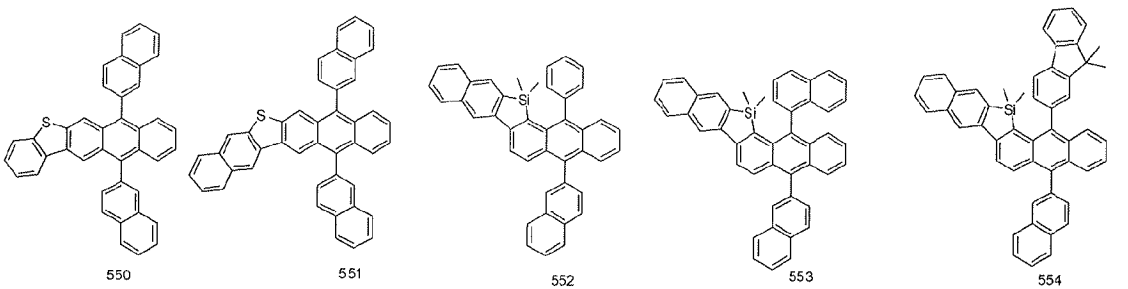
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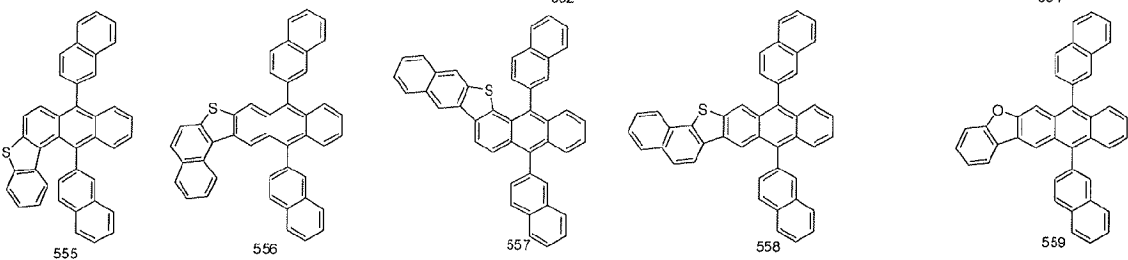
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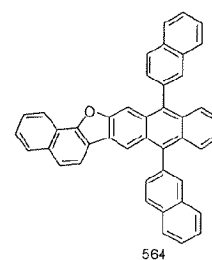
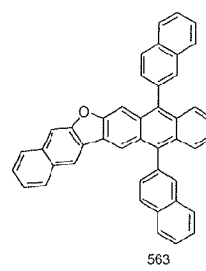
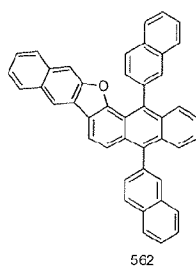
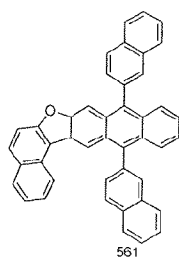
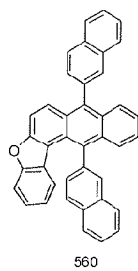
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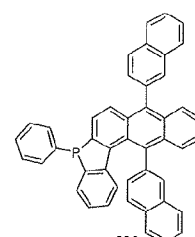
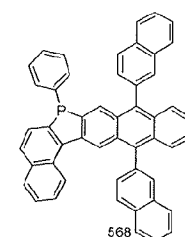
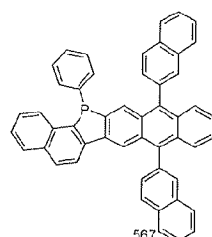
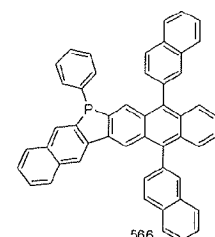
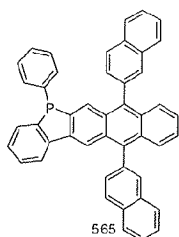
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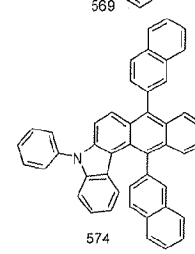
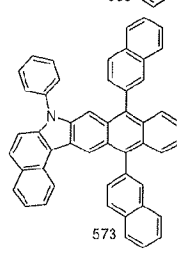
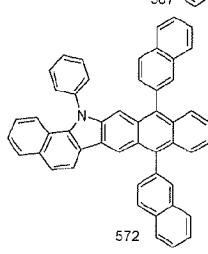
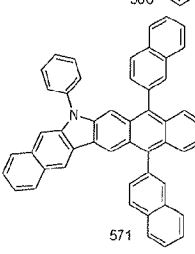
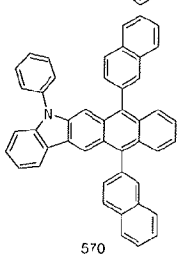
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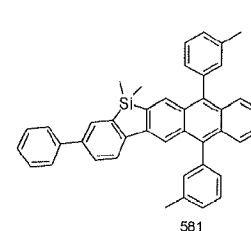
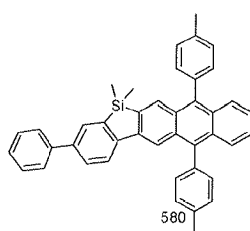
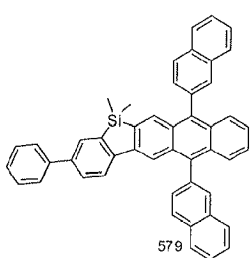
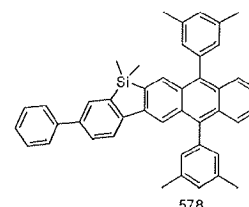
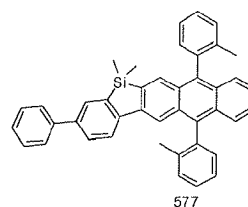
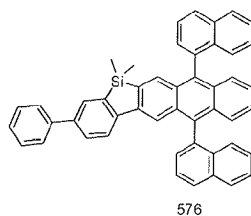
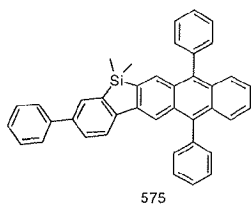
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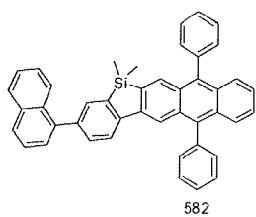
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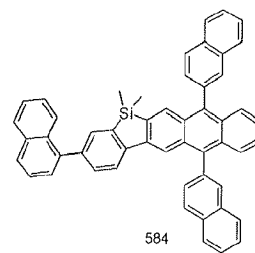
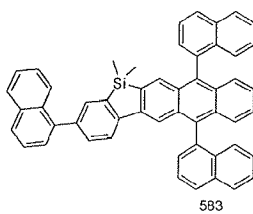
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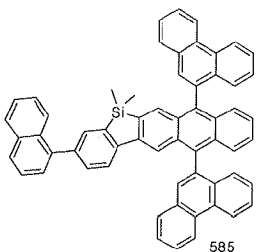
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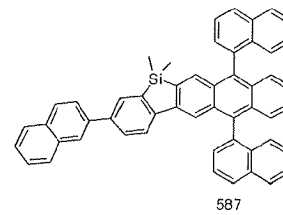
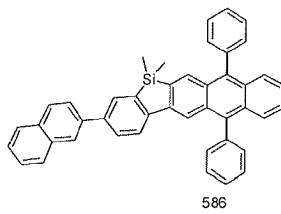
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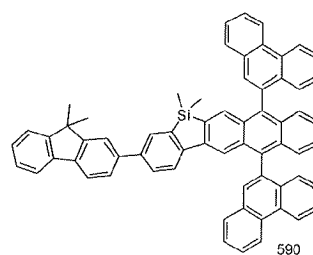
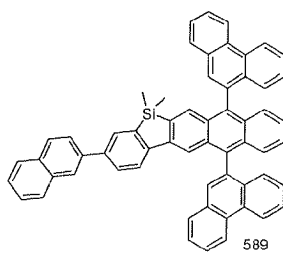
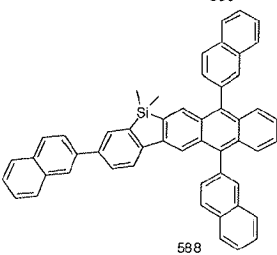
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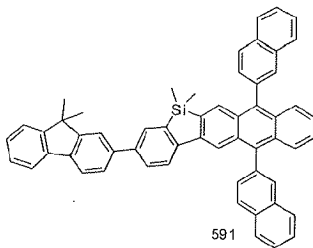
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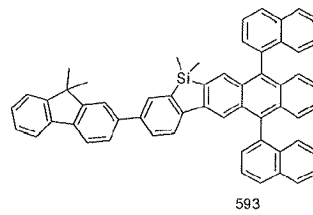
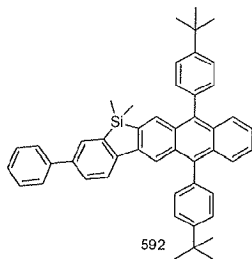
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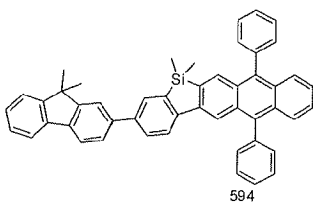
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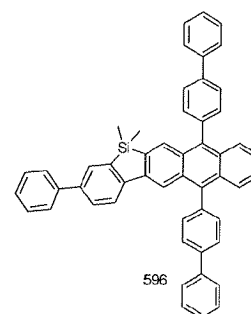
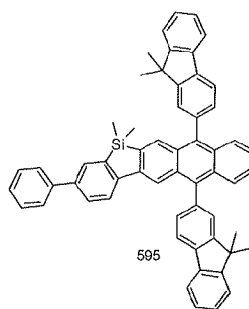
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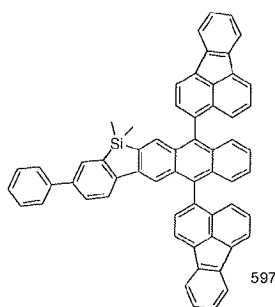
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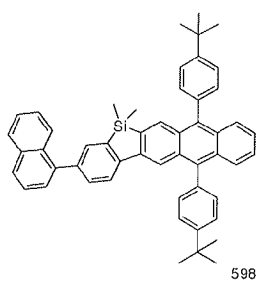
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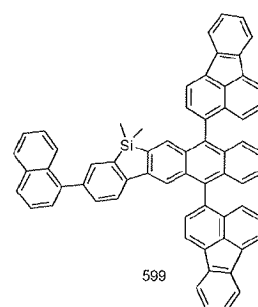
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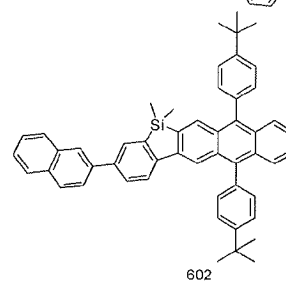
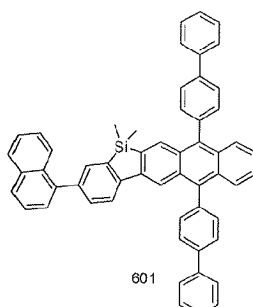
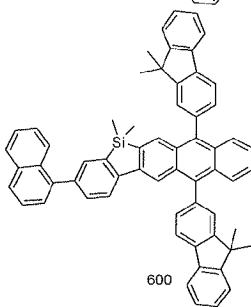
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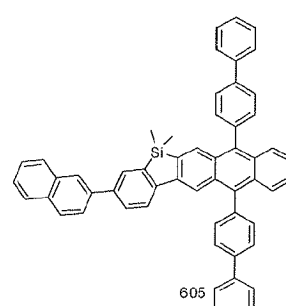
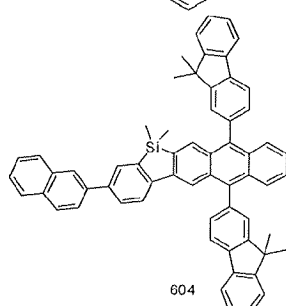
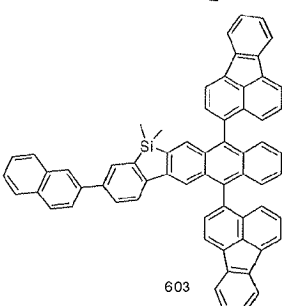
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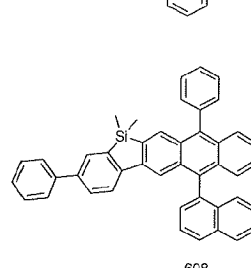
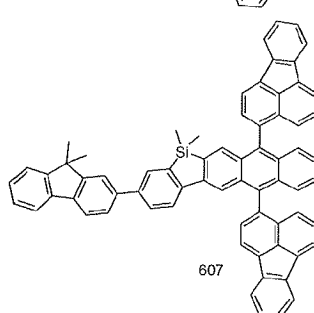
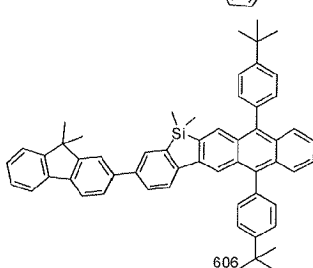


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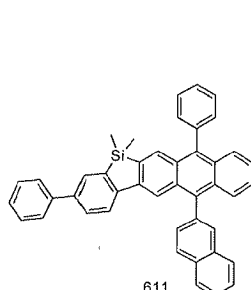
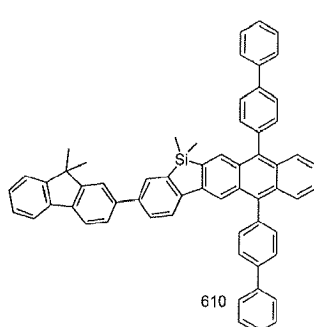
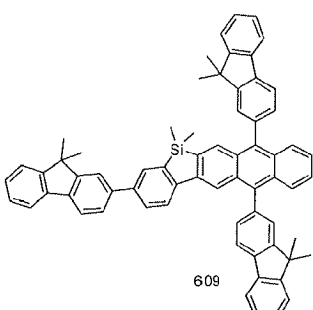
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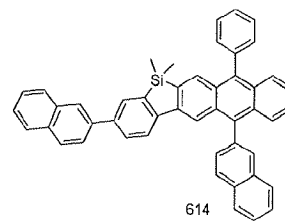
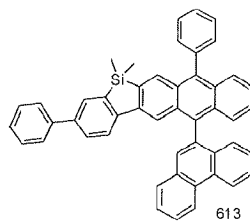
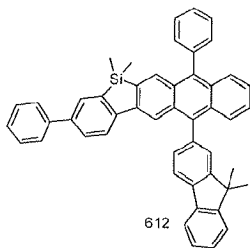
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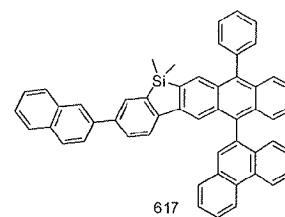
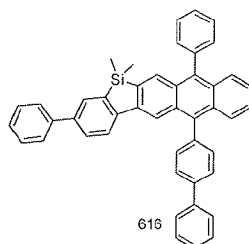
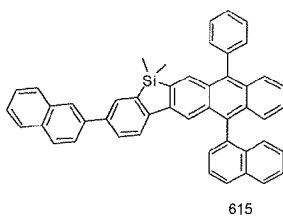
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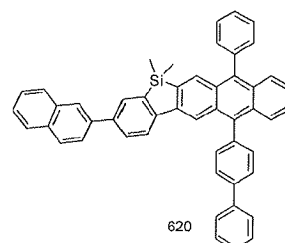
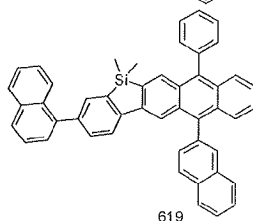
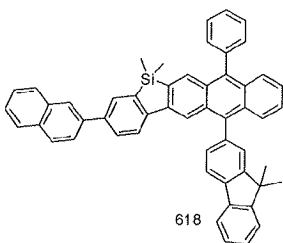
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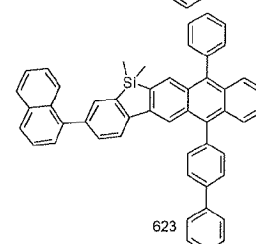
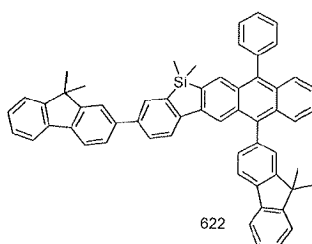
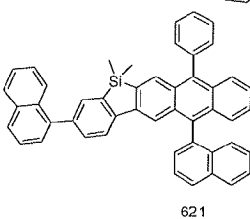


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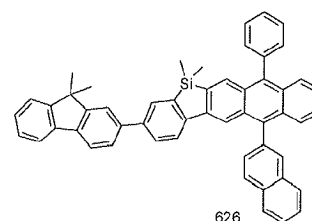
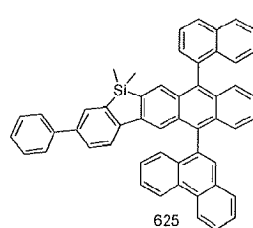
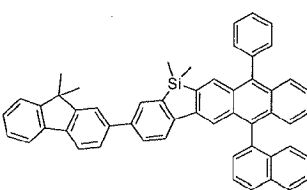


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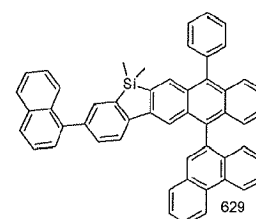
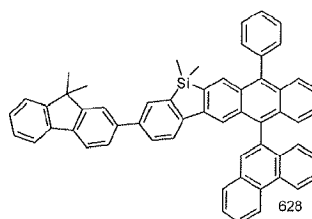
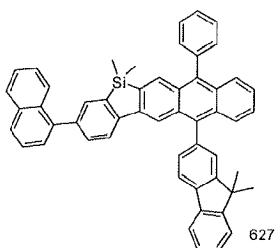
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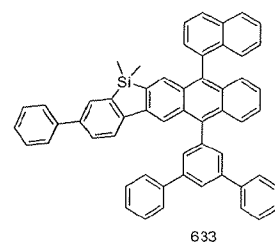
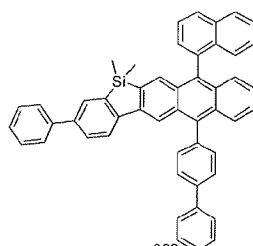
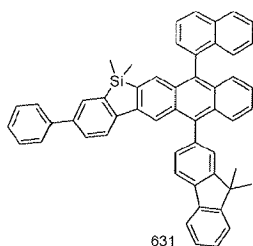
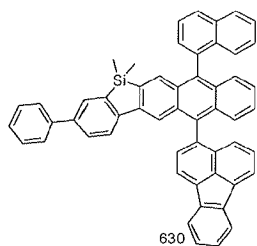
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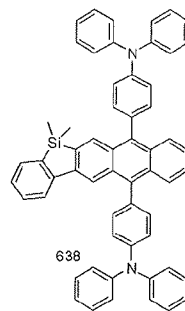
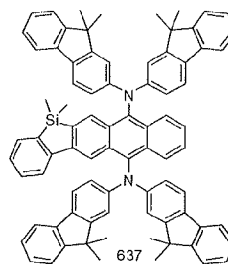
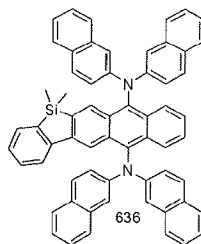
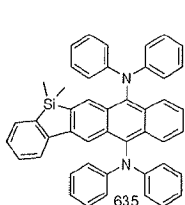
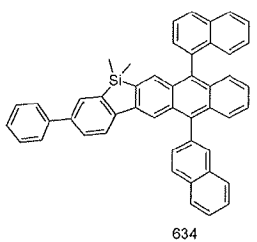


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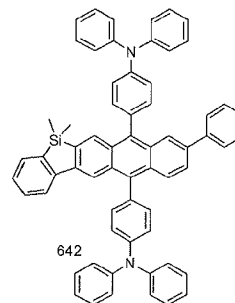
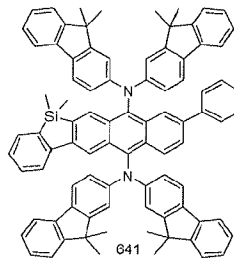
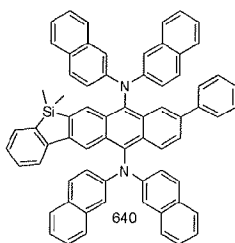
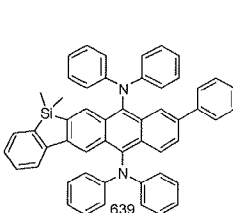
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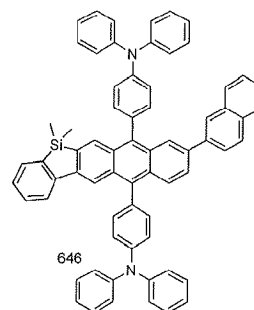
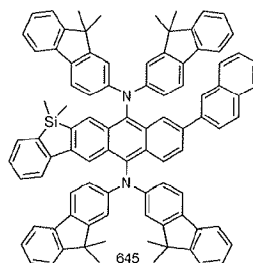
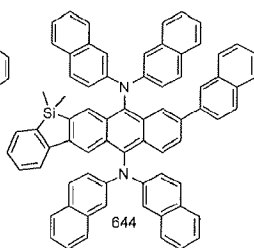
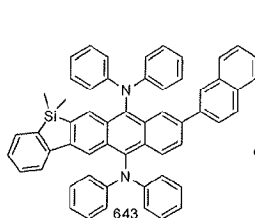
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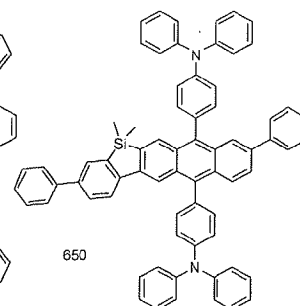
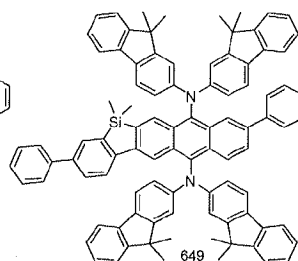
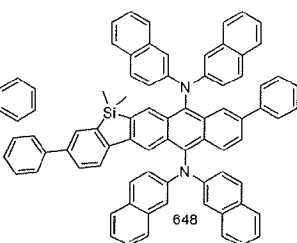
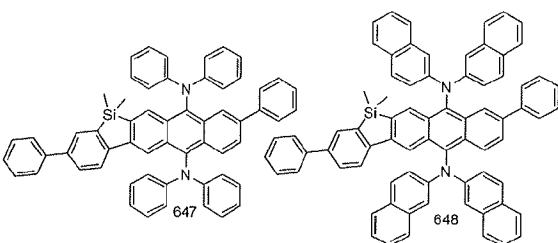
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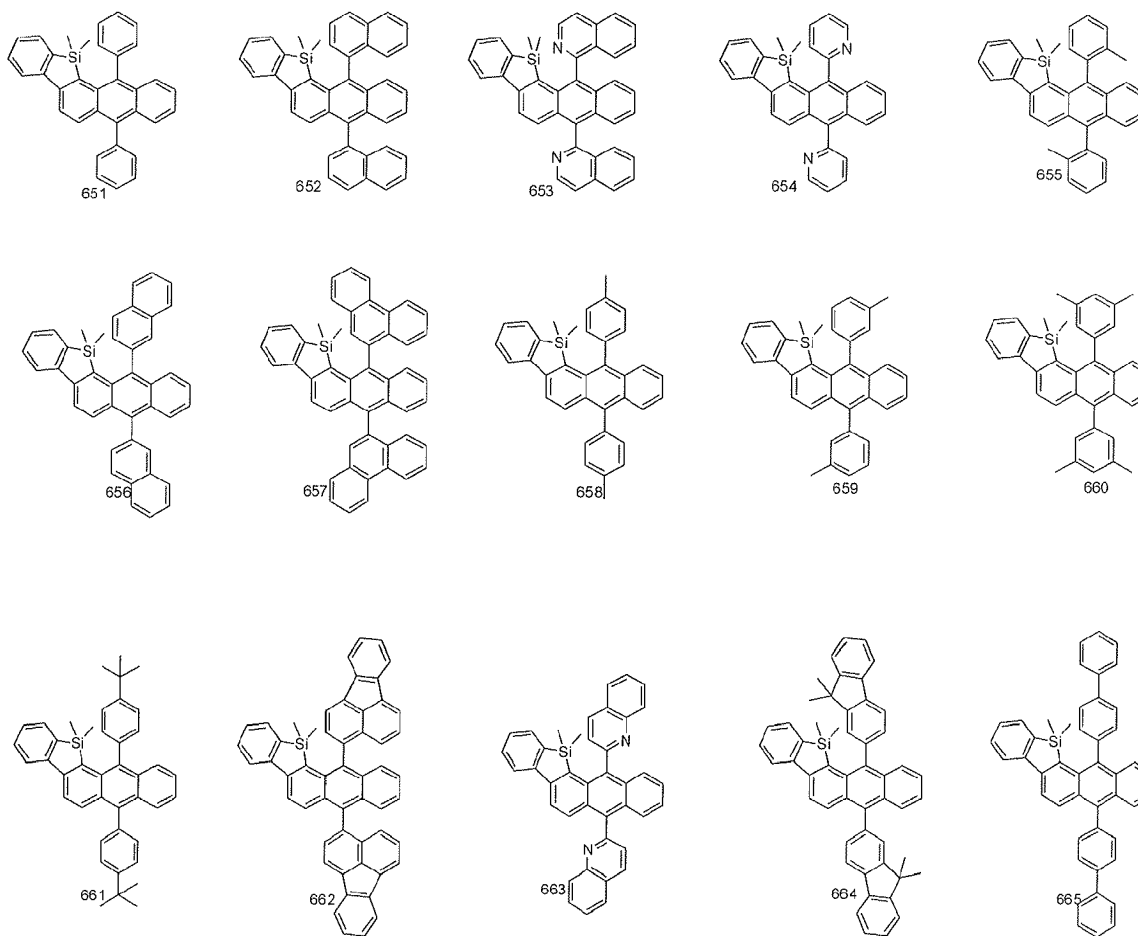


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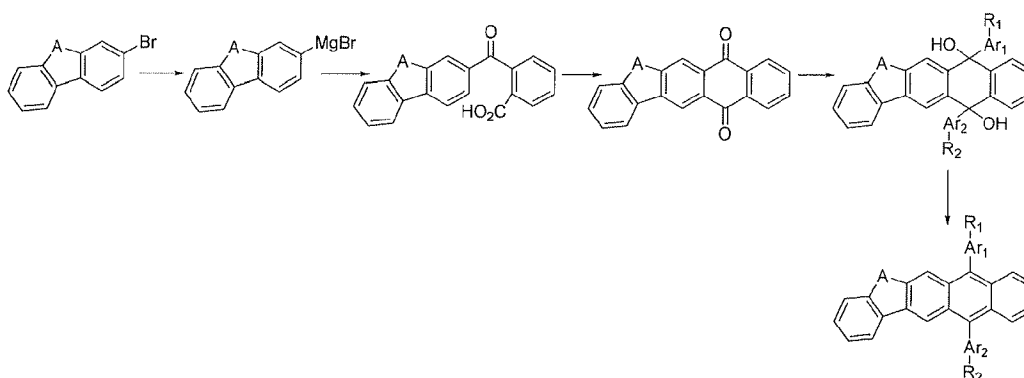


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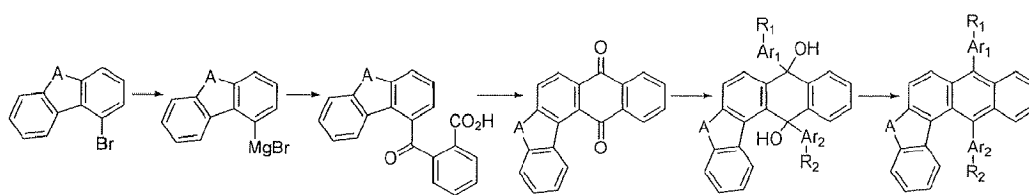


[0015] The organic electroluminescent compound according to the present invention may be prepared in accordance with Schemes 1 to 7:

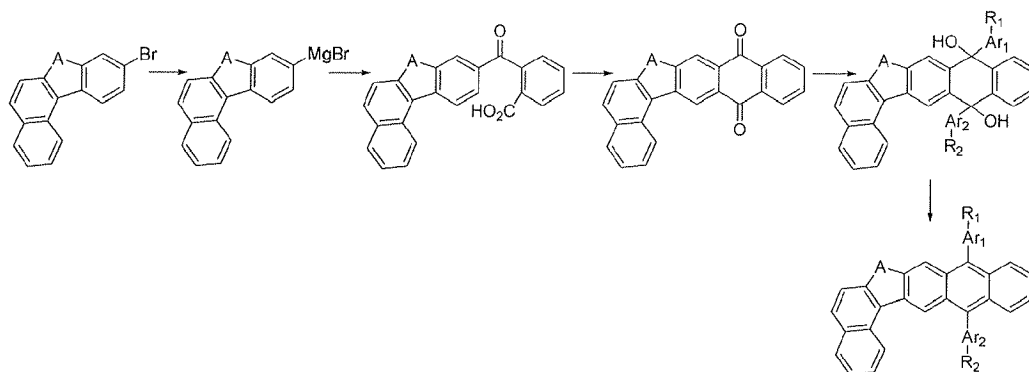
[Scheme 1]



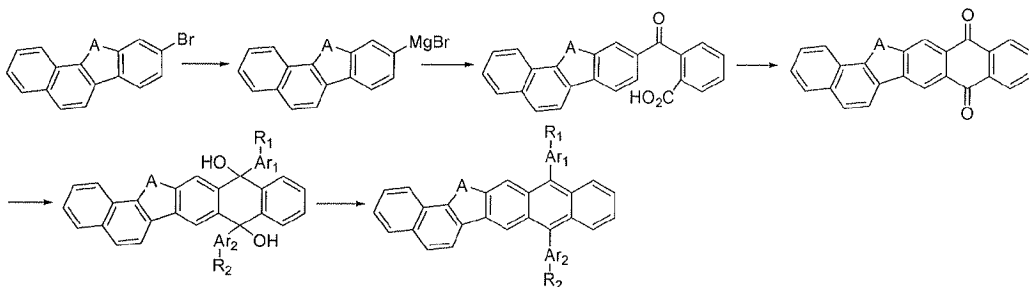
[Scheme 2]



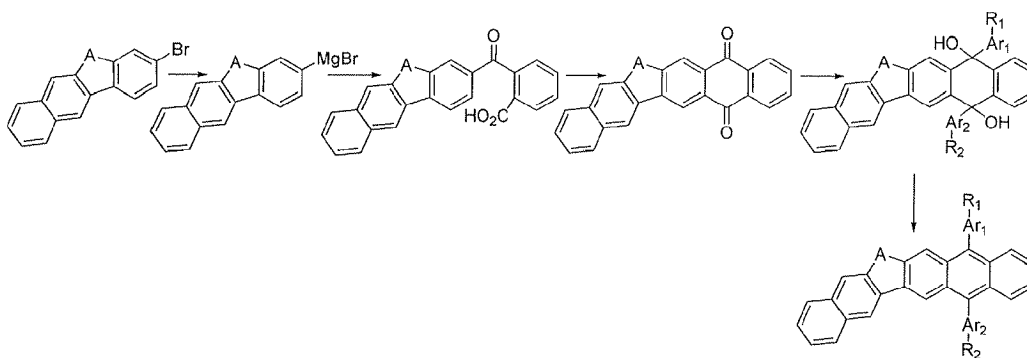
[Scheme 3]



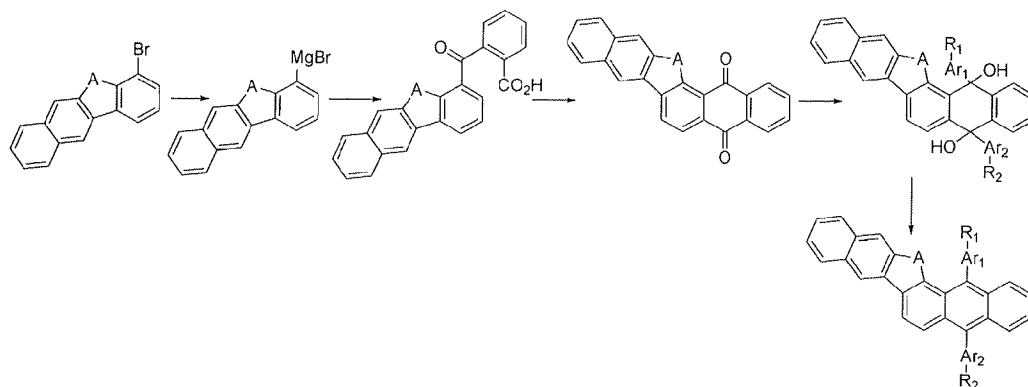
[Scheme 4]



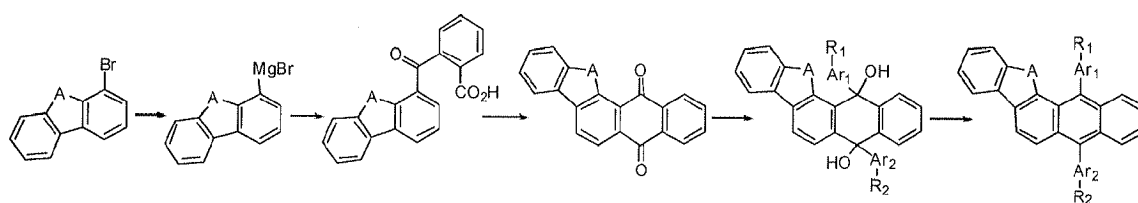
[Scheme 5]



[Scheme 6]



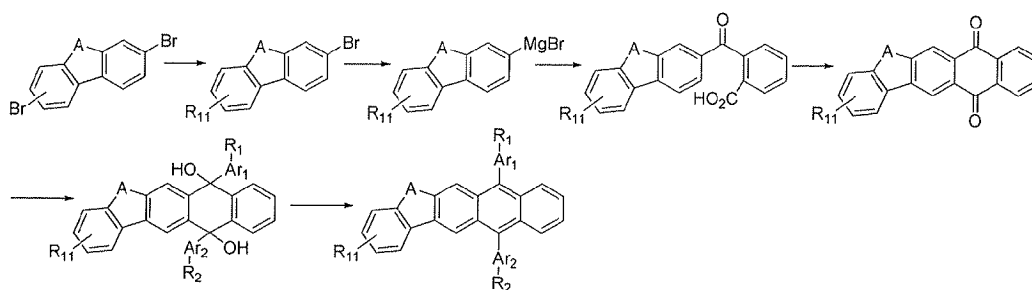
[Scheme 7]



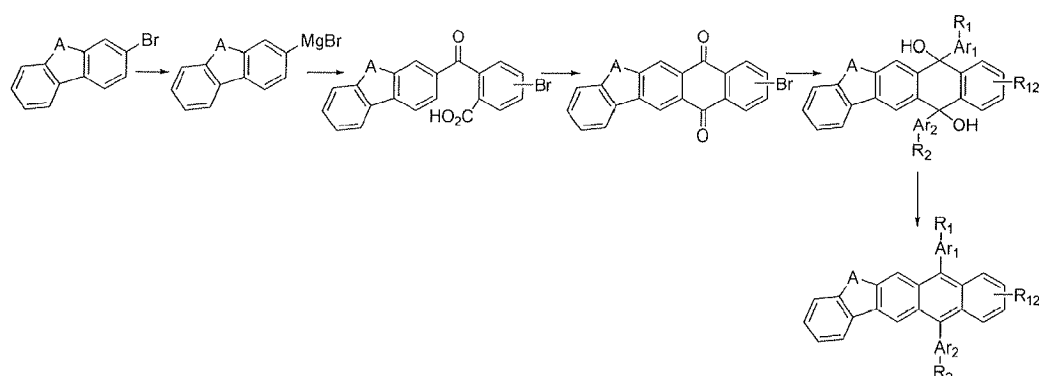
wherein A, Ar₁, Ar₂, R₁ and R₂ are the same as defined in Chemical Formula 1.

[0016] Further, as shown in Schemes 8 to 10, R₁₁ and/or R₁₂ substituent(s) may bind to the substituent L of the organic electroluminescent compound according to the present invention:

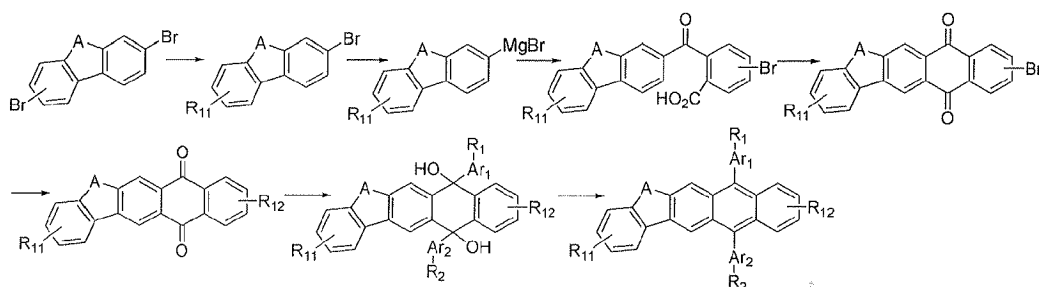
[Scheme 8]



[Scheme 9]



[Scheme 10]



wherein

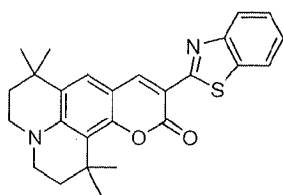
A, Ar₁, Ar₂, R₁, R₂, R₁₁ and R₁₂ are the same as defined in Chemical Formula 1.

[0017] The present invention further provides an organic solar cell. The organic solar cell according to the present invention comprises one or more organic electroluminescent compound(s) represented by Chemical Formula 1.

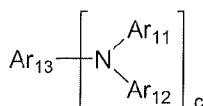
[0018] The present invention further provides an organic electroluminescent device. The organic electroluminescent device according to the present invention comprises a first electrode; a second electrode; and at least one organic layer (s) interposed between the first electrode and the second electrode, wherein the organic layer comprises one or more organic electroluminescent compound(s) represented by Chemical Formula 1.

[0019] The organic layer comprises an electroluminescent layer. In addition to one or more organic electroluminescent compound(s) represented by Chemical Formula 1, the electroluminescent layer further comprises one or more dopant(s) or host(s). The dopant or host used in the organic electroluminescent device according to the present invention is not particularly limited.

[0020] The dopant used in the organic electroluminescent device according to the present invention may be selected from the compounds represented by Chemical Formulas 2 to 4:



(2)

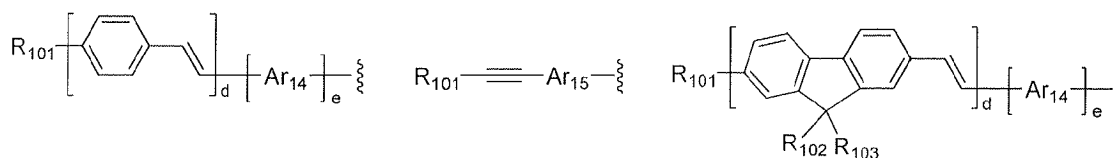


(3)

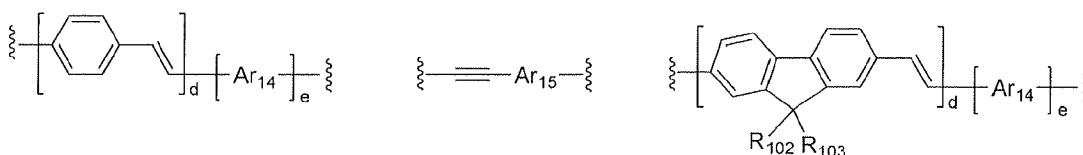
wherein

Ar₁₁ and Ar₁₂ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, mono- or di-(C6-C60)arylamino, mono- or di-(C1-C60)alkylamino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S or (C3-C60)cycloalkyl, or Ar₁₁ and Ar₁₂ may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

Ar₁₃ represents (C6-C60)aryl, (C4-C60)heteroaryl or aryl having one of the following structures, when c is 1:



Ar₁₃ represents (C6-C60)arylene, (C4-C60)heteroarylene or arylene having one of the following structures, when c is 2:



wherein

Ar₁₄ and Ar₁₅ independently represent (C6-C60)arylene or (C4-C60)heteroarylene;

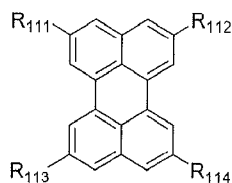
R₁₀₁ through R₁₀₃ independently represent hydrogen, deuterium, (C1-C60)alkyl or (C6-C60)aryl;

d represents an integer from 1 to 4;

e represents an integer 0 or 1;

the alkyl, aryl, heteroaryl, arylamino, alkylamino, cycloalkyl or heterocycloalkyl of Ar₁₁ and Ar₁₂, the aryl, heteroaryl, arylene or heteroarylene of Ar₁₃, the arylene or heteroarylene of Ar₁₄ and Ar₁₅, or the alkyl or aryl of R₁₀₁ through R₁₀₃ may be further substituted by one or more substituent(s) selected from halogen, deuterium, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C1-C60)alkyloxy, (C6-C60)arylthio, (C1-C60)alkylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl;

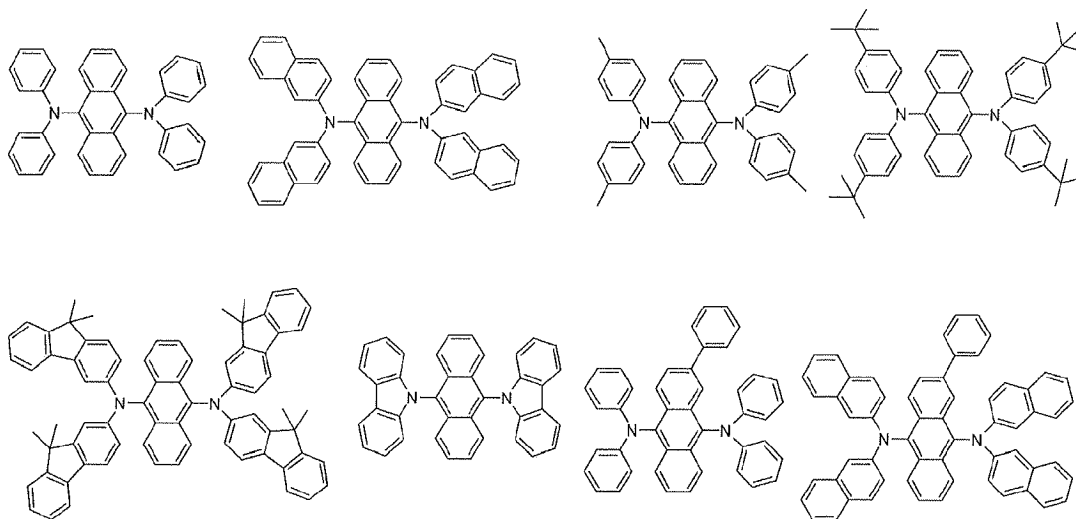
Chemical Formula 4



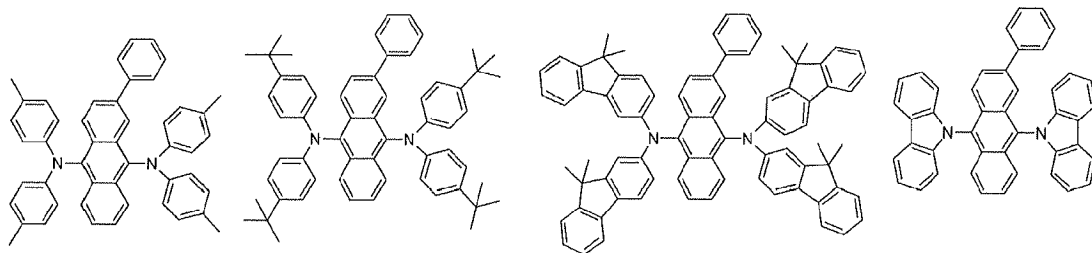
wherein

R₁₁₁ through R₁₁₄ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl, or each of R₁₁₁ through R₁₁₄ may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring; and the alkyl, alkenyl, alkynyl, cycloalkyl, heterocycloalkyl, aryl, heteroaryl, arylsilyl, alkylsilyl, alkylamino or arylamino of R₁₁₁ through R₁₁₄, or the alicyclic ring or monocyclic or polycyclic aromatic ring formed as they are linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring may be further substituted by one or more substituent(s) selected from deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro and hydroxyl.

[0021] The dopant compound represented by Chemical Formulas 2 to 4 may be exemplified by the compounds having the following structures, but not limited thereto:

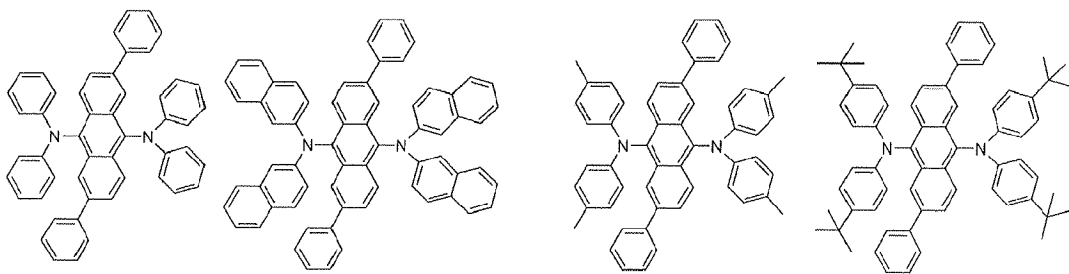


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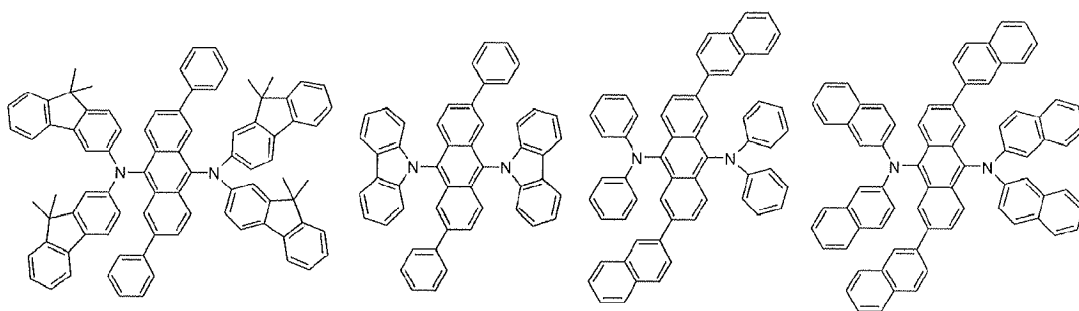
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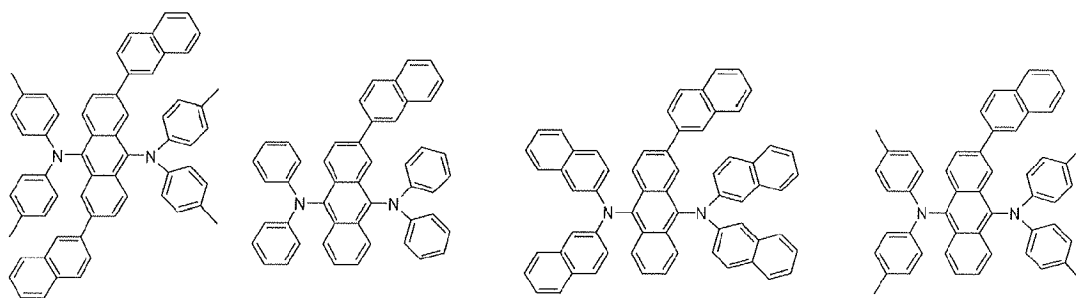
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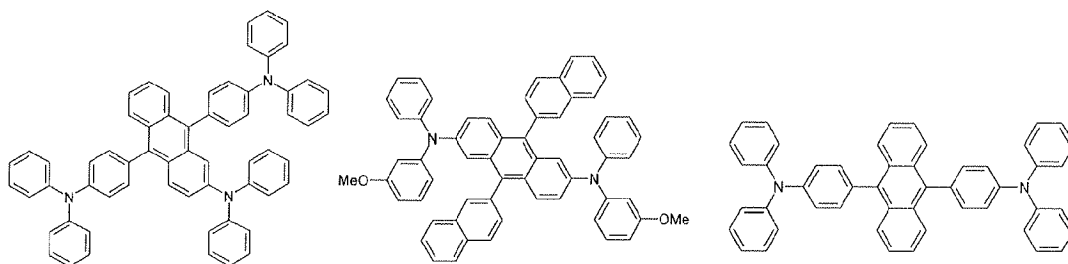
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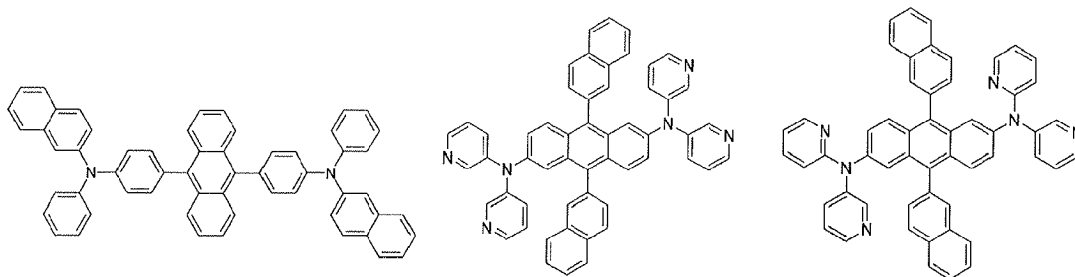
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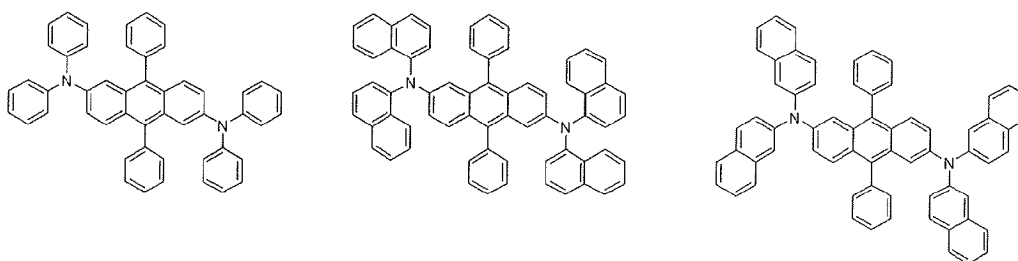
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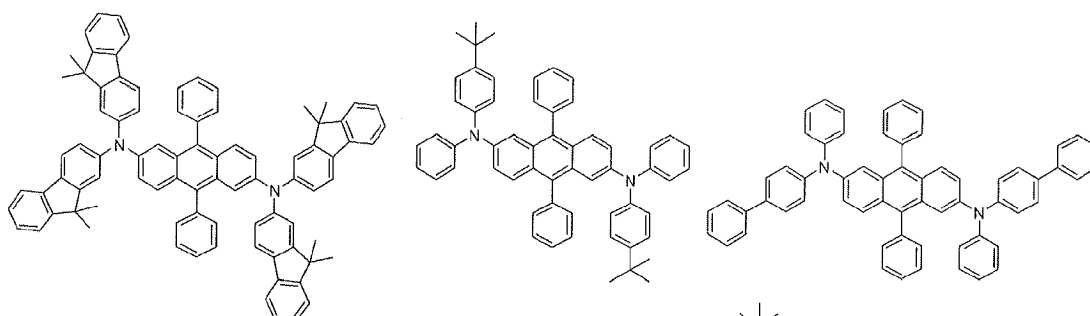
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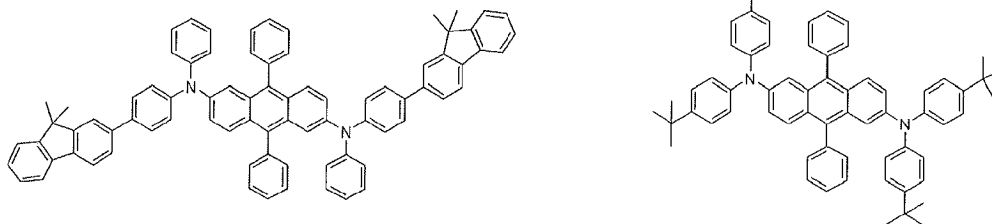
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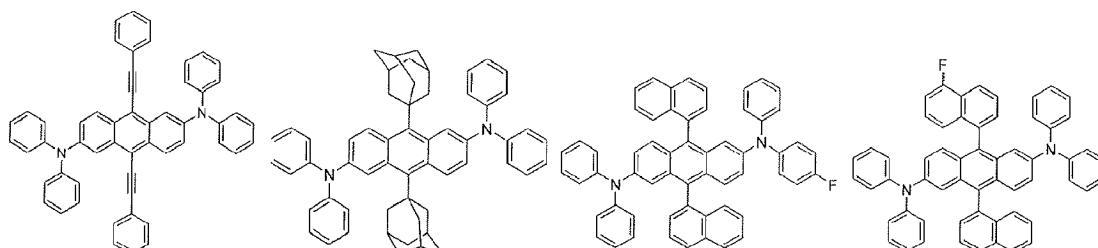
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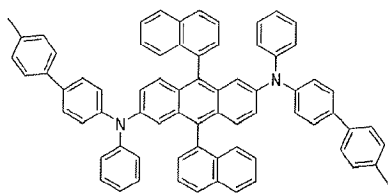
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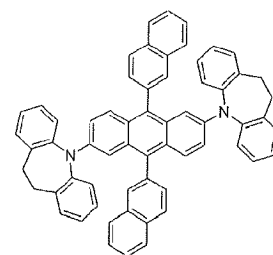
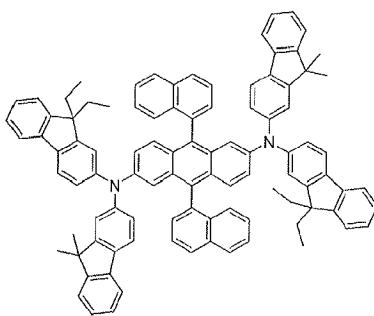
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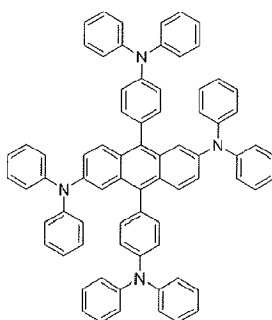
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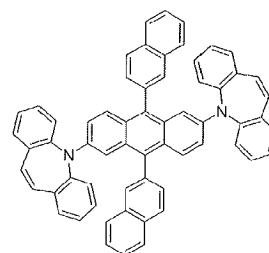
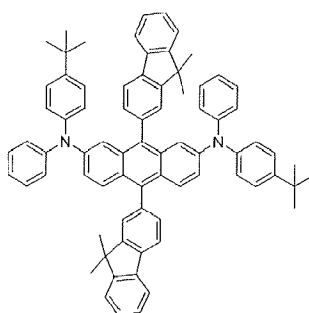
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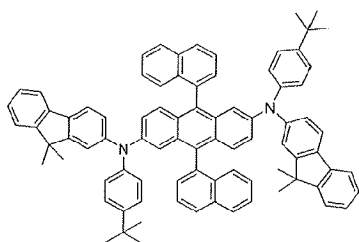


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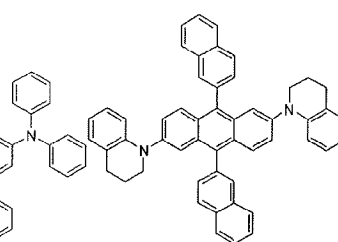
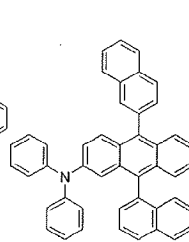
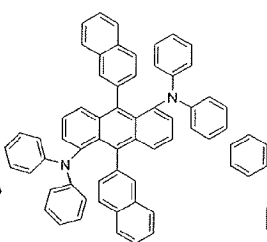


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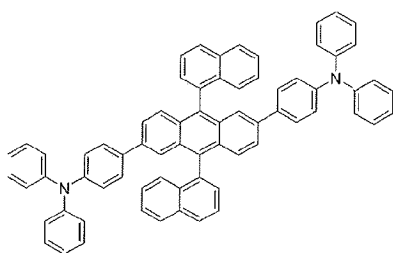
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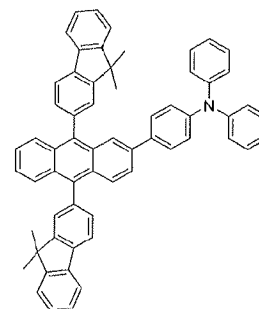
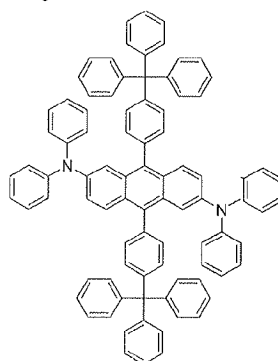
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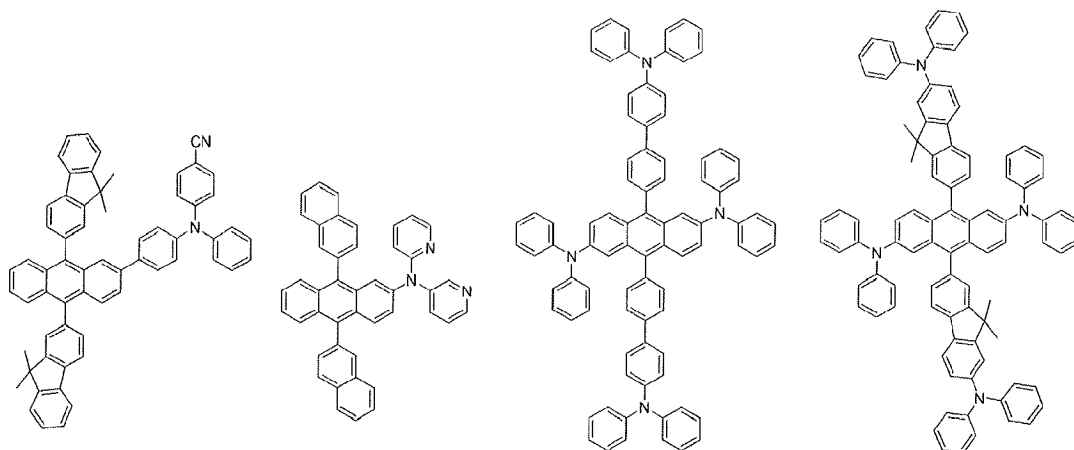
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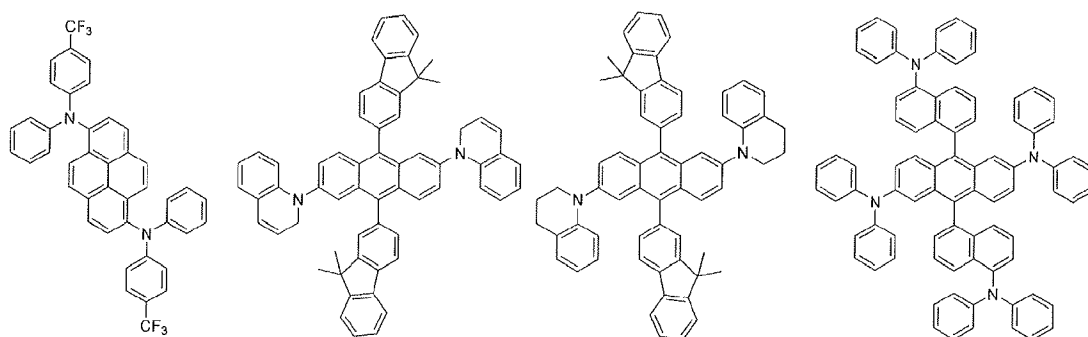
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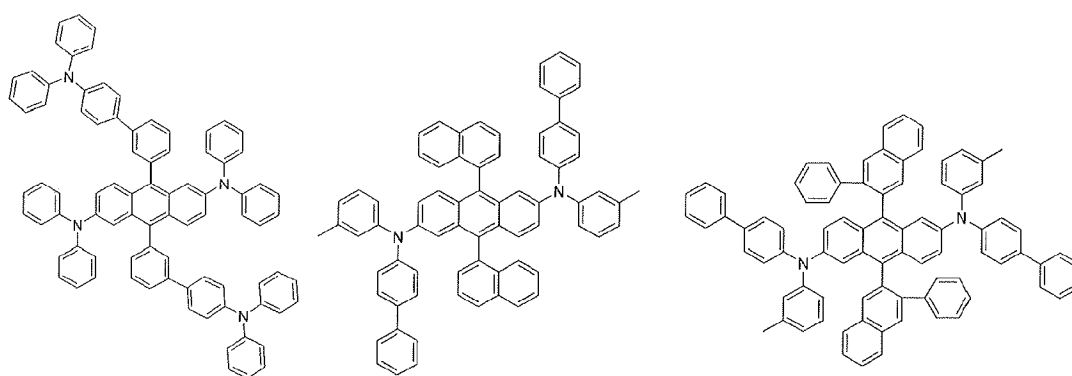
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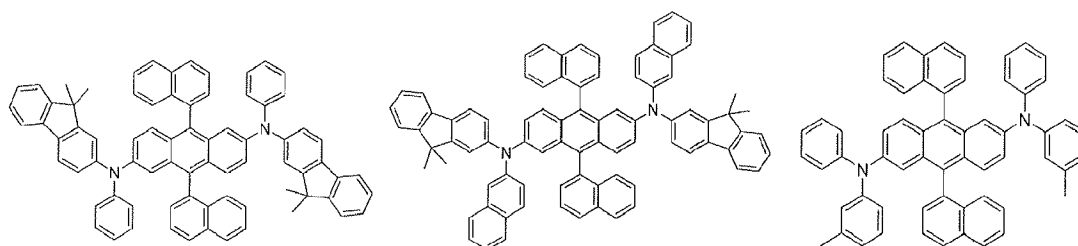
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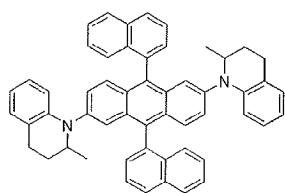


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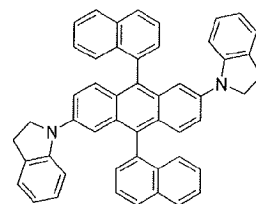
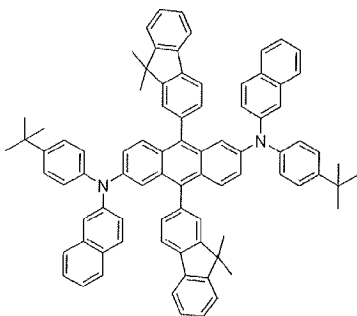
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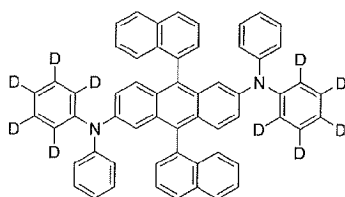
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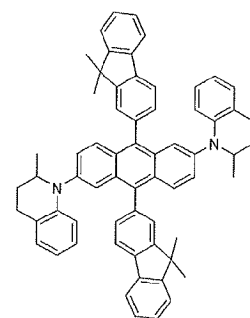
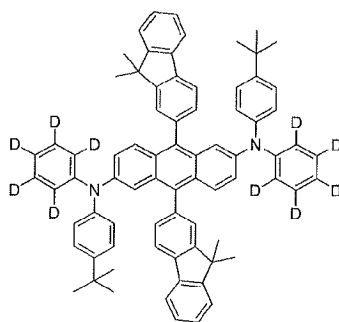
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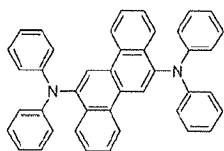
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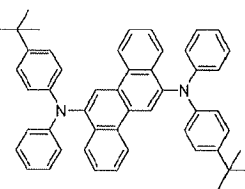
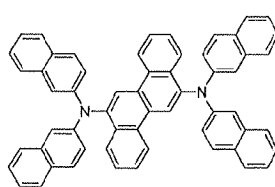
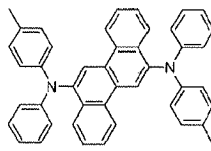
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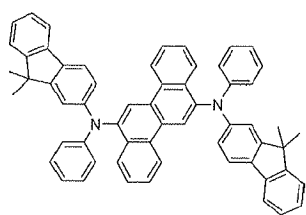
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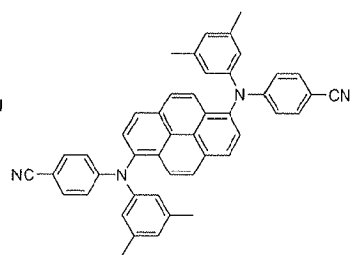
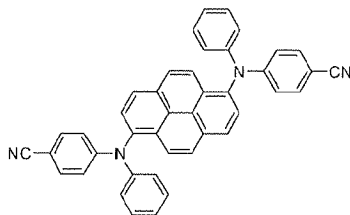
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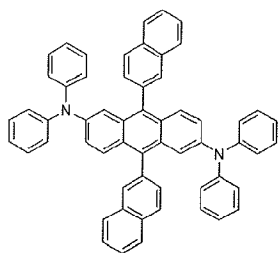


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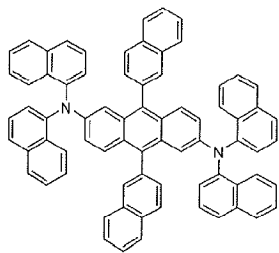
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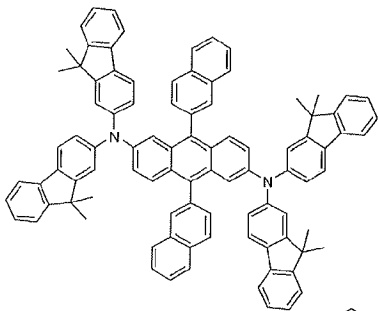
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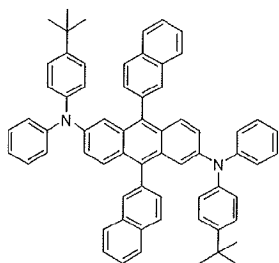
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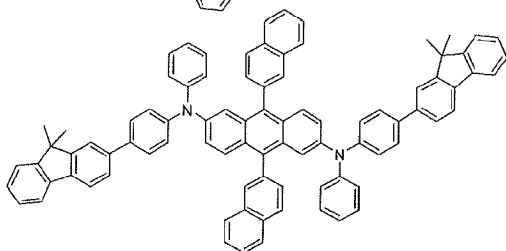
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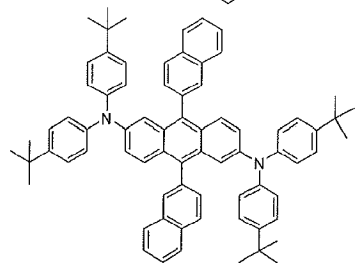
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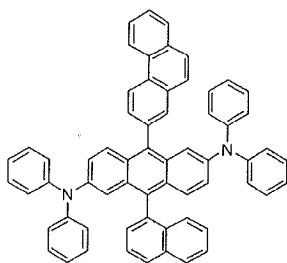
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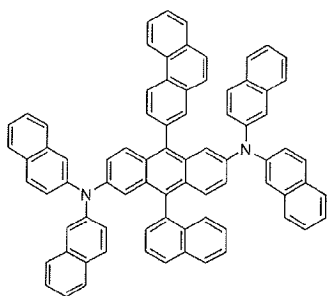
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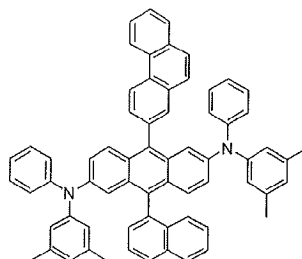
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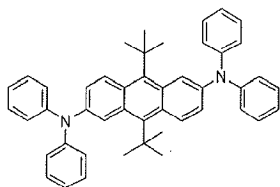
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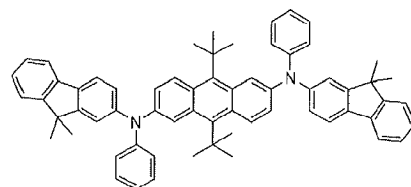
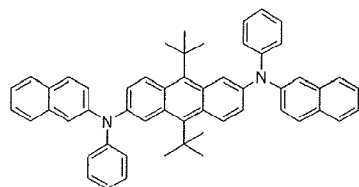
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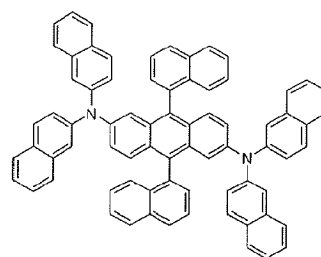
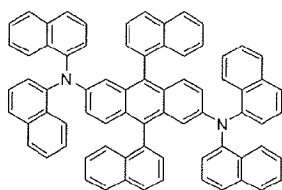
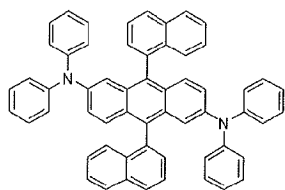
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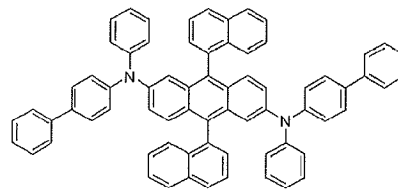
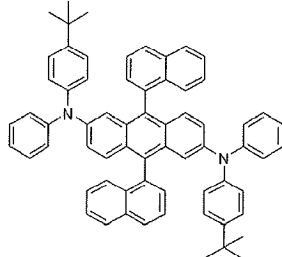
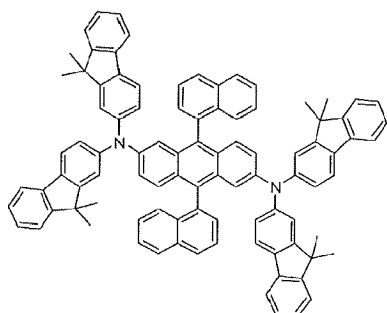
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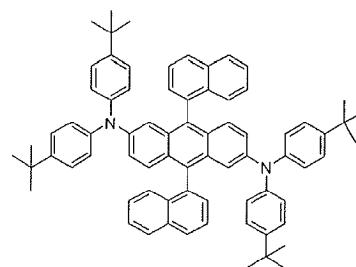
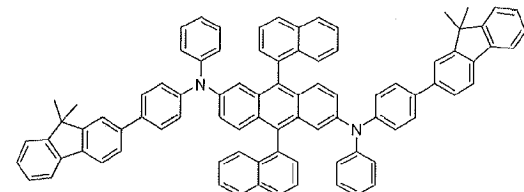


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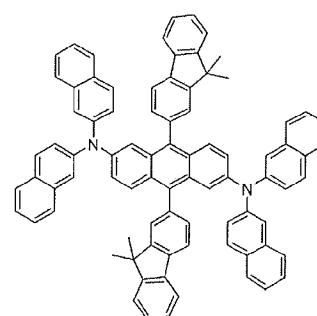
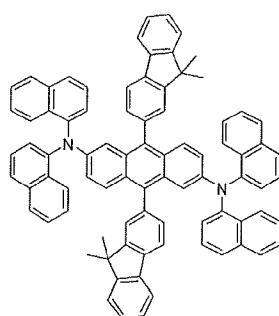
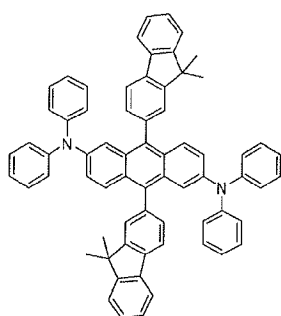
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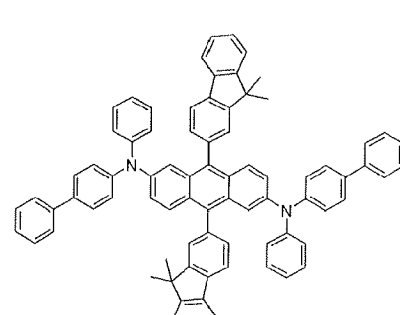
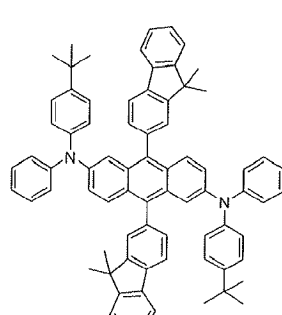
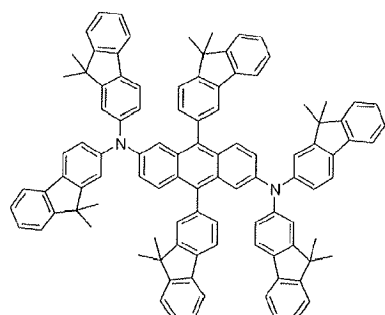
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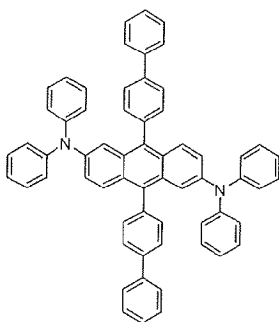
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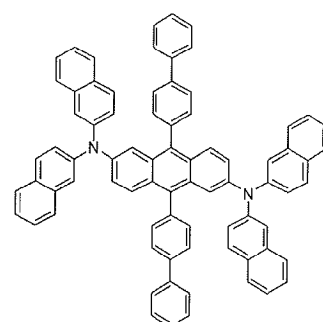
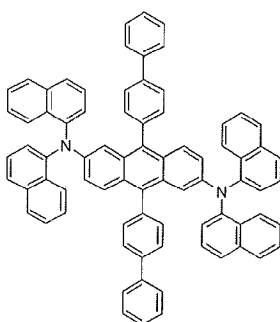
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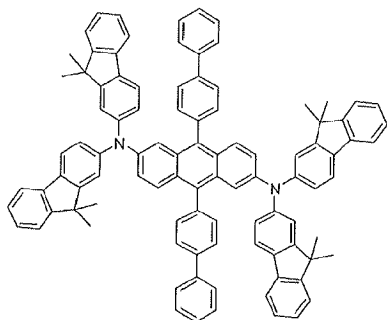
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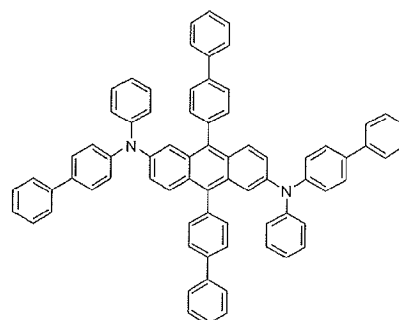
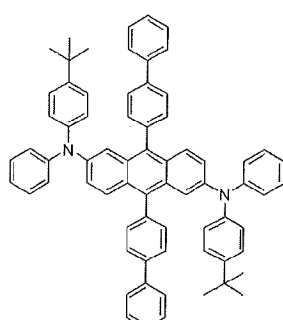
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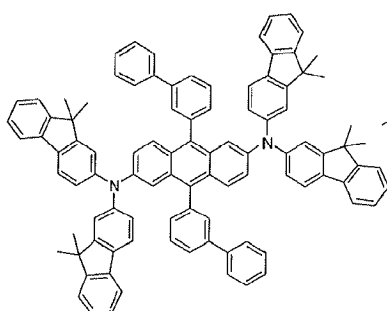


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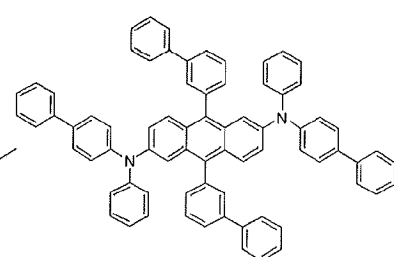
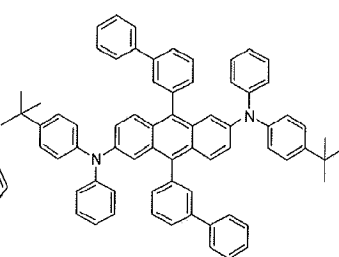


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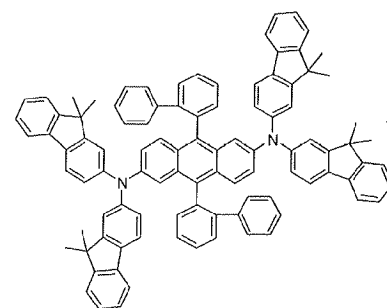


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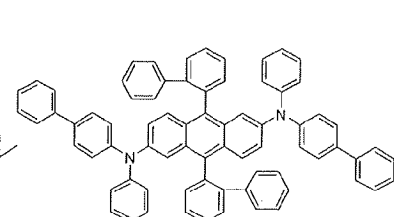
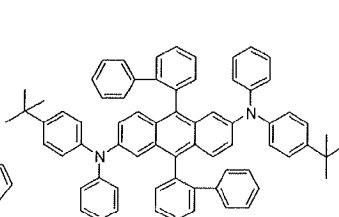


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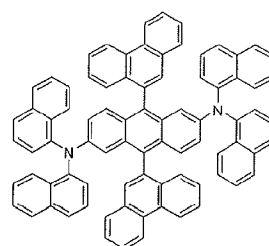
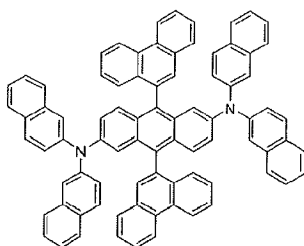
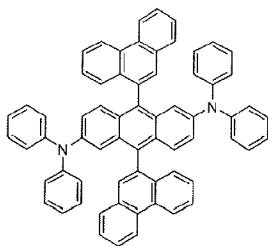


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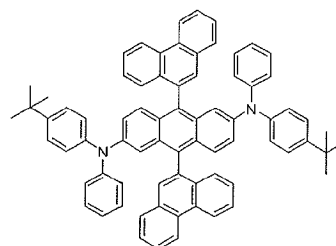
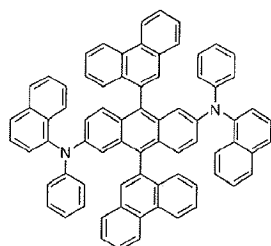
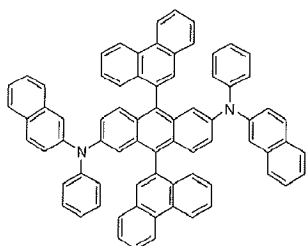
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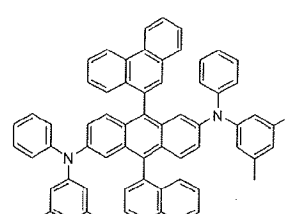
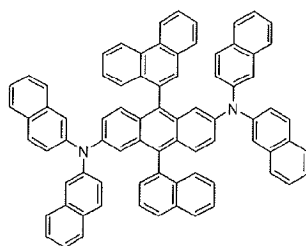
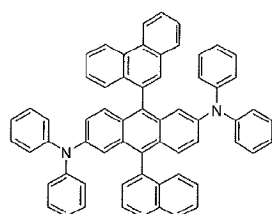
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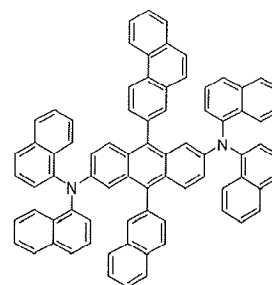
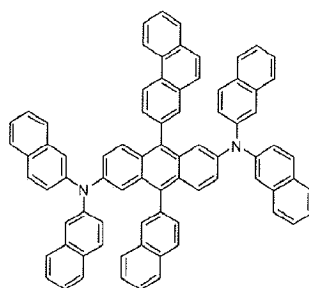
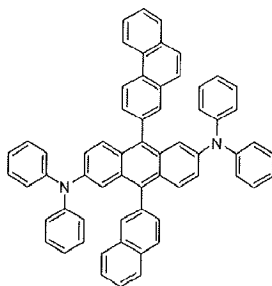
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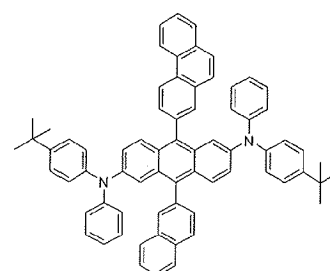
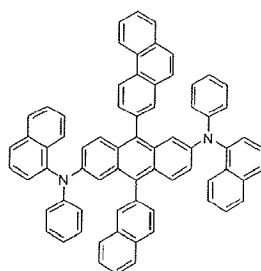
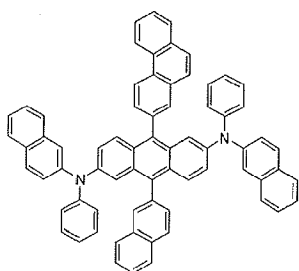
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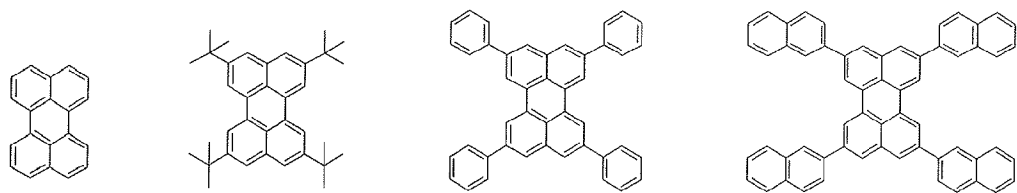
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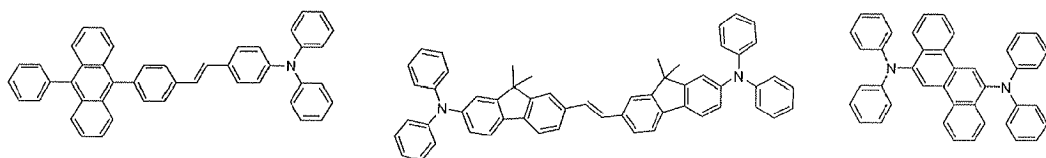


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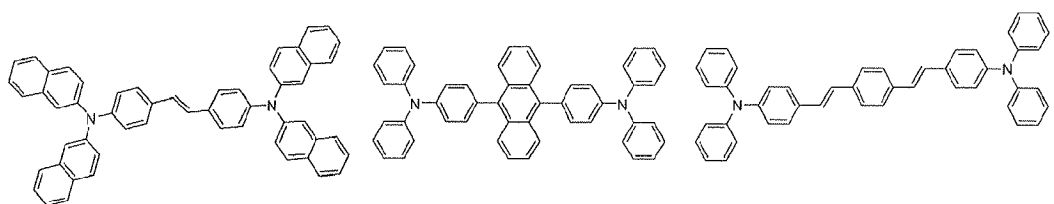


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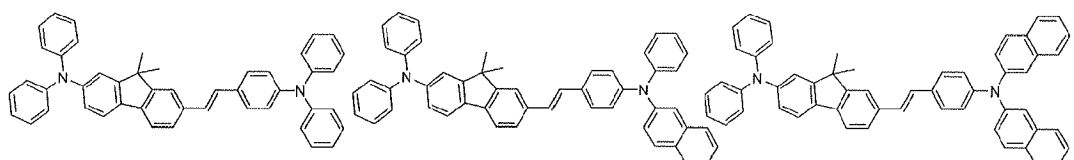


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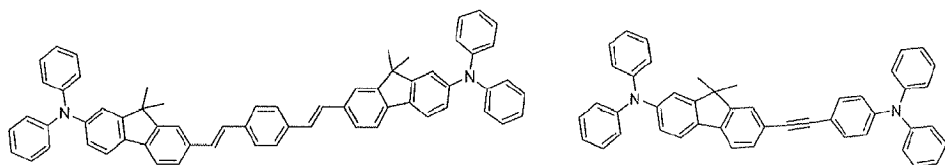


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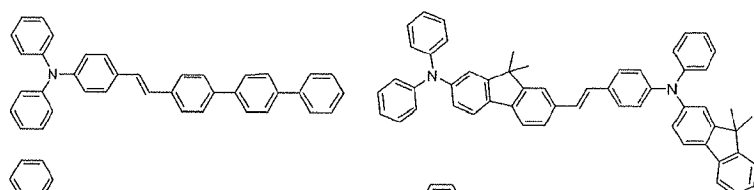


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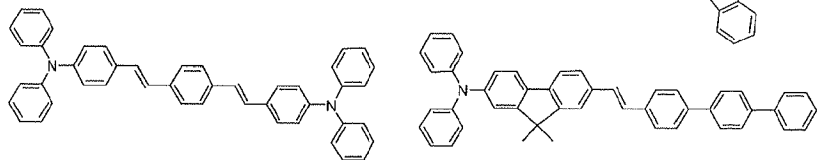
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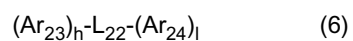
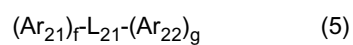
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[0022] The host used in the organic electroluminescent device according to the present invention may be selected from the compounds represented by Chemical Formulas 5 and 6:

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wherein

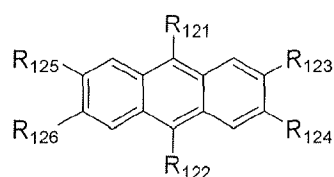
L_{21} represents (C6-C60)arylene or (C4-C60)heteroarylene;

L_{22} represents anthracenylene;

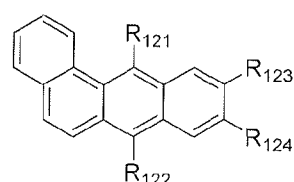
Ar_{21} through Ar_{24} independently represent hydrogen, (C1-C60)alkyl, (C1-C60)alkoxy, halogen, (C4-C60)heteroaryl, (C5-C60)cycloalkyl or (C6-C60)aryl, and the cycloalkyl, aryl or heteroaryl of Ar_{21} through Ar_{24} may be further substituted by one or more substituent(s) selected from a group consisting of (C6-C60)aryl or (C4-C60)heteroaryl with or without one or more substituent(s) selected from a group consisting of deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, (C3-C60)cycloalkyl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl, (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, (C3-C60)cycloalkyl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl; and

f, g, h and i independently represent an integer from 0 to 4.

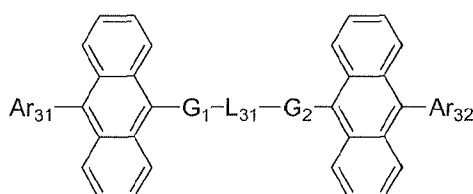
[0023] The compound represented by Chemical Formula 5 or 6 may be exemplified by the anthracene derivatives or benz[a]anthracene derivatives represented by Chemical Formulas 7 to 10:



(7)



(8)



(9)

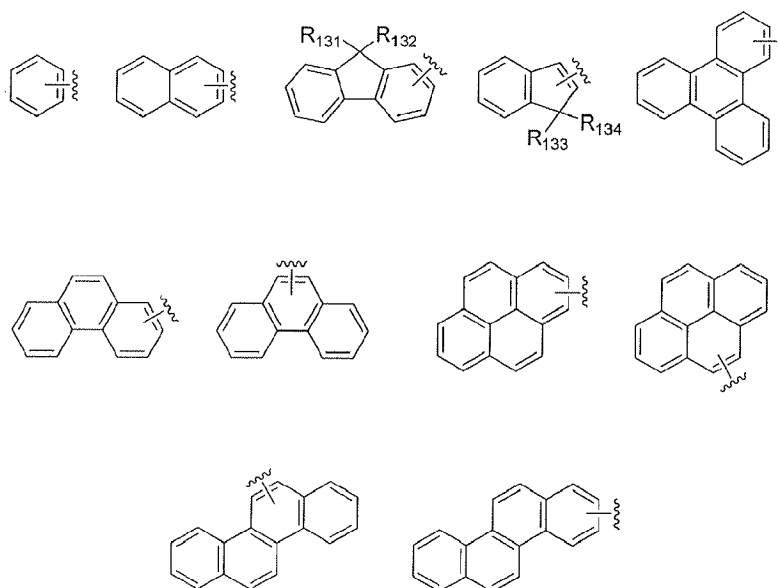
wherein

R_{121} and R_{122} independently represent (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S or (C3-C60)cycloalkyl, and the aryl or heteroaryl of R_{121} and R_{122} may be further substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl, halo(C1-C60)alkyl, (C1-C60)alkoxy, (C3-C60)cycloalkyl, (C6-C60)aryl, (C4-C60)heteroaryl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl;

R_{123} through R_{126} independently represent hydrogen, deuterium, (C1-C60)alkyl, (C1-C60)alkoxy, halogen, (C4-C60)heteroaryl, (C5-C60)cycloalkyl or (C6-C60)aryl, and the heteroaryl, cycloalkyl or aryl of R_{123} through R_{126} may be further substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, (C3-C60)cycloalkyl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl;

G_1 and G_2 independently represent a chemical bond or (C6-C60)arylene with or without one or more substituent(s) selected from (C1-C60)alkyl, (C1-C60)alkoxy, (C6-C60)aryl, (C4-C60)heteroaryl and halogen;

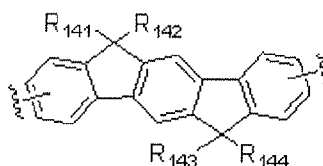
Ar_{31} and Ar_{32} independently represent (C4-C60)heteroaryl or aryl selected from the following structures:



wherein

the aryl or heteroaryl of Ar₃₁ and Ar₃₂ may be substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl, (C1-C60)alkoxy, (C6-C60)aryl and (C4-C60)heteroaryl;

L₃₁ represents (C6-C60)arylene, (C4-C60)heteroarylene or a compound having the following structure:

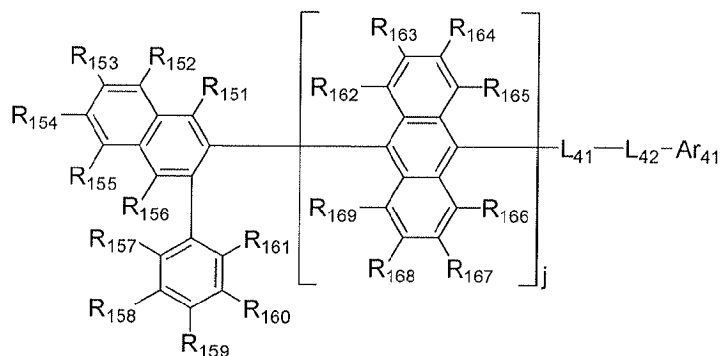


wherein

the arylene or heteroarylene of L₃₁ may be substituted by one or more substituent(s) selected from deuterium, (C1-C60) alkyl, (C1-C60)alkoxy, (C6-C60)aryl, (C4-C60)heteroaryl and halogen;

R₁₃₁ through R₁₃₄ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl or (C6-C60)aryl, or they may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring; and

R₁₄₁ through R₁₄₄ independently represent hydrogen, deuterium, (C1-C60)alkyl, (C1-C60)alkoxy, (C6-C60)aryl, (C4-C60)heteroaryl or halogen, or they may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;



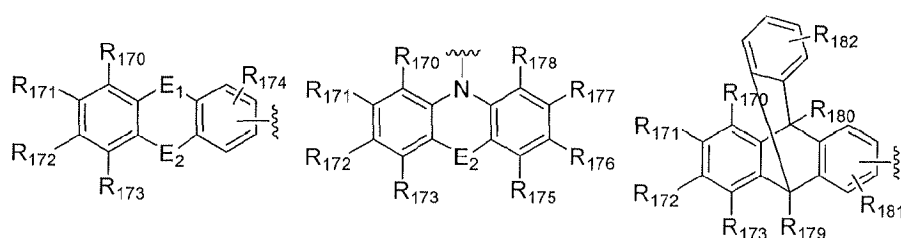
(10)

wherein

L_{41} and L_{42} independently represent a chemical bond, (C6-C60)arylene or (C3-C60)heteroarylene, and the arylene or heteroarylene of L_{41} and L_{42} may be further substituted by one or more substituent(s) selected from deuterium, (C1-C60)alkyl, halogen, cyano, (C1-C60)alkoxy, (C3-C60)cycloalkyl, (C6-C60)aryl, (C3-C60)heteroaryl, tri(C1-C30)alkylsilyl, di(C1-C30)alkyl(C6-C30)arylsilyl and tri(C6-C30)arylsilyl;

R_{151} through R_{169} independently represent hydrogen, halogen, deuterium, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl, or each of R_{151} through R_{169} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

Ar_{41} represents (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, adamantyl, (C7-C60)bicycloalkyl or a substituent selected from the following structures:



wherein

R_{170} through R_{182} independently represent hydrogen, halogen, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl;

E_1 and E_2 independently represent a chemical bond, $-(CR_{183}R_{184})_n-$, $-N(R_{185})-$, $-S-$, $-O-$, $-Si(R_{186})(R_{187})-$, $-P(R_{188})-$, $-C(=O)-$, $-B(R_{189})-$, $-In(R_{190})-$, $-Se-$, $-Ge(R_{191})(R_{192})-$, $-Sn(R_{193})(R_{194})-$, $-Ga(R_{195})-$ or $-(R_{196})C=C(R_{197})-$;

R_{183} through R_{197} independently represent hydrogen, halogen, deuterium, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl, or each of R_{183} through R_{197} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

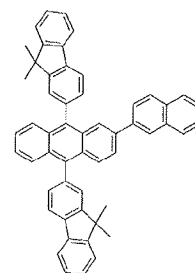
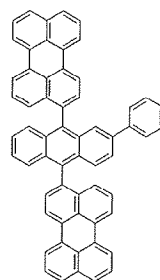
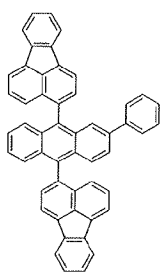
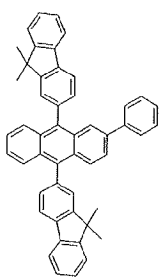
the aryl, heteroaryl, heterocycloalkyl, adamantyl or bicycloalkyl of Ar_{41} , or the alkyl, alkenyl, alkynyl, cycloalkyl, heterocycloalkyl, aryl, heteroaryl, arylsilyl, alkylsilyl, alkylamino or arylamino of R_{151} through R_{182} may be further substituted by one or more substituent(s) selected from deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro and hydroxyl;

j represents an integer from 1 to 4; and

m represents an integer 0 to 4.

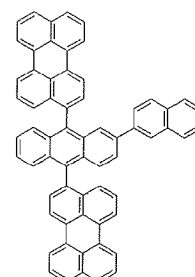
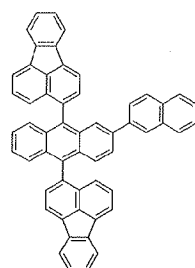
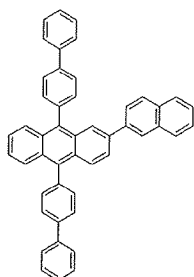
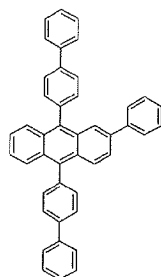
[0024] The host compound represented by Chemical Formulas 7 to 10 may be exemplified by the compounds having the following structures, but not limited thereto:

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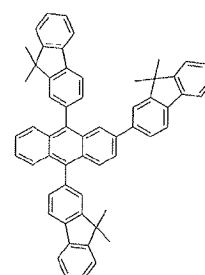
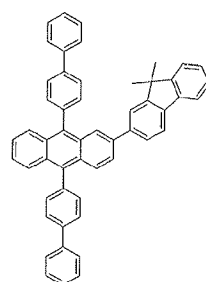
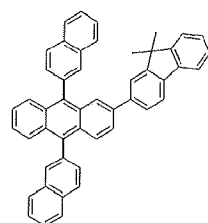
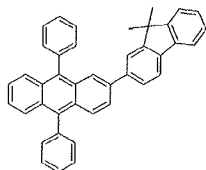
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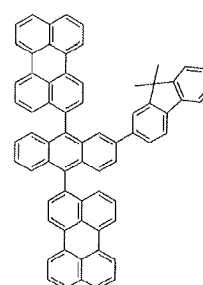
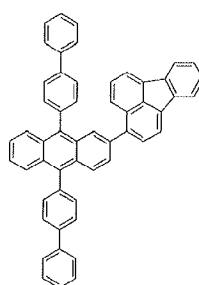
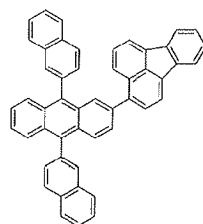
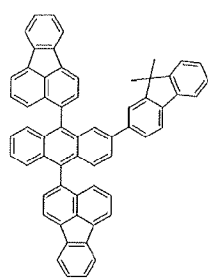
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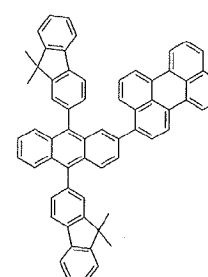
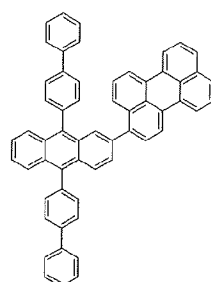
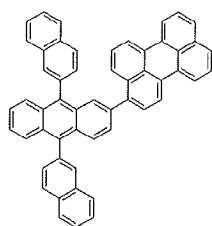
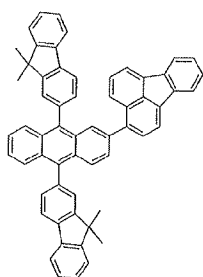
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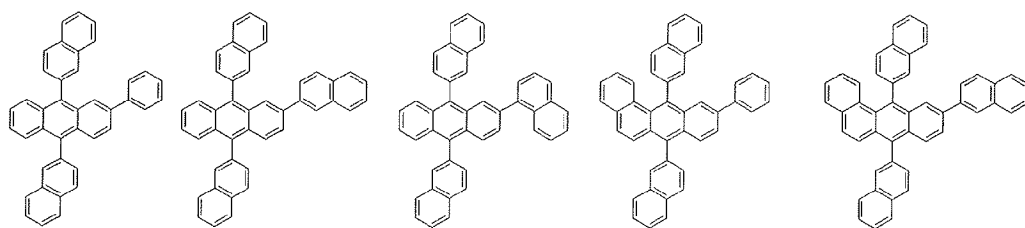
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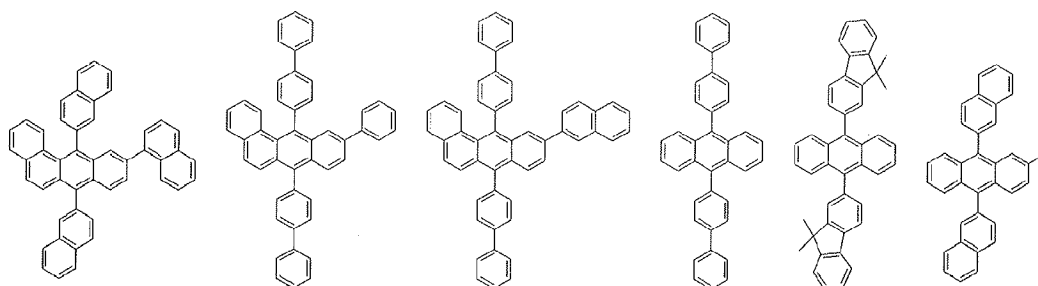
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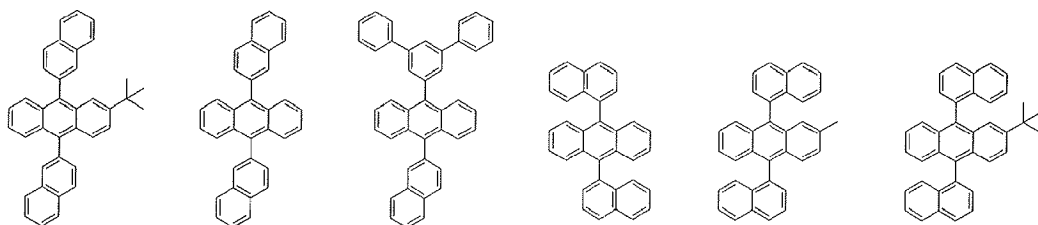
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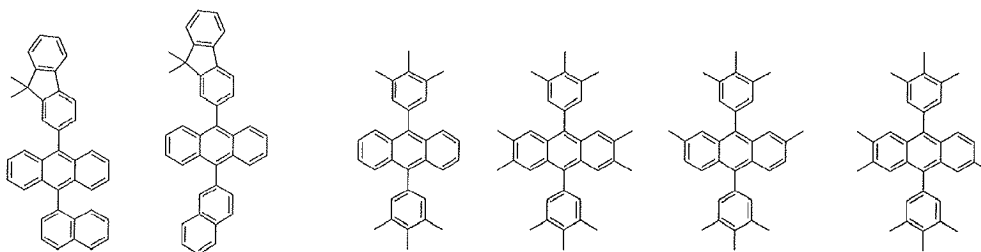
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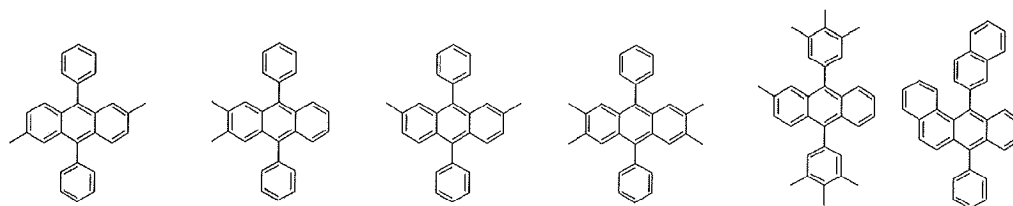
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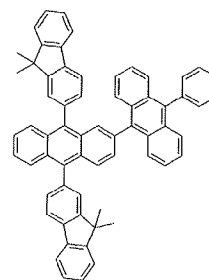
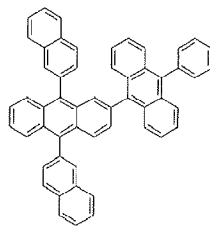
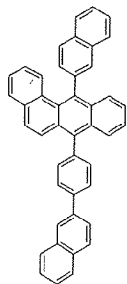
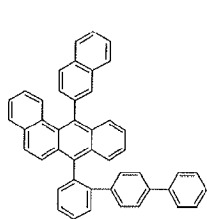
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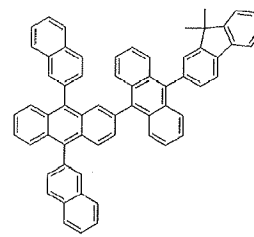
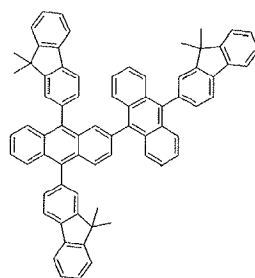
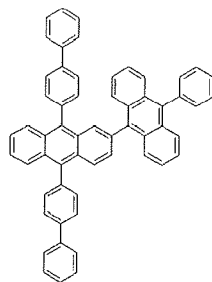
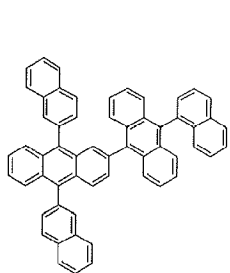
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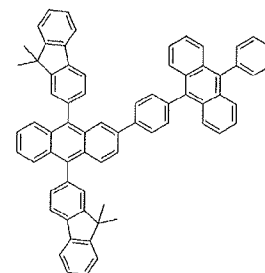
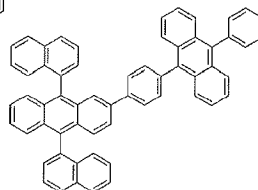
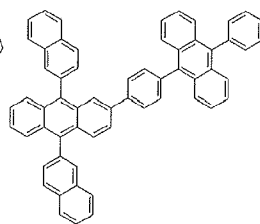
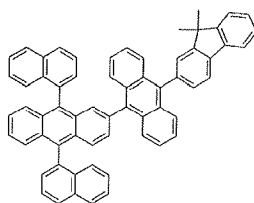
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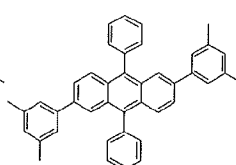
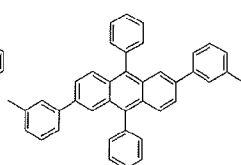
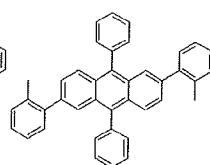
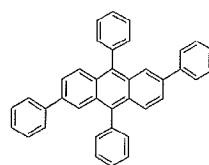
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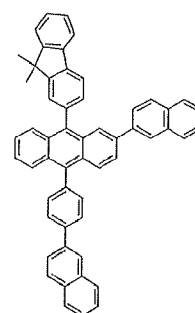
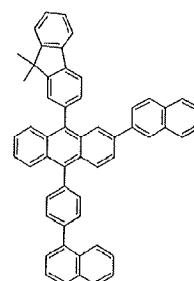
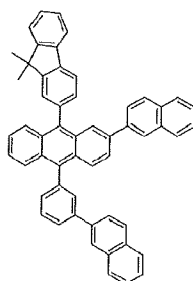
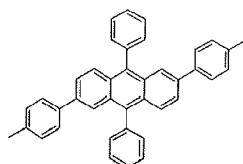
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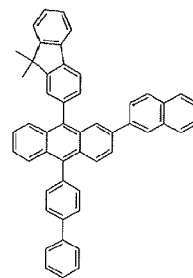
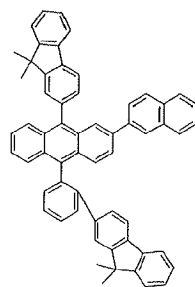
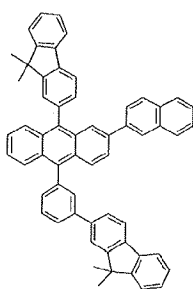
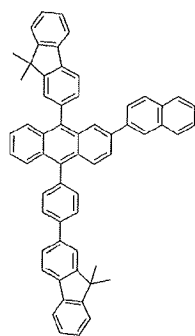
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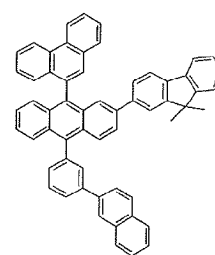
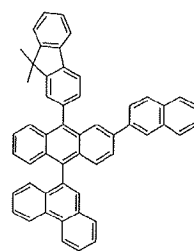
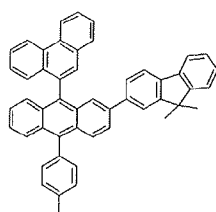
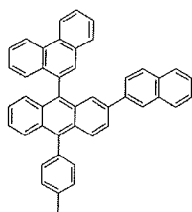
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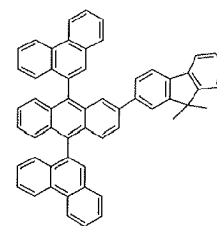
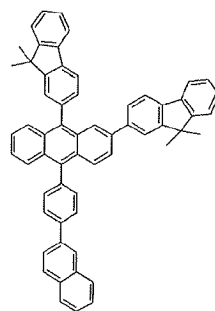
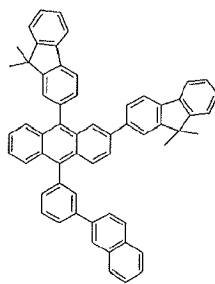
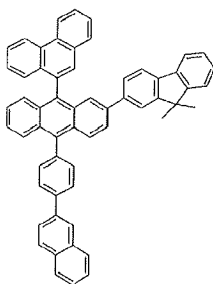
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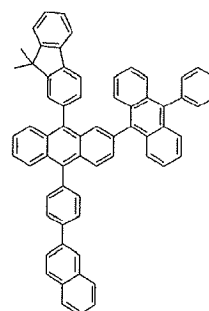
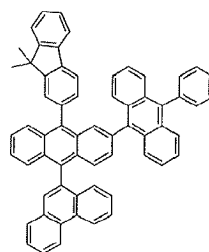
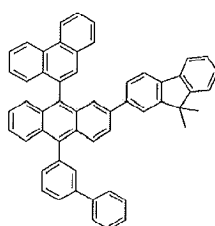
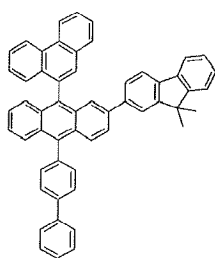
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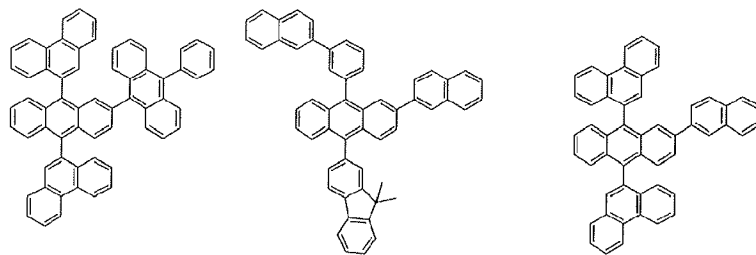


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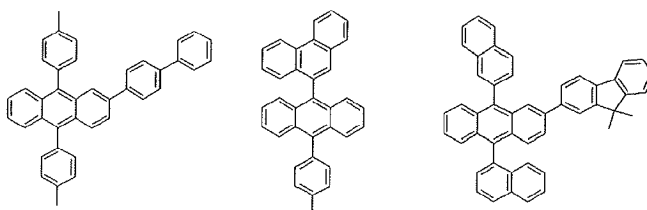
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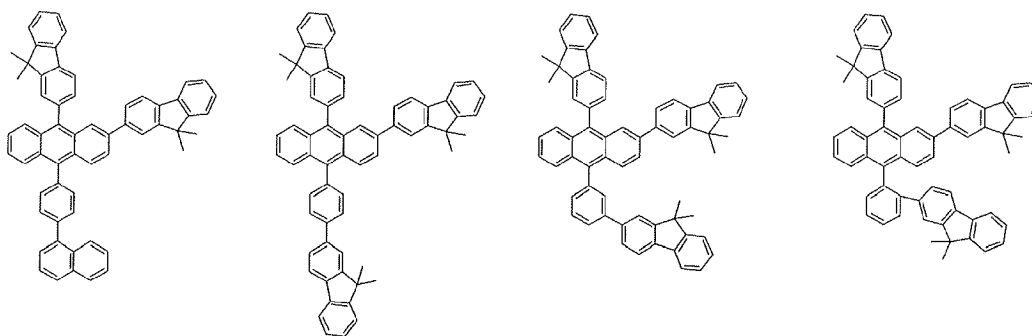
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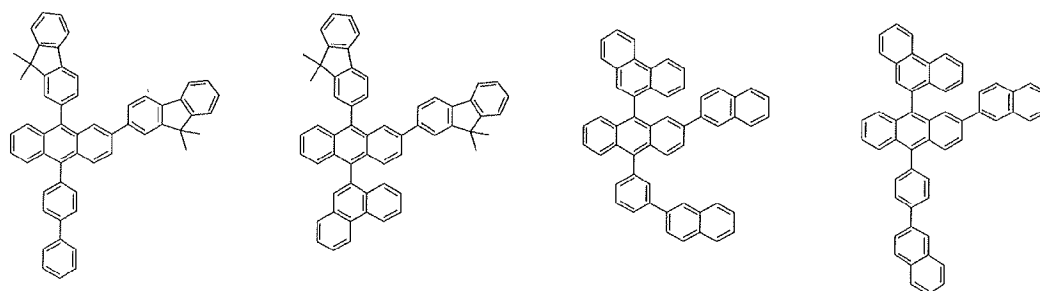
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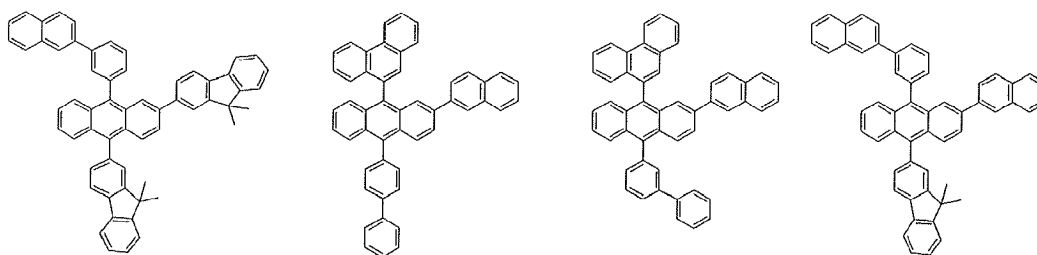
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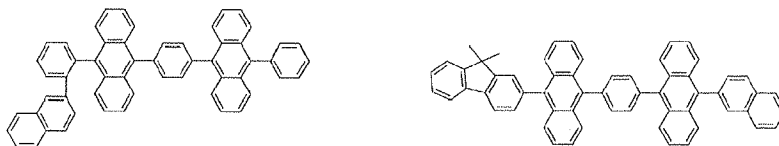


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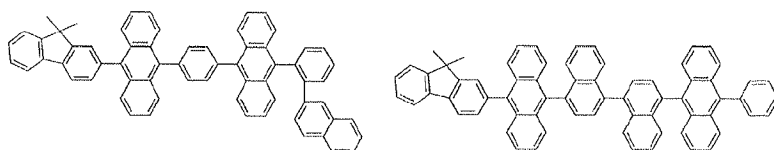
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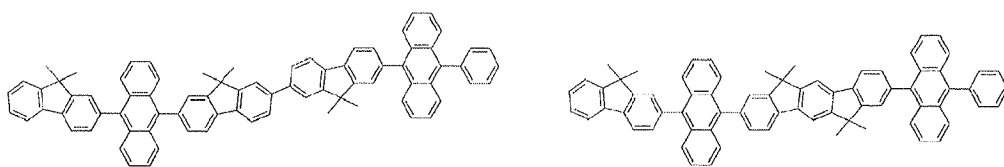
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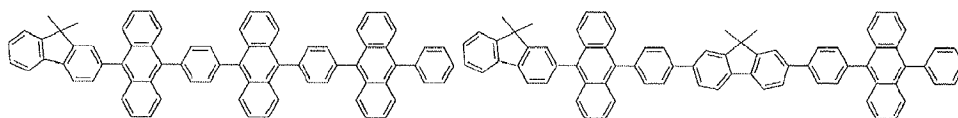


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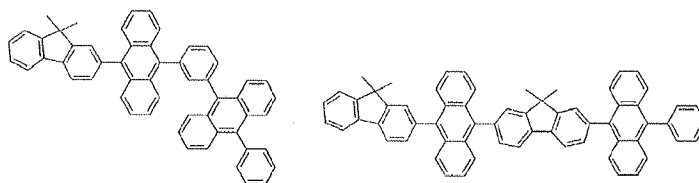
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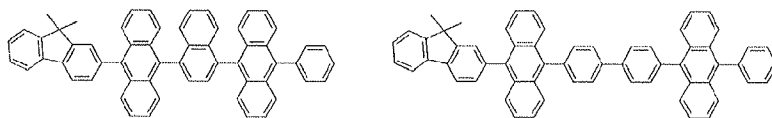


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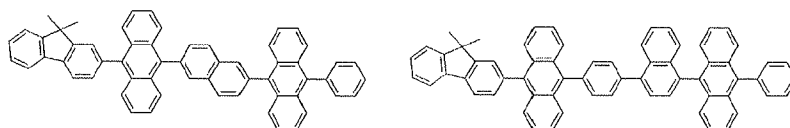
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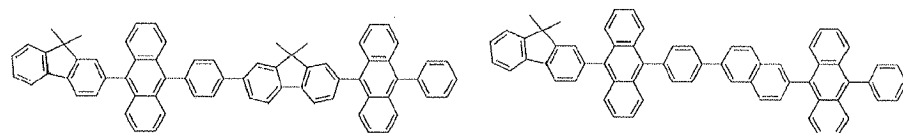


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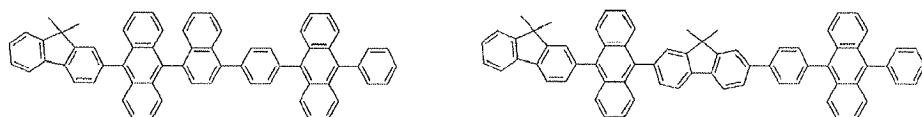


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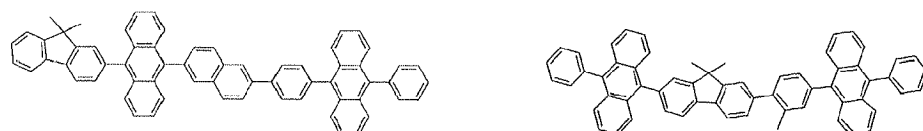
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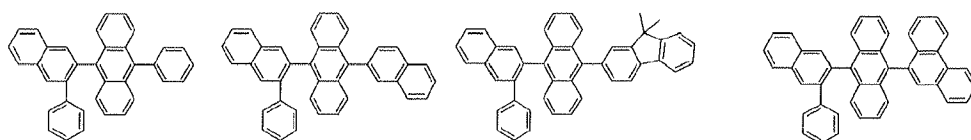


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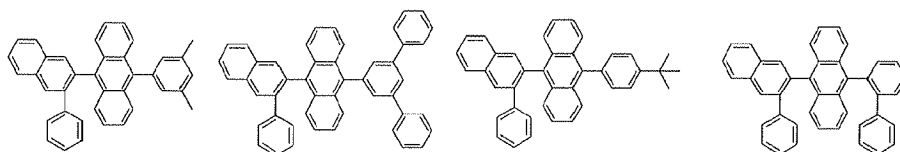


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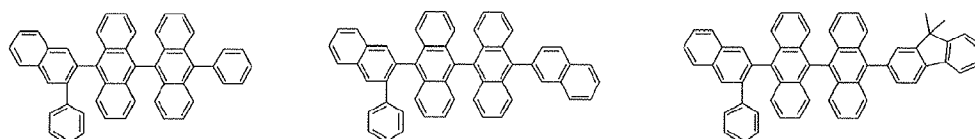
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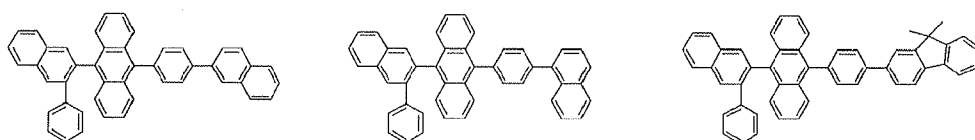


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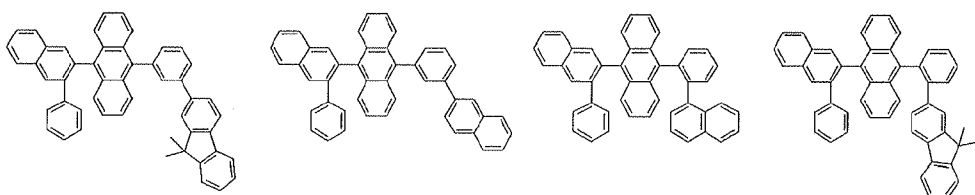
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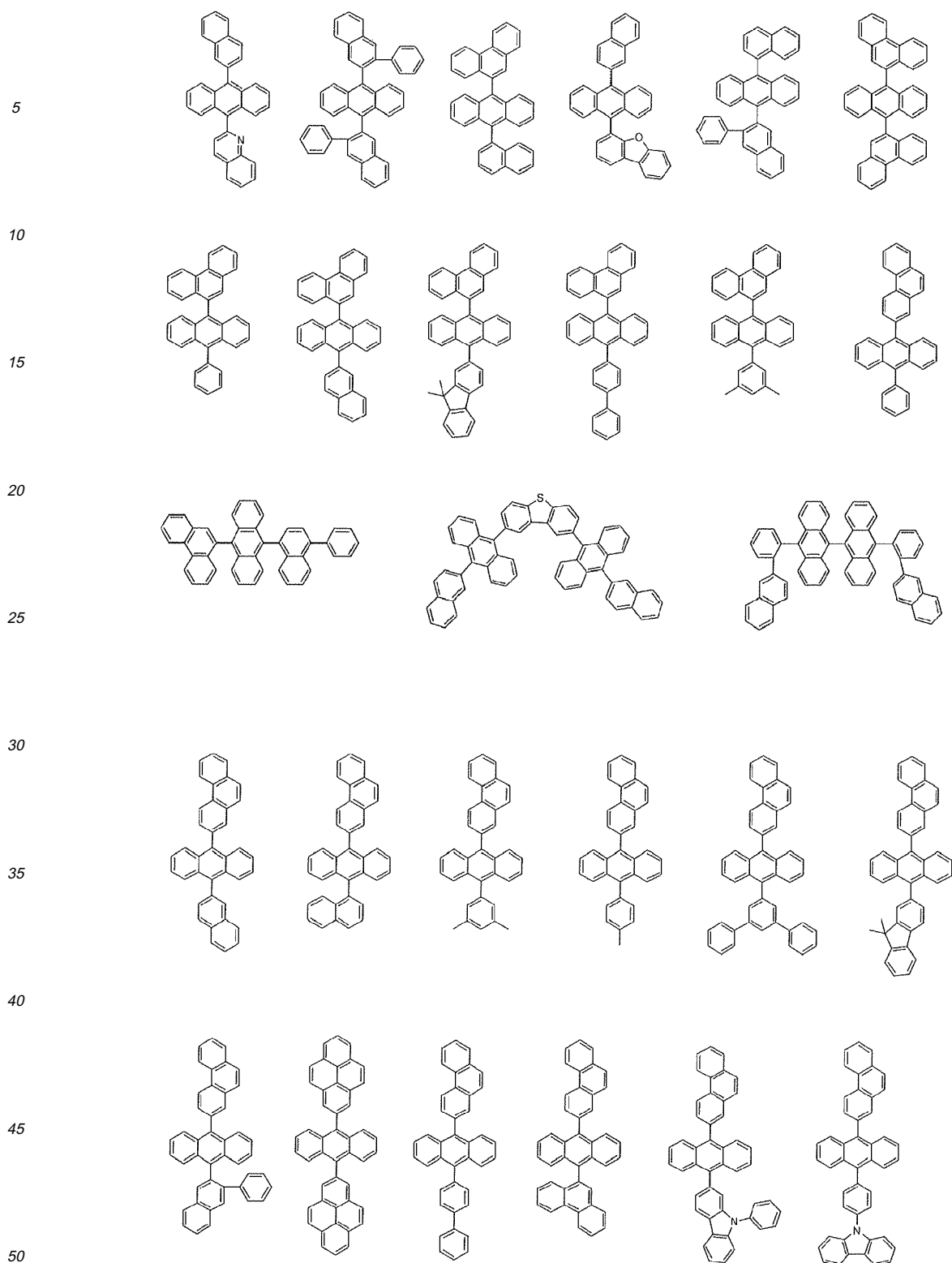
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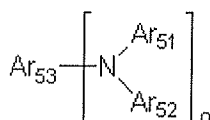
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[0025] The organic electroluminescent device according to the present invention comprises the organic electroluminescent compound represented by Chemical Formula 1, and, at the same time, may comprise one or more compound (s) selected from a group consisting of arylamine compounds and styrylarylamine compounds. The arylamine compounds or the styrylarylamine compounds may be exemplified by the compound represented by Chemical Formula 11, but not limited thereto:

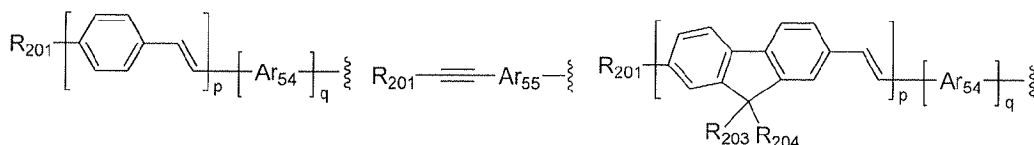


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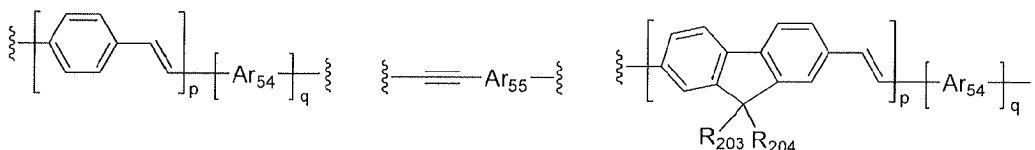
wherein

Ar_{51} and Ar_{52} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, mono- or di-(C6-C60)arylamino, mono- or di-(C1-C60)alkylamino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S or (C3-C60)cycloalkyl, and Ar_{51} and Ar_{52} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

Ar_{53} represents (C6-C60)aryl, (C4-C60)heteroaryl or a substituent selected from the following structures, when o is 1:



Ar_{53} represents (C6-C60)arylene, (C4-C60)heteroarylene or a substituent selected from the following structures, when o is 2:



Ar_{54} and Ar_{55} independently represent (C6-C60)arylene or (C4-C60)heteroarylene;

R_{201} through R_{203} independently represent hydrogen, halogen, deuterium, (C1-C60)alkyl or (C6-C60)aryl;

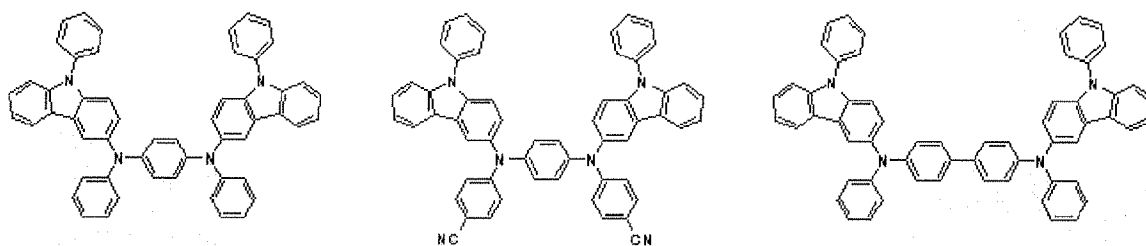
p represents an integer from 1 to 4;

q represents an integer 0 or 1; and

the alkyl, aryl, heteroaryl, arylamino, alkylamino, cycloalkyl or heterocycloalkyl of Ar_{51} and Ar_{52} , the aryl, heteroaryl, arylene or heteroarylene of Ar_{53} , the arylene or heteroarylene of Ar_{54} and Ar_{55} , or the alkyl or aryl of R_{201} through R_{203} may be further substituted by one or more substituent(s) selected from deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C1-C60)alkyloxy, (C6-C60)arylthio, (C1-C60)alkylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl.

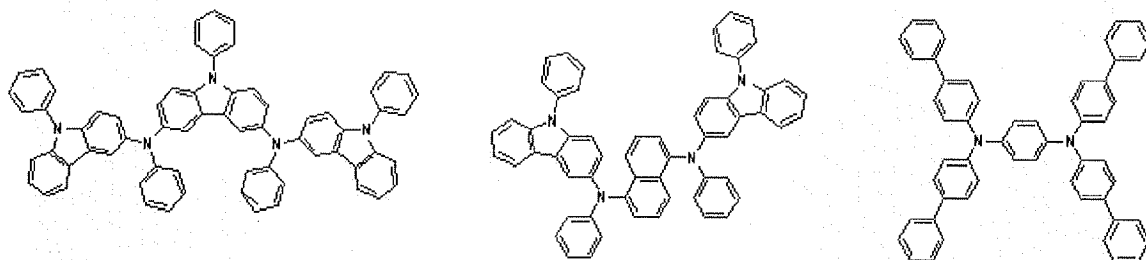
[0026] Specifically, the arylamine compound or styrylarylamine compound may be exemplified by the following compounds, but not limited thereto:

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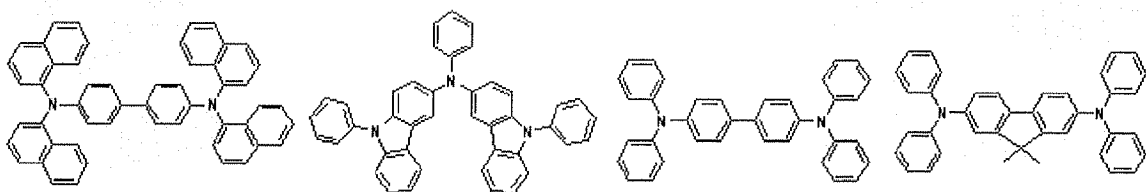
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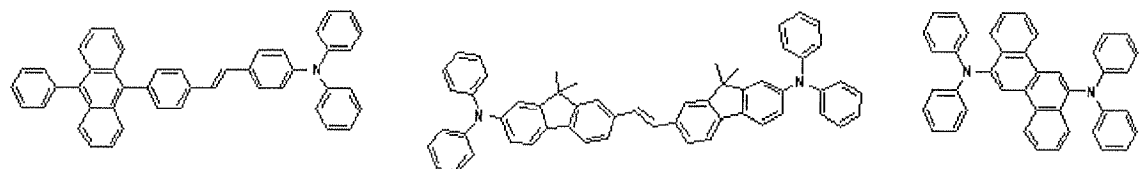
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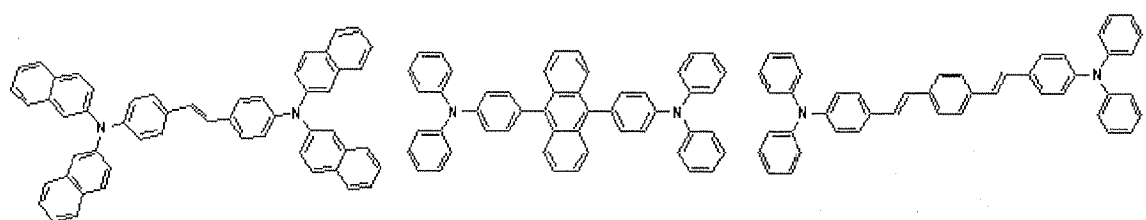
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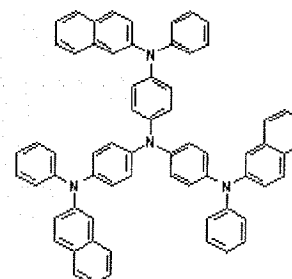
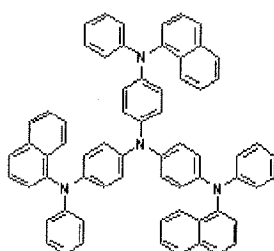
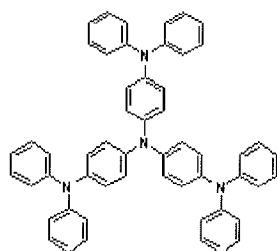
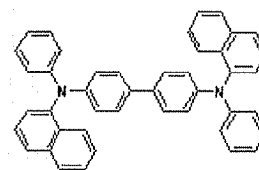
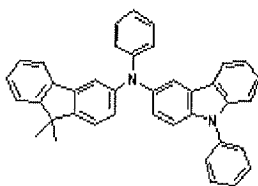
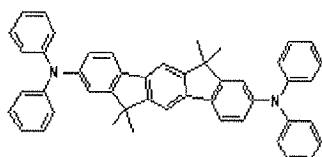
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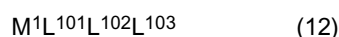
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[0027] In the organic electroluminescent device according to the present invention, the organic layer may further comprise, in addition to the organic electroluminescent compound represented by Chemical Formula 1, one or more metal(s) selected from a group consisting of organic metals of Group 1, Group 2, 4th period and 5th period transition metals, lanthanide metals and d-transition elements. Also, the organic layer may comprise an electroluminescent layer and a charge generating layer.

[0028] An independent electroluminescence type organic electroluminescent device having a pixel structure in which the organic electroluminescent device according to the present invention comprising the organic electroluminescent compound represented by Chemical Formula 1 is used as a subpixel and one or more subpixel(s) comprising one or more metal compound(s) selected from a group consisting of Ir, Pt, Pd, Rh, Re, Os, Ti, Pb, Bi, In, Sn, Sb, Te, Au and Ag is patterned in parallel may be manufactured.

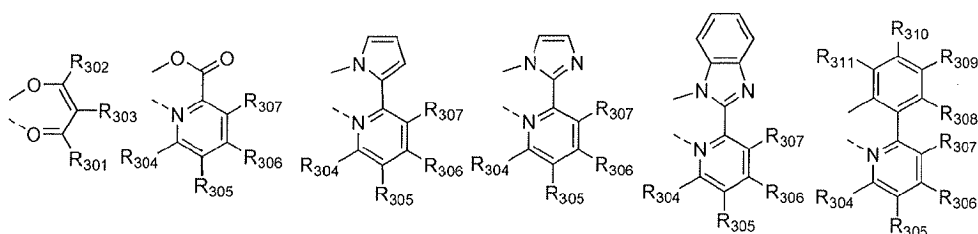
[0029] The organic layer may further comprise, in addition to the organic electroluminescent compound, one or more compound(s) having an electroluminescence peak with wavelength of not less than 560 nm. The compound having an electroluminescence peak with wavelength of not less than 560 nm may be exemplified by the compounds represented by Chemical Formulas 12 to 16, but not limited thereto:

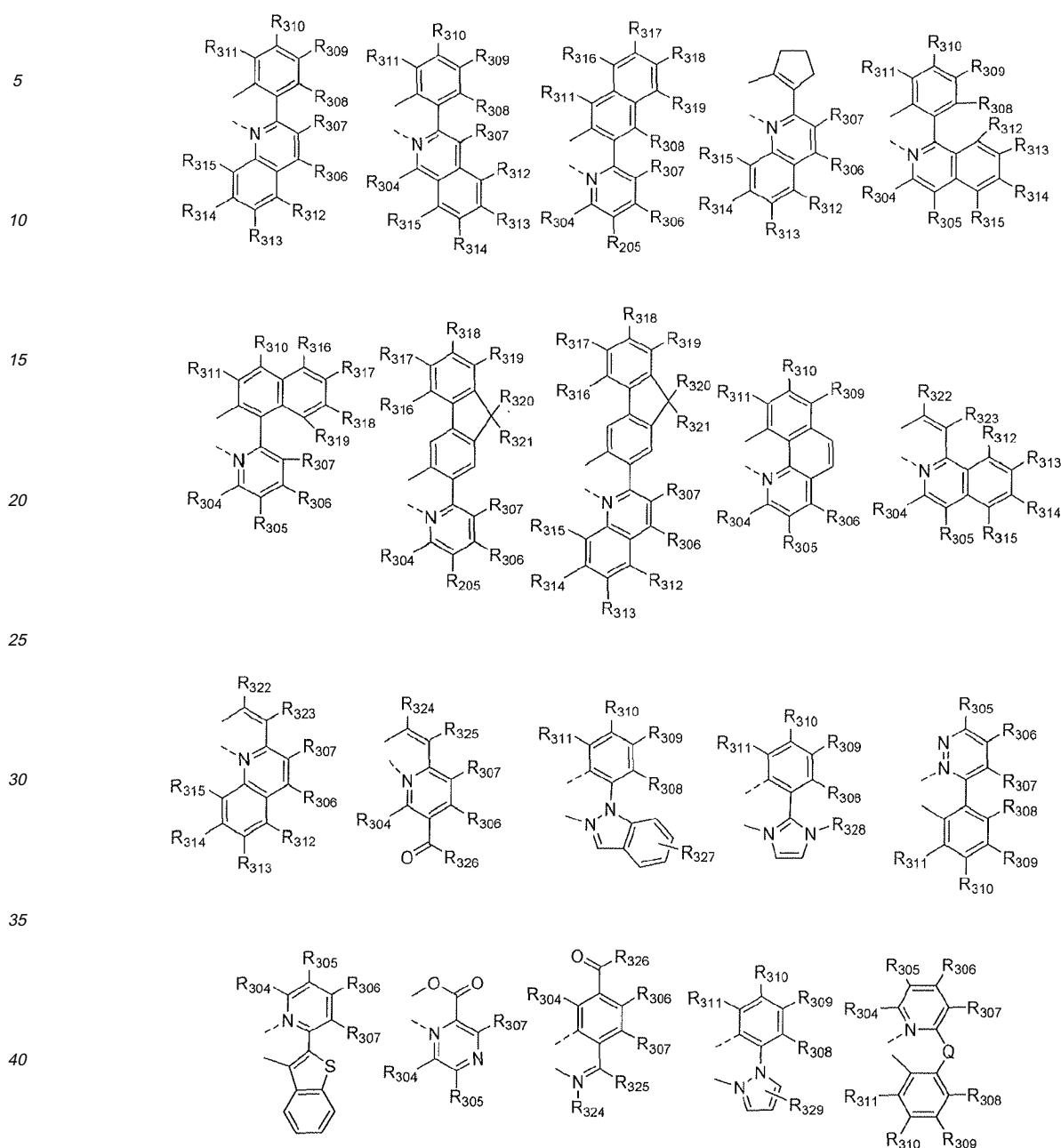


wherein

M^1 is a metal selected from a group consisting of Group 7, Group 8, Group 9, Group 10, Group 11, Group 13, Group 14, Group 15 and Group 16 metals;

ligands L^{101} , L^{102} and L^{103} are independently selected from the following structures:





wherein

R₃₀₁ through R₃₀₃ independently represent hydrogen, (C1-C60)alkyl with or without halogen substituent(s), (C6-C60) aryl with or without (C1-C60)alkyl substituent(s) or halogen;

R₃₀₄ through R₃₁₉ independently represent hydrogen, (C1-C60)alkyl, (C1-C30)alkoxy, (C3-C60)cycloalkyl, (C2-C30) alkenyl, (C6-C60)aryl, mono- or di-(C1-C30)alkylamino, mono- or di-(C6-C30)arylamino, SF₅, tri(C1-C30)alkylsilyl, di (C1-C30)alkyl(C6-C30)arylsilyl, tri(C6-C30)arylsilyl, cyano or halogen, and the alkyl, cycloalkyl, alkenyl or aryl of R₃₀₄ through R₃₁₉ may be further substituted by one or more substituent(s) selected from (C1-C60)alkyl, (C6-C60)aryl and halogen;

R₃₂₀ through R₃₂₃ independently represent hydrogen, (C1-C60)alkyl with or without halogen substituent(s) or (C6-C60) aryl with or without (C1-C60)alkyl substituent(s);

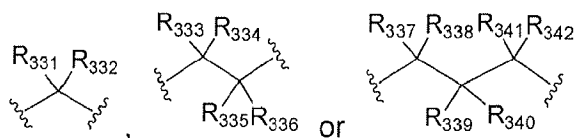
R₃₂₄ and R₃₂₅ independently represent hydrogen, (C1-C60)alkyl, (C6-C60)aryl or halogen, or R₃₂₄ and R₃₂₅ may be linked via (C3-C12)alkylene or (C3-C12)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring, and the alkyl or aryl of R₃₂₄ and R₃₂₅ or the alicyclic ring or monocyclic or polycyclic aromatic ring formed as they are linked via (C3-C12)alkylene or (C3-C12)alkenylene with or without a fused ring may be further

substituted by one or more substituent(s) selected from (C1-C60)alkyl with or without halogen substituent(s), (C1-C30)alkoxy, halogen, tri(C1-C30)alkylsilyl, tri(C6-C30)arylsilyl and (C6-C60)aryl;

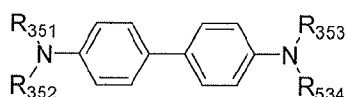
R₃₂₆ represents (C1-C60)alkyl, (C6-C60)aryl, (C5-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S or halogen;

R₃₂₇ through R₃₂₉ independently represent hydrogen, (C1-C60)alkyl, (C6-C60)aryl or halogen, and the alkyl or aryl of R₃₂₆ through R₃₂₉ may be further substituted by halogen or (C1-C60)alkyl;

Q represents



wherein R₃₃₁ through R₃₄₂ independently represent hydrogen, (C1-C60)alkyl with or without halogen substituent(s), (C1-C30)alkoxy, halogen, (C6-C60)aryl, cyano or (C5-C60)cycloalkyl, or each of R₃₃₁ through R₃₄₂ may be linked to an adjacent substituent via alkylene or alkenylene to form a (C5-C7)spiro ring or (C5-C9)fused ring, or may be linked to R₃₀₇ or R₃₀₈ via alkylene or alkenylene to form a (C5-C7)fused ring;

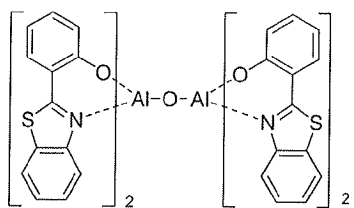


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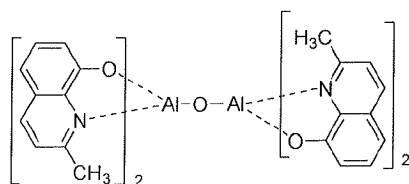
wherein

R₃₅₁ through R₃₅₄ independently represent (C1-C60)alkyl or (C6-C60)aryl, or they are linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

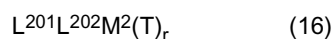
the alkyl or aryl of R₃₅₁ through R₃₅₄, or the alicyclic ring or monocyclic or polycyclic aromatic ring formed as they are linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring may be further substituted by one or more substituent(s) selected from (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, halogen, tri(C1-C60)alkylsilyl, tri(C6-C60)arylsilyl and (C6-C60)aryl;



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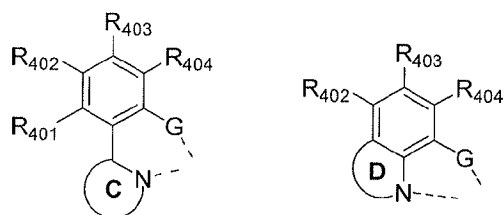


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wherein

ligands L^{201} and L^{202} are independently selected from the following structures:



wherein

M^2 represents a divalent or trivalent metal;

r is 0 when M^2 is a divalent metal, and r is 1 when M^2 is a trivalent metal;

T represents (C6-C60)aryloxy or tri(C6-C60)arylsilyl, and the aryloxy or triarylsilyl of T may be further substituted by (C1-C60)alkyl or (C6-C60)aryl;

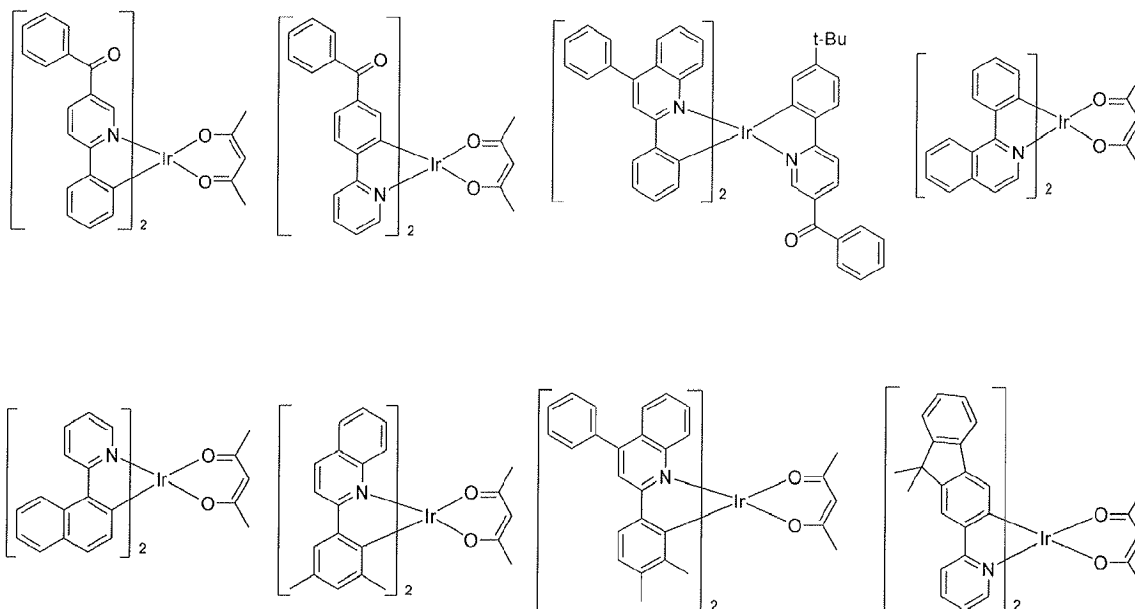
G represents O, S or Se;

ring C represents oxazole, thiazole, imidazole, oxadiazole, thiadiazole, benzoxazole, benzothiazole, benzoimidazole, pyridine or quinoline;

ring D represents pyridine or quinoline, and the ring D may be further substituted by (C1-C60)alkyl, phenyl with or without (C1-C60)alkyl substituent(s) or naphthyl;

R_{401} through R_{404} independently represent hydrogen, (C1-C60)alkyl, halogen, tri(C1-C60)alkylsilyl, tri(C6-C60)arylsilyl or (C6-C60)aryl, or they may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene to form a fused ring, and the pyridine or quinoline may be linked to R_{401} via a chemical bond to form a fused ring; and the aryl of ring C and R_{401} through R_{404} may be further substituted by (C1-C60)alkyl, halogen, (C1-C60)alkyl with halogen substituent(s), phenyl, naphthyl, tri(C1-C60)alkylsilyl, tri(C6-C60)arylsilyl or amino.

[0030] The compound having an electroluminescence peak with wavelength of not less than 560 nm included in the electroluminescent layer may be exemplified by the following compounds, but not limited thereto:



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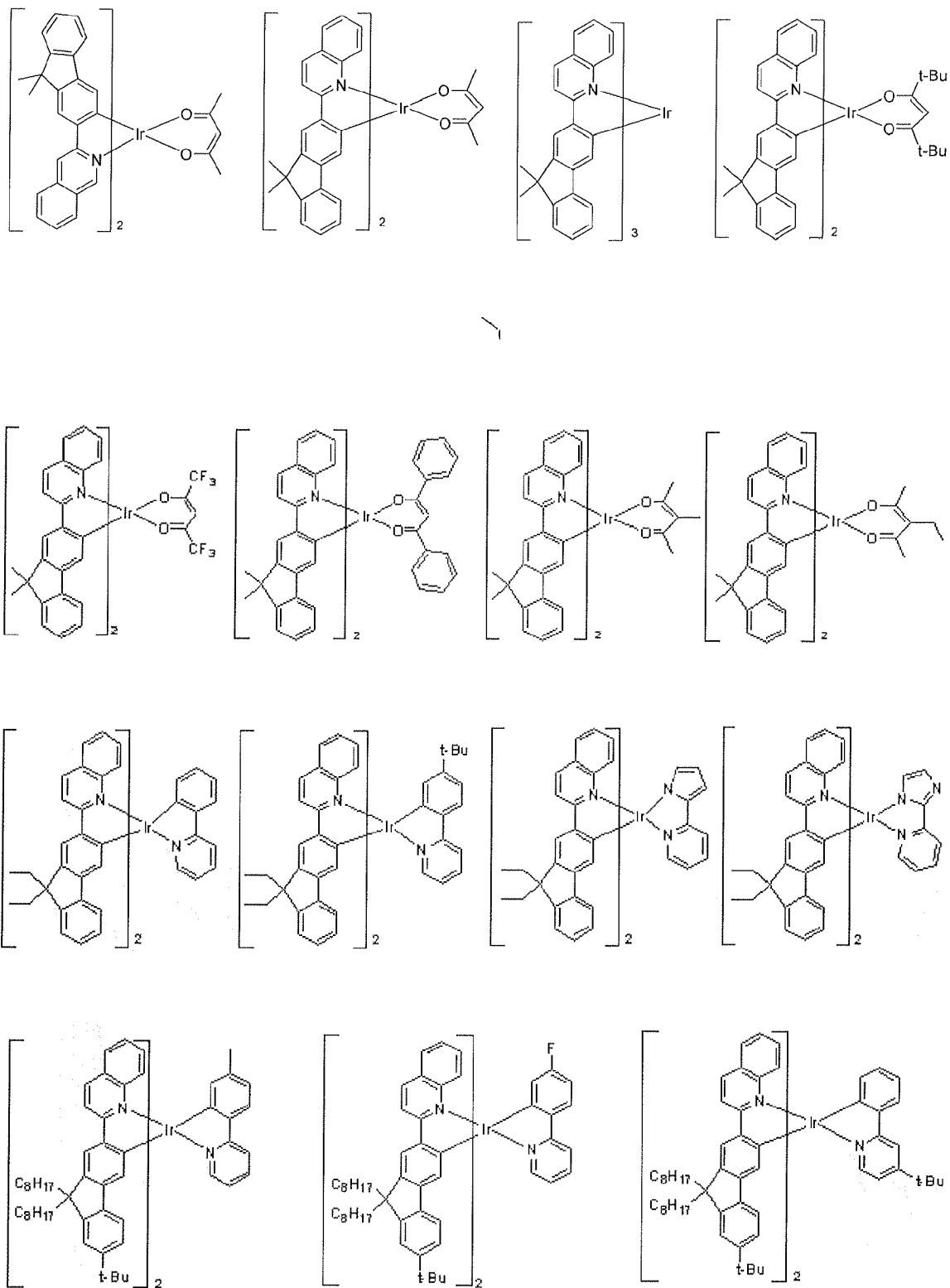
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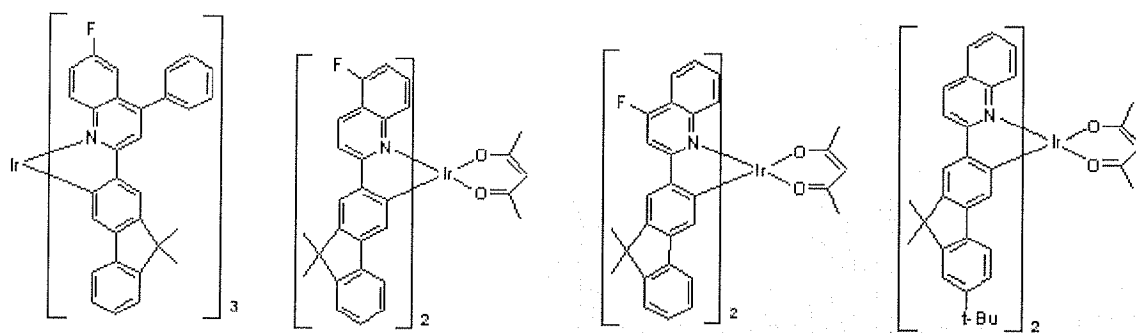
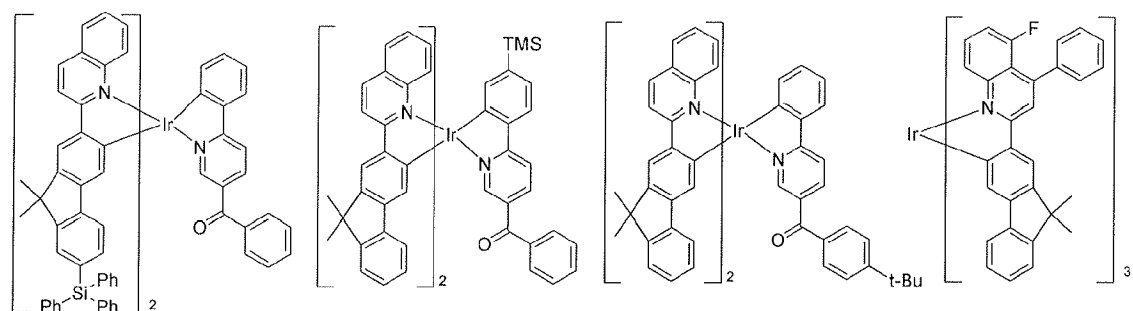
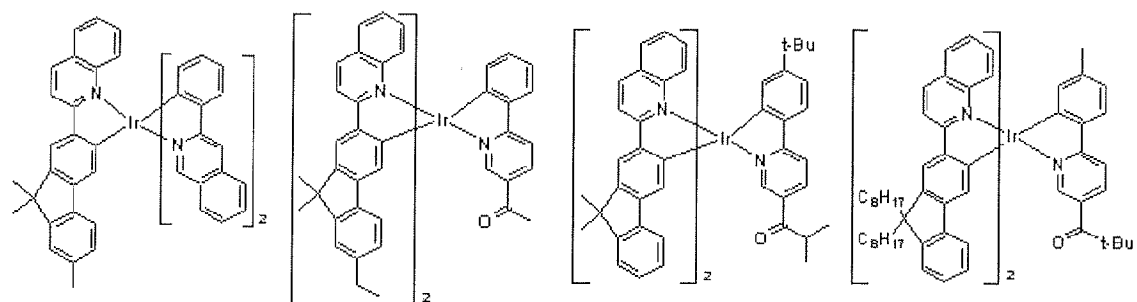
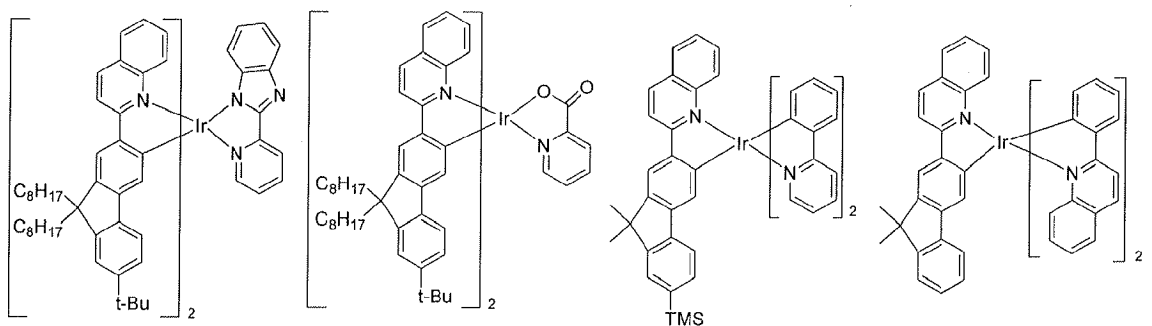
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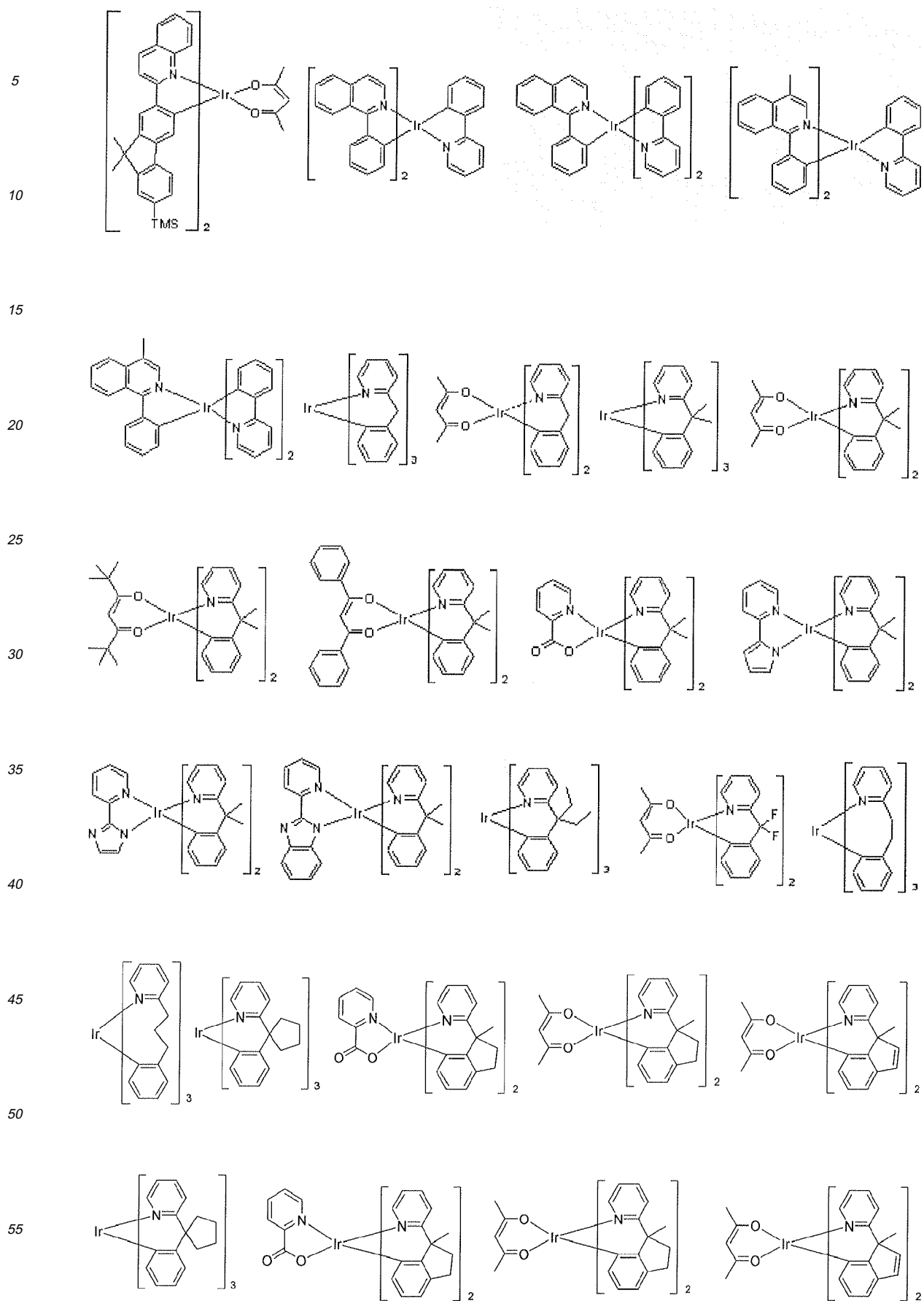
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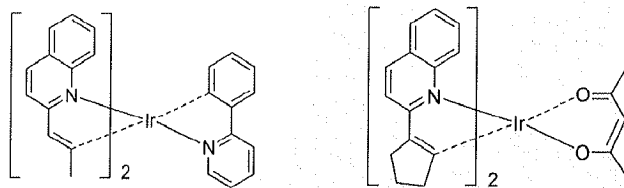
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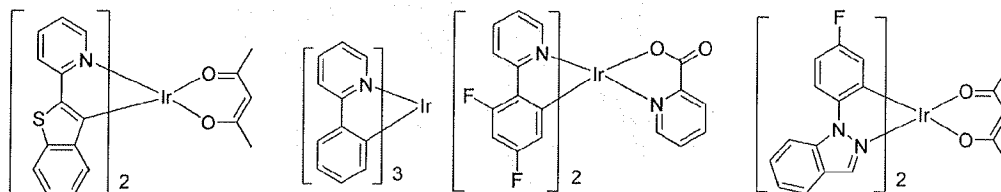




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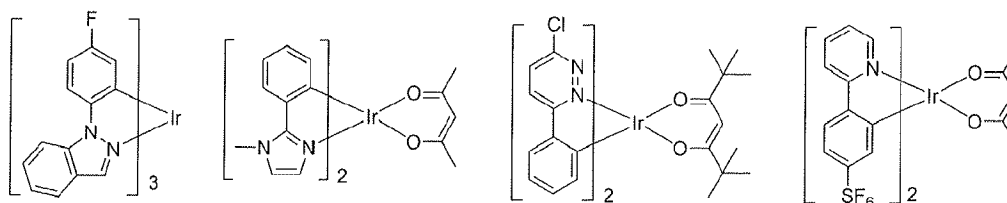


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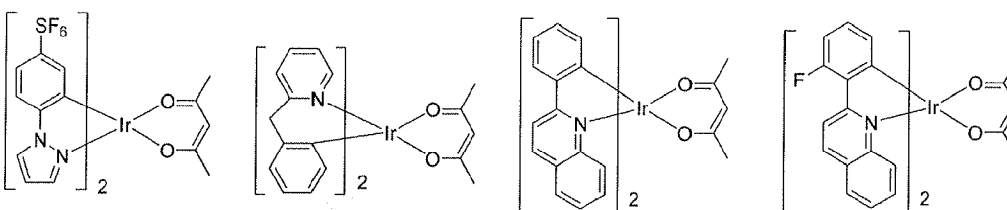
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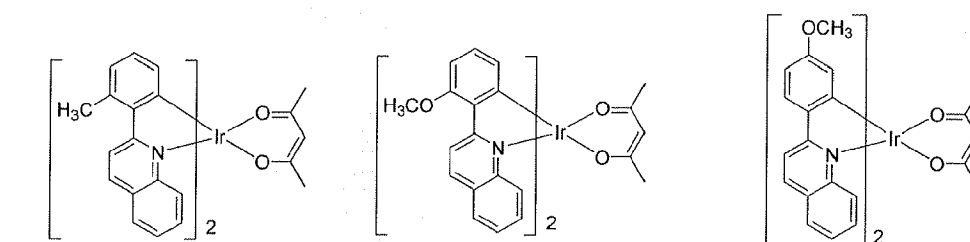
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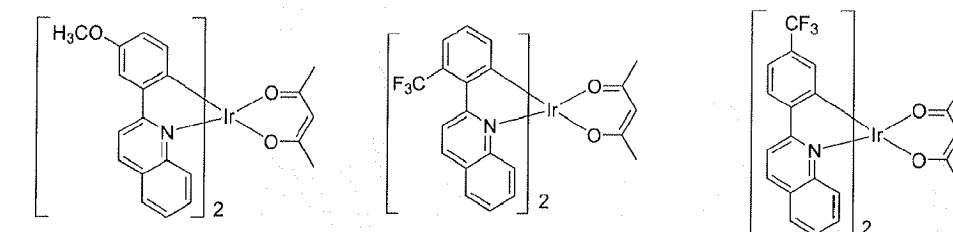
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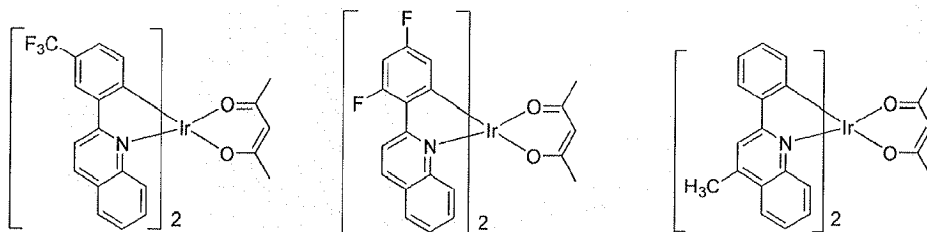
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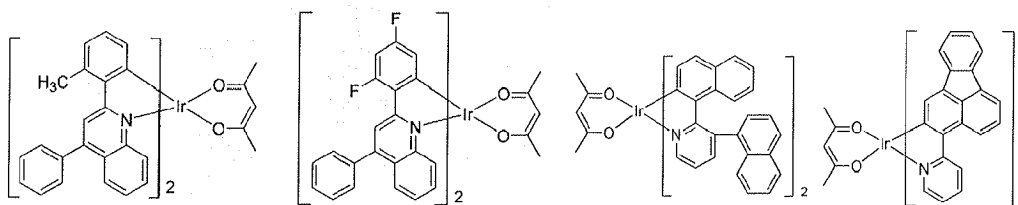


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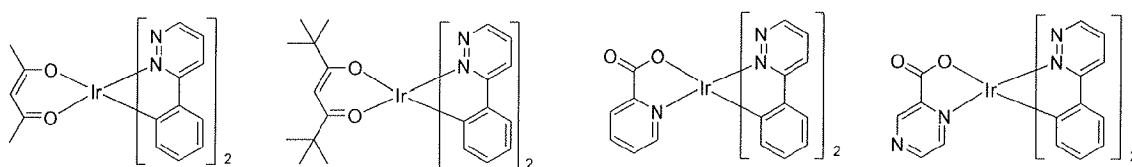
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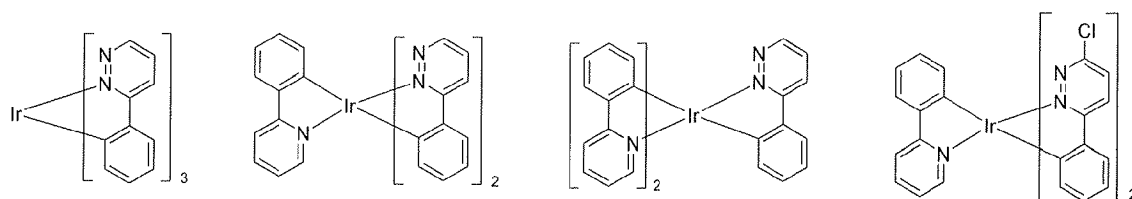
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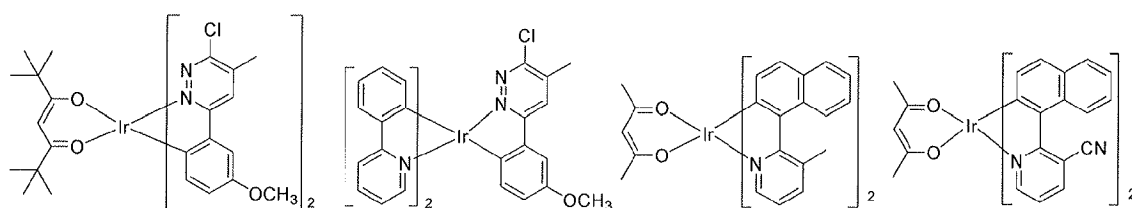
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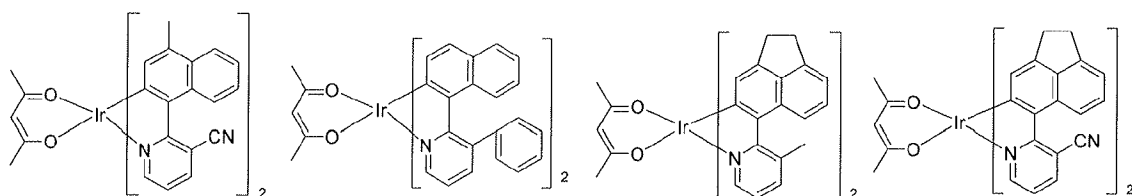
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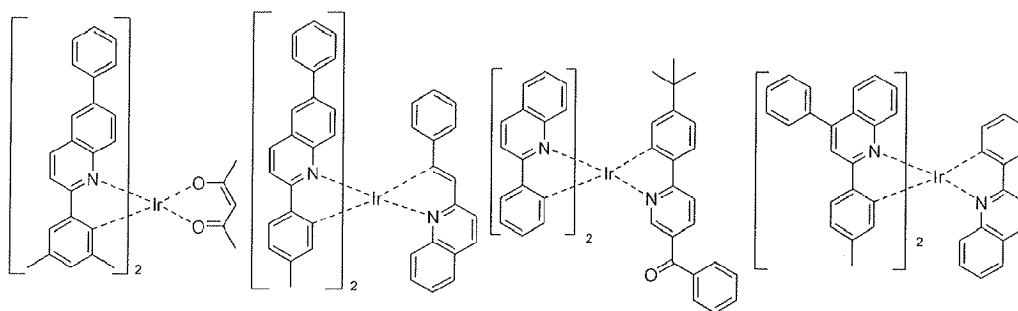
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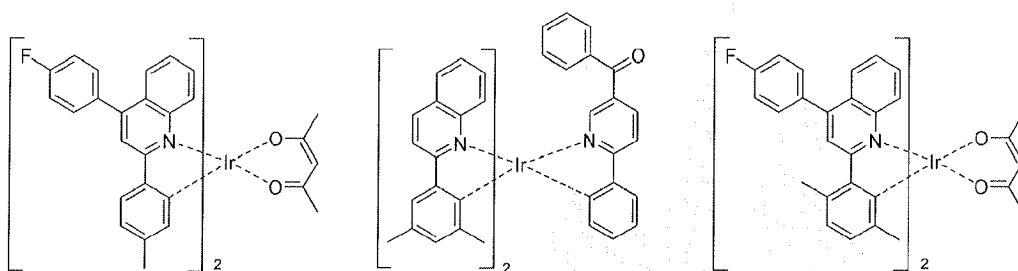
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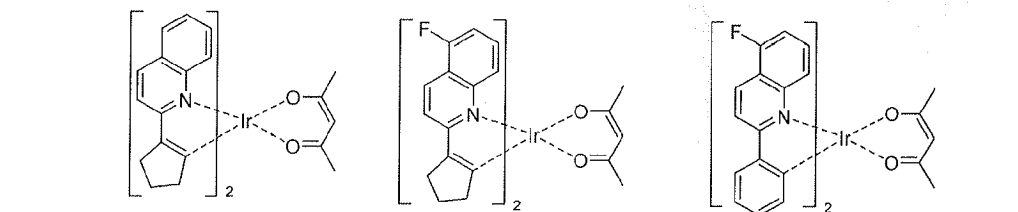
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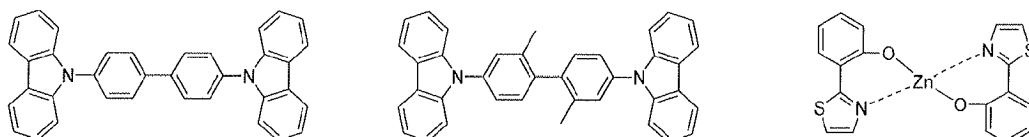


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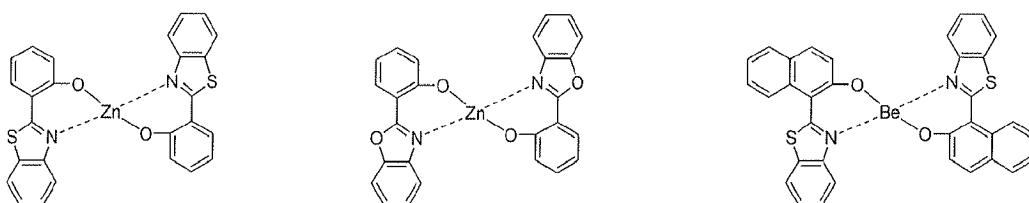


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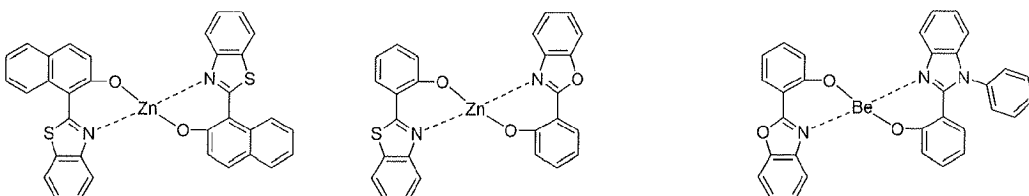


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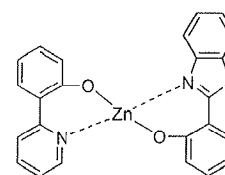
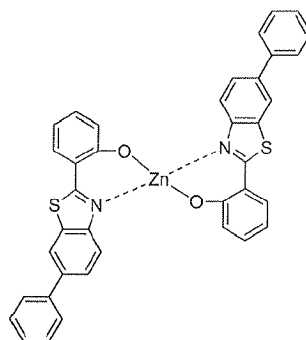
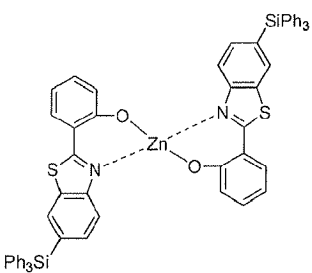
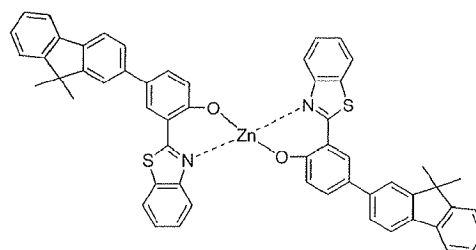
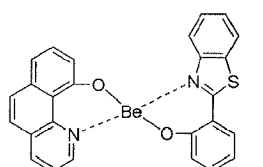
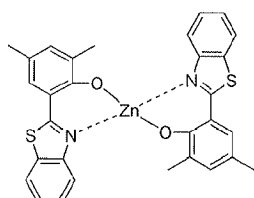
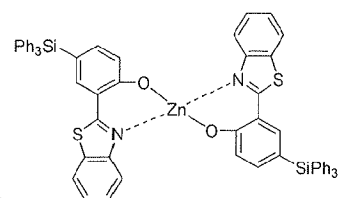
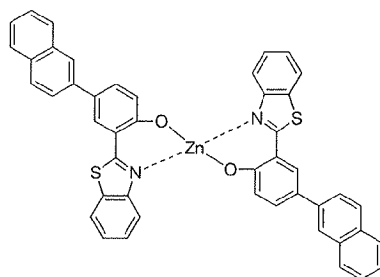
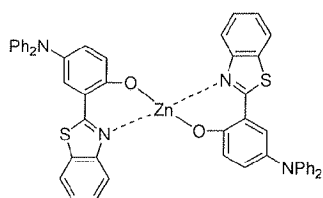
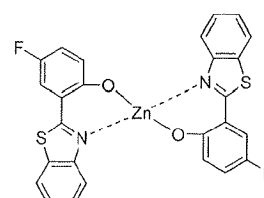
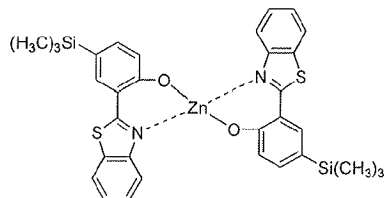
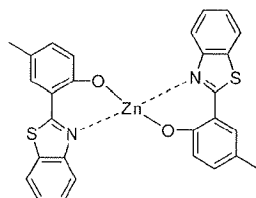
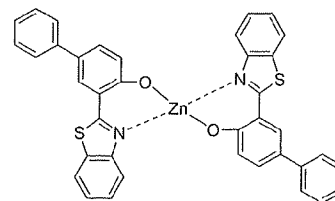
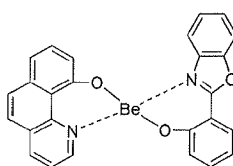
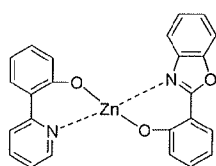
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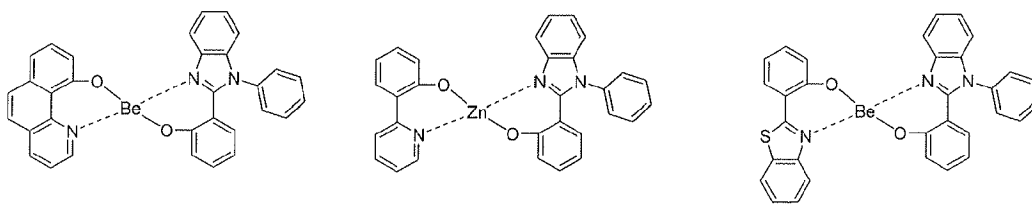
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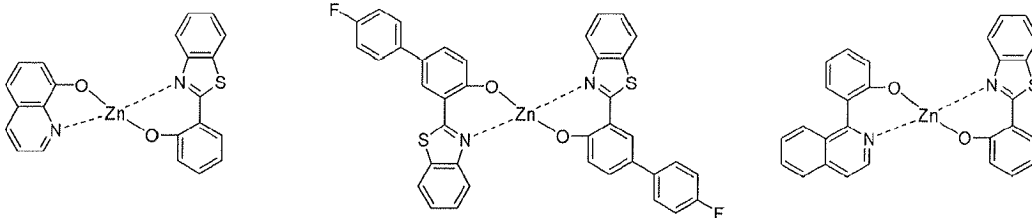
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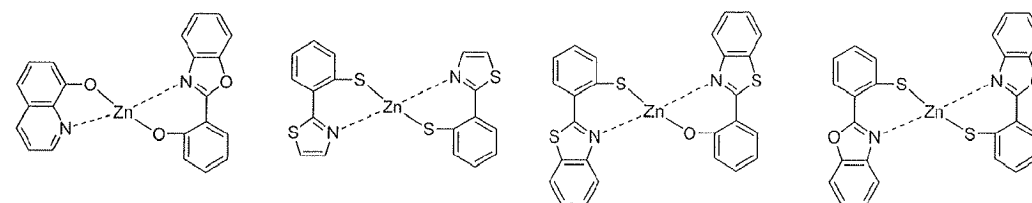


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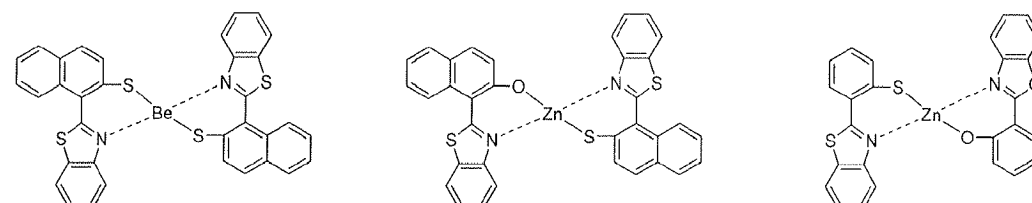
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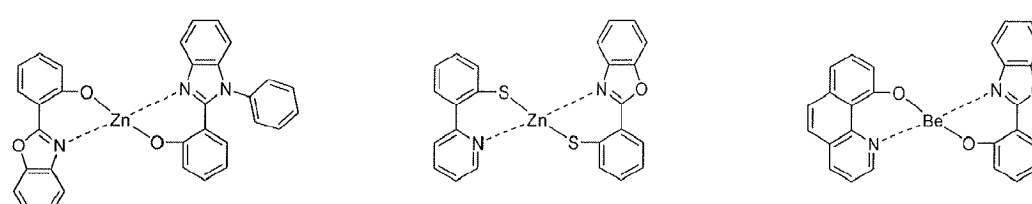
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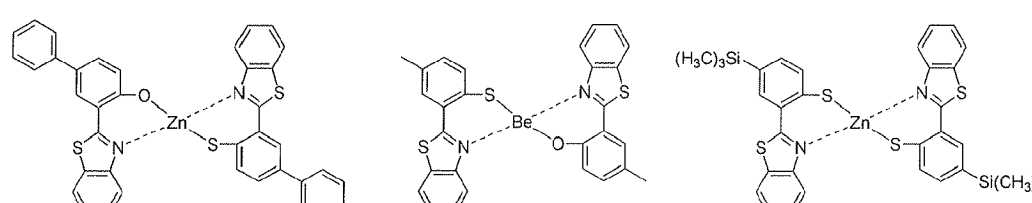


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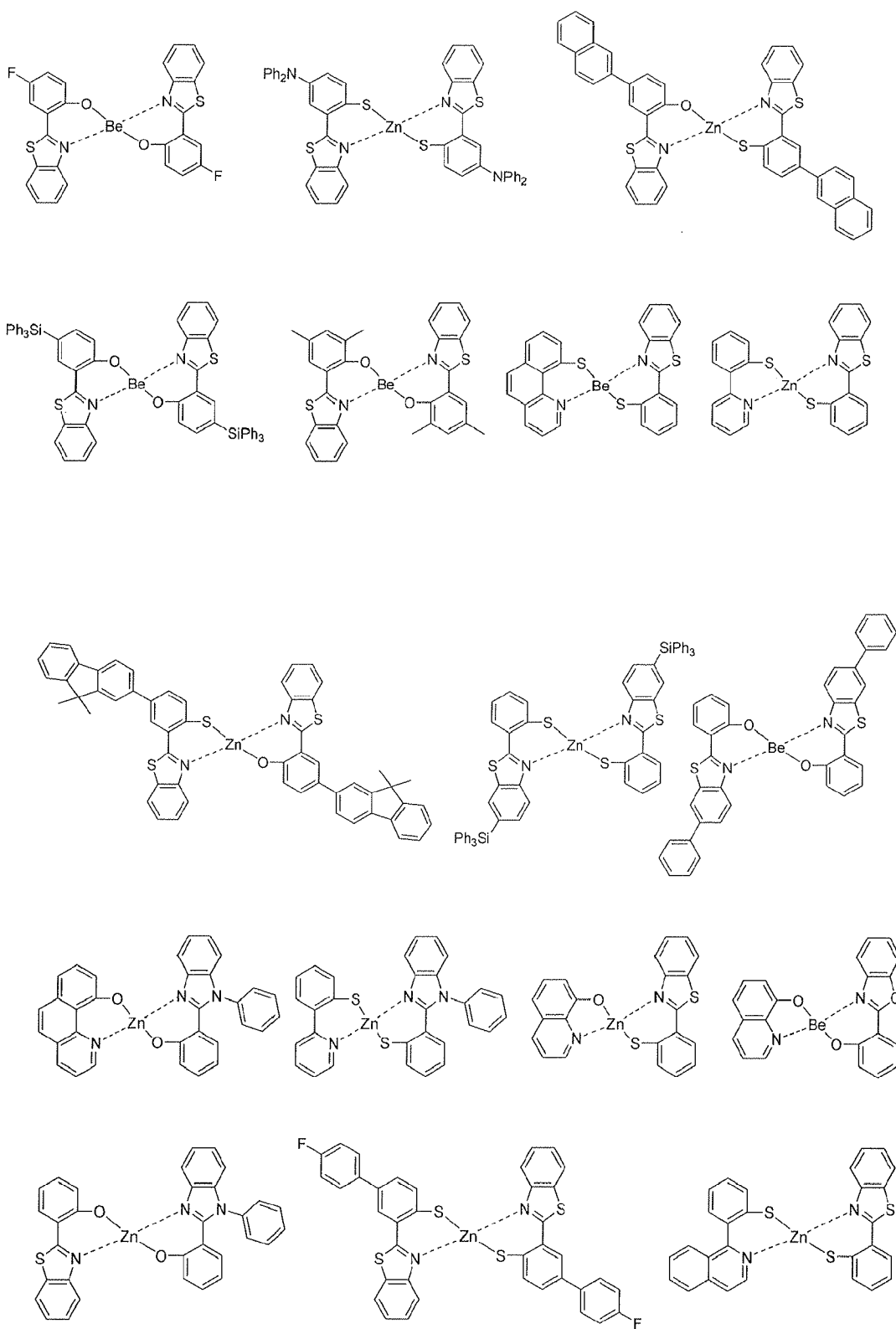


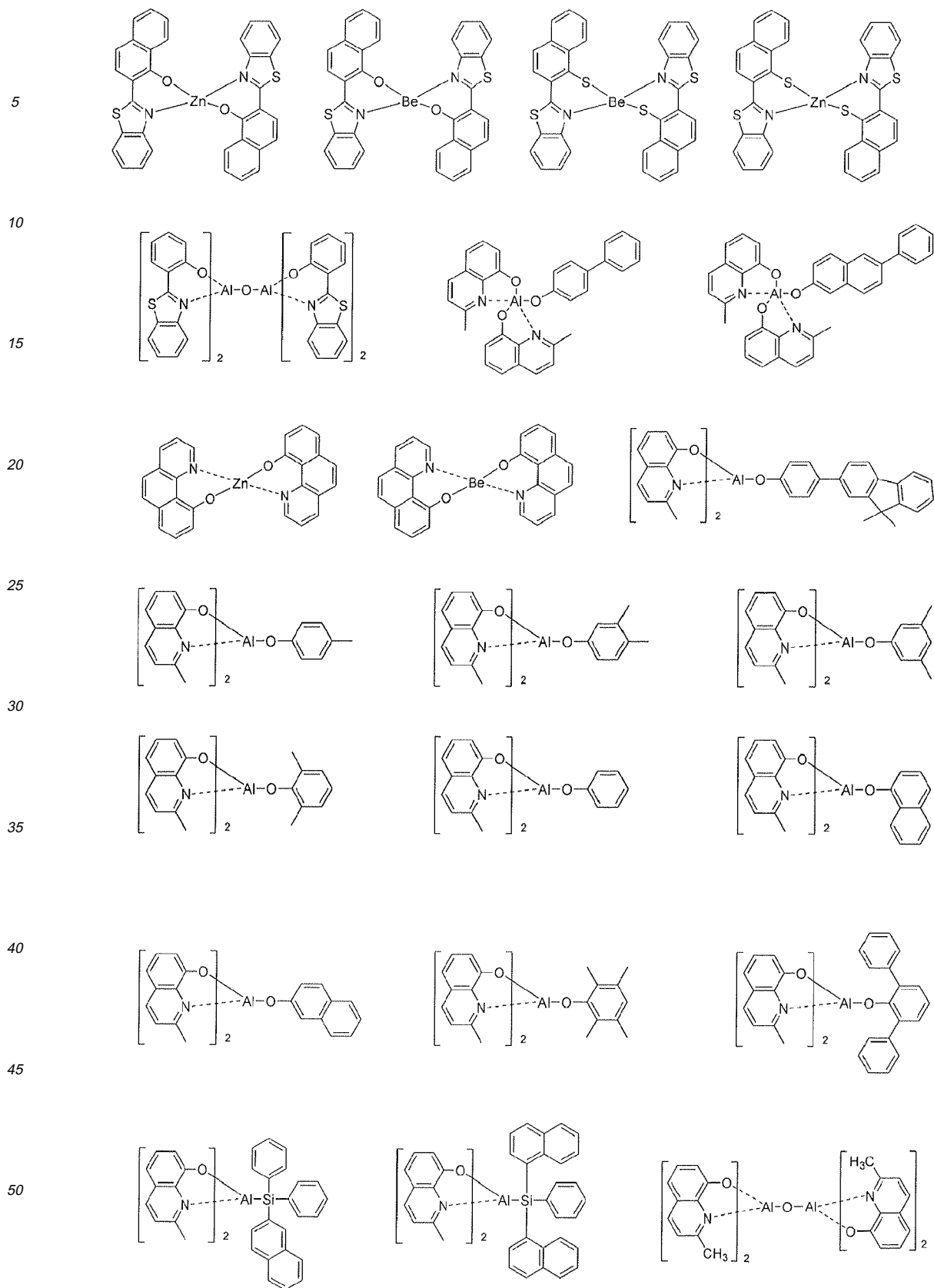
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[0031] In the organic electroluminescent device according to the present invention, a layer (hereinafter referred to as "surface layer") selected from a metal chalcogenide layer, a metal halide layer and a metal oxide layer may be placed on the inner surface of one or both electrode(s) among the pair of electrodes. More specifically, a metal chalcogenide

(including oxide) layer of silicon or aluminum may be placed on the anode surface of the electroluminescent layer, and a metal halide layer or metal oxide layer may be placed on the cathode surface of the electroluminescent layer. A driving stability may be attained therefrom.

[0032] The chalcogenide may be, for example, SiO_x ($1 \leq x \leq 2$), AlO_x ($1 \leq x \leq 1.5$), SiON , SiAlON , etc. The metal halide may be, for example, LiF , MgF_2 , CaF_2 , a rare earth metal fluoride, etc. The metal oxide may be, for example, Cs_2O , Li_2O , MgO , SrO , BaO , CaO , etc.

[0033] Further, in the organic electroluminescent device according to the present invention, a mixed region of an electron transport compound and a reductive dopant or a mixed region of a hole transport compound and an oxidative dopant may be placed on the inner surface of one or both electrode(s) among the pair of electrodes. In that case, transport of electrons from the mixed region to the electroluminescent layer becomes easier, because the electron transport compound is reduced to an anion. Further, transport of holes from the mixed region to the electroluminescent layer becomes easier, because the hole transport compound is oxidized to a cation. Preferred examples of the oxidative dopant include various Lewis acids and acceptor compounds. Preferred examples of the reductive dopant include alkali metals, alkali metal compounds, alkaline earth metals, rare earth metals and mixtures thereof.

[0034] The organic electroluminescent compound according to the present invention has superior luminous efficiency, excellent color purity of the material and very good life property. Therefore, it may be used to manufacture OLED devices having very good operation life.

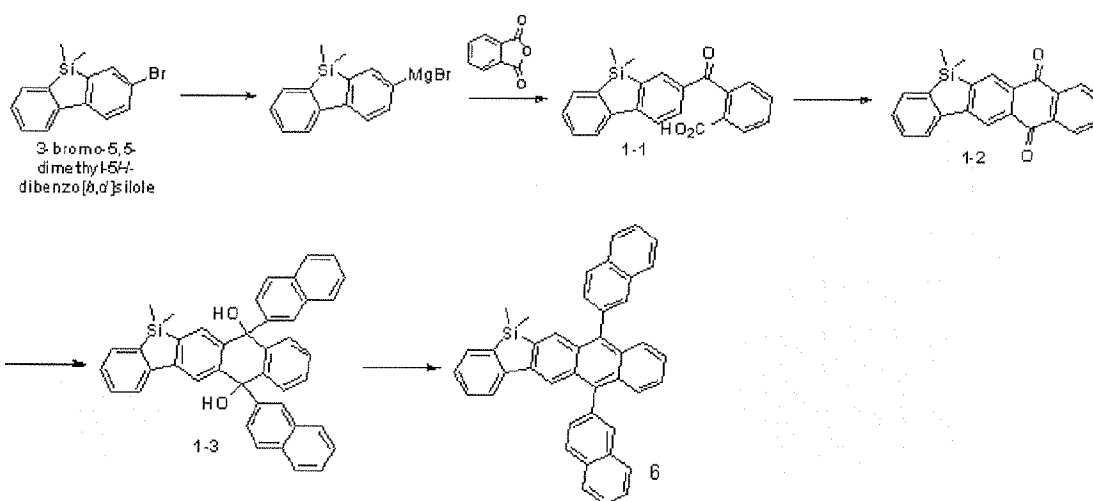
EXAMPLES

[0035] Hereinafter, organic electroluminescent compounds according to the present invention, preparation method thereof and electroluminescence characteristics thereof will be described referring to representative exemplary compounds. However, the following examples are for illustrative purposes only and not intended to limit the scope of the present invention.

Preparation Examples

Preparation Example 1: Preparation of Compound 6

[0036]



Preparation of Compound 1-1

[0037] Magnesium (Mg) (1.1 g, 44.9 mmol) and iodine (I_2) (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, 3-bromo-5,5-dimethyl-5H-dibenzo[b,d]silole (10.0 g, 34.6 mmol) dissolved in THF (500 mL) were added to the mixture solution of Mg and I_2 . After stirring for an hour under reflux, the solution was cooled to room temperature. After adding phthalic anhydride (5.1 g, 34.6 mmol), followed by stirring for 5 hours at 50 °C, distilled water was added at room temperature. After extracting with MC, followed by drying with MgSO_4 , Compound 1-1 (10.0 g, 27.9 mmol, 82.05 %) was obtained by distillation under reduced pressure and

column separation.

Preparation of Compound 1-2

[0038] Compound 1-1 (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for 2 hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound 1-2 (4.0 g, 11.7 mmol, 43.51 %) was obtained by column separation.

Preparation of Compound 1-3

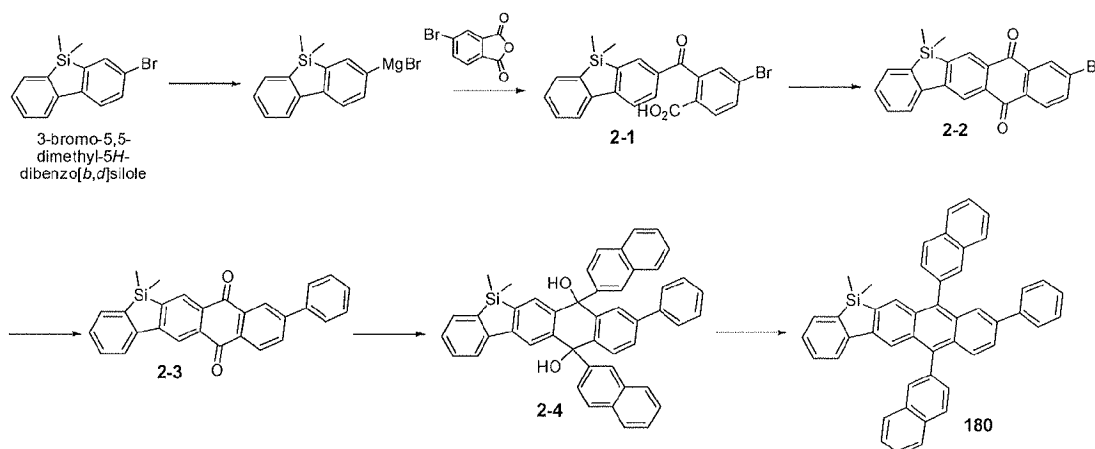
[0039] 2-Bromonaphthalene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at -78 °C. After stirring for an hour, Compound 1-2 (4.0 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with MgSO₄, Compound 1-3 (6.7 g, 11.7 mmol, 100 %) was obtained by distillation under reduced pressure.

Preparation of Compound 6

[0040] Compound 1-3 (6.7 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and NaH₂PO₂H₂O (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, the mixture was cooled to room temperature and distilled water was added to filter the produced solid under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound 6 (3.0 g, 63.7 %, 5.3 mmol) was obtained by column separation.

Preparation Example 2: Preparation of Compound 180

[0041]



Preparation of Compound 2-1

[0042] Mg (1.1 g, 44.9 mmol) and I₂ (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, 3-bromo-5,5-dimethyl-5H-dibenzo[b,d]silole (10.0 g, 34.6 mmol) dissolved in THF (500 mL) was added to the mixture solution of Mg and I₂. The mixture was stirred under reflux for an hour and cooled to room temperature. 5-Bromoisobenzofuran-1,3-dione (5.12 g, 34.57 mmol) was added. After stirring at 50 °C for 5 hours, distilled water was added at room temperature. After extracting with MC, followed by drying with MgSO₄, Compound 2-1 (10 g, 27.89 mmol, 82.05 %) was obtained by distillation under reduced pressure and column separation.

Preparation of Compound 2-2

[0043] Compound 2-1 (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for two hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound 2-2 (4.0 g, 11.7 mmol, 43.5 %) was obtained by column

separation.

Preparation of Compound 2-3

[0044] Compound **2-2** (2.0 g, 4.1 mmol), phenylboronic acid (1.3 g, 10.3 mmol) and tetrakis palladium(0) triphenylphosphine ($\text{Pd}(\text{PPh}_3)_4$) (0.6 g, 0.4 mmol) were dissolved in toluene (100 mL) and ethanol (50 mL). After adding 2 M aqueous sodium carbonate solution (50 mL), the mixture was stirred at 120 °C for 4 hours under reflux. After cooling to 25 °C, distilled water (200 mL) was added to terminate the reaction, followed by extraction with ethyl acetate (150 mL) and drying under reduced pressure. Compound **2-3** (1.6 g, 3.3 mmol) was obtained by column chromatography.

Preparation of Compound 2-4

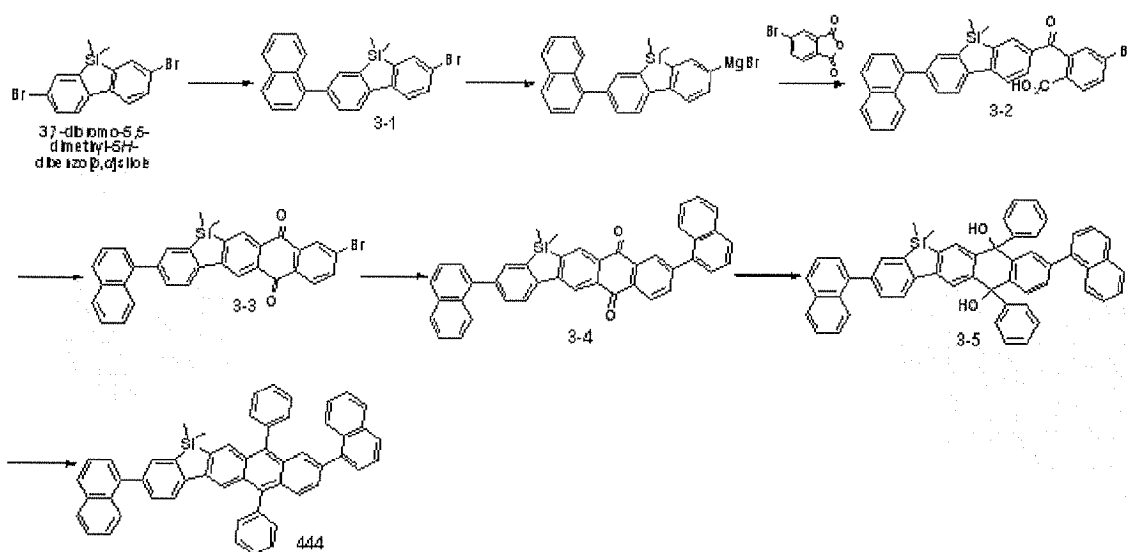
[0045] 2-Bromonaphthalene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at -78 °C. After stirring for an hour, Compound **2-3** (4.0 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with MgSO_4 , Compound **2-4** (7.9 g, 11.7 mmol) was obtained by distillation under reduced pressure.

Preparation of Compound 180

[0046] Compound **2-4** (7.9 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and $\text{NaH}_2\text{PO}_2 \cdot \text{H}_2\text{O}$ (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, after cooling to room temperature, distilled water was added and the produced solid was filtered under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound **180** (3 g, 5.3 mmol, 63.9%) was obtained by column separation.

Preparation Example 3: Preparation of Compound 444

[0047]



Preparation of Compound 3-1

[0048] 3,7-Dibromo-5,5-dimethyl-5H-dibenzo[b,d]silole (2.0 g, 4.1 mmol), 1-naphthylboronic acid (1.3 g, 10.3 mmol) and tetrakis palladium(0) triphenylphosphine ($\text{Pd}(\text{PPh}_3)_4$) (0.6 g, 0.4 mmol) were dissolved in toluene (100 mL) and ethanol (50 mL). After adding 2 M aqueous sodium carbonate solution (50 mL), the mixture was stirred at 120 °C for 4 hours under reflux.

After cooling to 25 °C, distilled water (200 mL) was added to terminate the reaction, followed by extraction with ethyl acetate (150 mL) and drying under reduced pressure. Compound **3-1** (1.6 g, 3.3 mmol) was obtained by column chromatography.

Preparation of Compound 3-2

[0049] Mg (1.1 g, 44.9 mmol) and I₂ (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, Compound 3-1 (10.0 g, 24.1 mmol) dissolved in THF (500 mL) was added to the mixture solution of Mg and I₂. After stirring for an hour under reflux, the mixture was cooled to room temperature. 5-Bromoisobenzofuran-1,3-dione (5.1 g, 34.8 mmol) was added. After stirring at 50 °C for 5 hours, distilled water was added at room temperature. After extracting with MC, followed by drying with MgSO₄, Compound 3-2 (10.0 g, 27.9 mmol, 82.1 %) was obtained by distillation under reduced pressure and column separation.

Preparation of Compound 3-3

[0050] Compound 3-2 (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for two hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound 3-3 (4.0 g, 11.7 mmol, 43.5 %) was obtained by column separation.

Preparation of Compound 3-4

[0051] Compound 3-3 (2.0 g, 4.1 mmol), 1-naphthylboronic acid (1.3 g, 10.3 mmol) and tetrakis palladium(0) triphenylphosphine (Pd(PPh₃)₄) (0.6 g, 0.4 mmol) were dissolved in toluene (100 mL) and ethanol (50 mL). 2 M aqueous sodium carbonate solution (50 mL) was added and the mixture was stirred at 120 °C for 4 hours under reflux. After cooling to 25 °C, distilled water (200 mL) was added to terminate the reaction, followed by extraction with ethyl acetate (150 mL) and drying under reduced pressure. Compound 3-4 (1.6 g, 3.3 mmol) was obtained by column chromatography.

Preparation of Compound 3-5

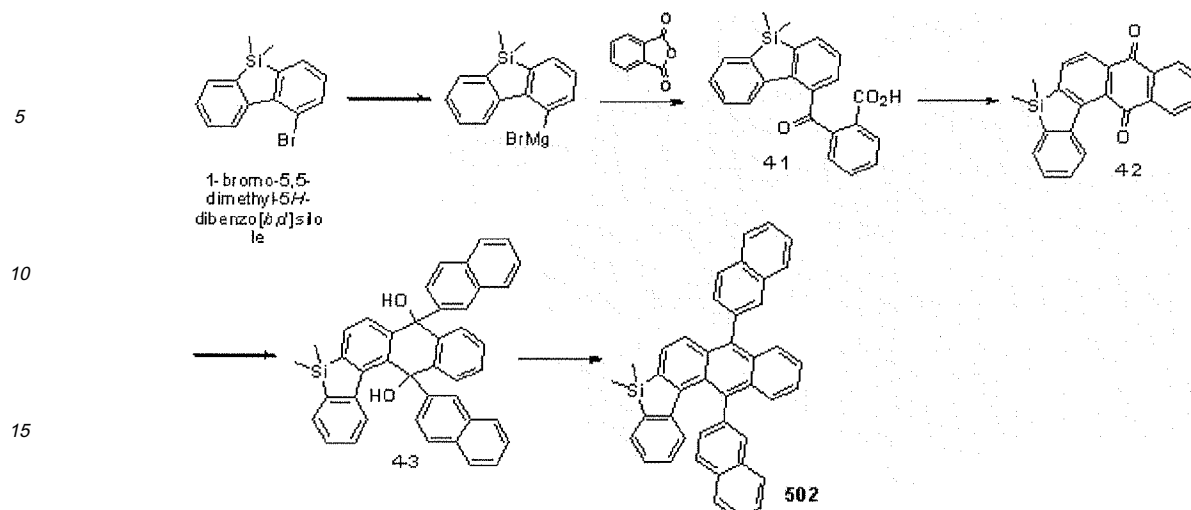
[0052] Bromobenzene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at -78 °C. After stirring for an hour, Compound 3-4 (4.0 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with MgSO₄, Compound 3-5 (8.8 g, 11.7 mmol) was obtained by distillation under reduced pressure.

Preparation of Compound 444

[0053] Compound 3-5 (8.8 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and NaH₂PO₂H₂O (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, after cooling to room temperature, distilled water was added and the produced solid was filtered under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound 444 (3.0 g, 5.3 mmol, 63.9 %) was obtained by column separation.

Preparation Example 4: Preparation of Compound 502

[0054]



Preparation of Compound 4-1

[0055] Mg (1.1 g, 44.9 mmol) and I₂ (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, 1-bromo-5,5-dimethyl-5H-dibenzo[b,d]silole (10.0 g, 34.6 mmol) dissolved in THF (500 mL) was added to the mixture solution of Mg and I₂. After stirring for an hour under reflux, the mixture was cooled to room temperature. Phthalic anhydride (5.1 g, 34.6 mmol) was added. After stirring at 50 °C for 5 hours, distilled water was added at room temperature. After extracting with MC, followed by drying with MgSO₄, Compound 4-1 (10.0 g, 27.9 mmol, 82.0 %) was obtained by distillation under reduced pressure and column separation.

Preparation of Compound 4-2

[0056] Compound 4-1 (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for two hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound 4-2 (4.0 g, 11.7 mmol, 43.5 %) was obtained by column separation.

Preparation of Compound 4-3

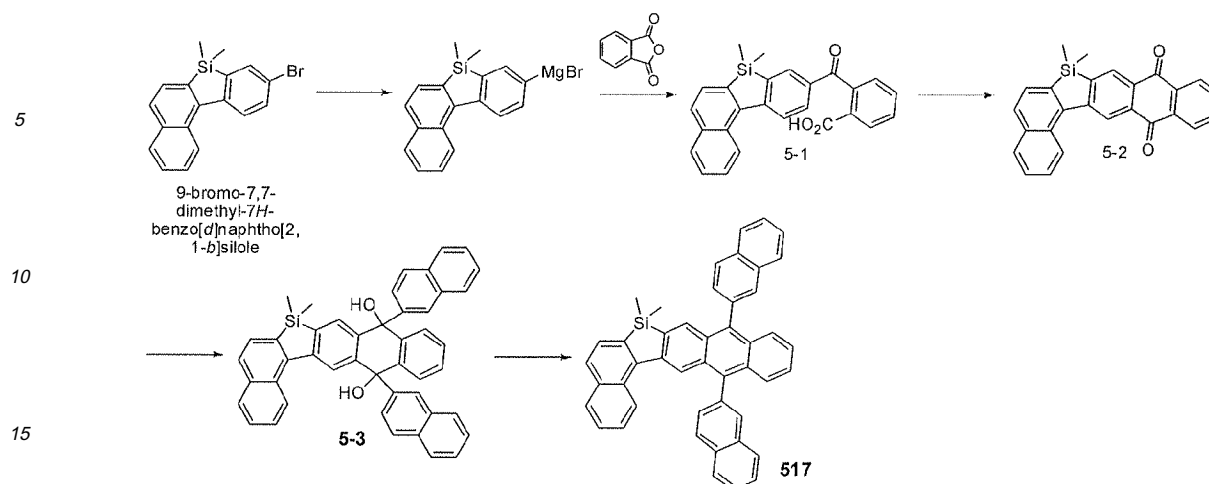
[0057] 2-Bromonaphthalene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at -78 °C. After stirring for an hour, Compound 4-2 (4 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with MgSO₄, Compound 4-3 (7.0 g, 11.7 mmol, 100 %) was obtained by distillation under reduced pressure.

Preparation of Compound 502

[0058] Compound 4-3 (7.0 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and NaH₂PO₂·H₂O (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, after cooling to room temperature, distilled water was added and the produced solid was filtered under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound 502 (3.0 g, 5.3 mmol, 63.9 %) was obtained by column separation.

Preparation Example 5: Preparation of Compound 517

[0059]



Preparation of Compound 5-1

[0060] Mg (1.1 g, 44.9 mmol) and I₂ (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, 9-bromo-7,7-dimethyl-7H-benzo[d]naphtho[2,1-b]silole (10.0 g, 29.5 mmol) dissolved in THF (500 mL) was added to the mixture solution of Mg and I₂.

After stirring for an hour under reflux, the mixture was cooled to room temperature. Phthalic anhydride (5.1 g, 34.8 mmol) was added. After stirring at 50 °C for 5 hours, distilled water was added at room temperature. After extracting with MC, followed by drying with MgSO₄, Compound 5-1 (10.0 g, 27.9 mmol, 82.1 %) was obtained by distillation under reduced pressure and column separation.

Preparation of Compound 5-2

[0061] Compound 5-1 (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for two hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound 5-2 (4.0 g, 11.7 mmol, 43.5 %) was obtained by column separation.

Preparation of Compound 5-3

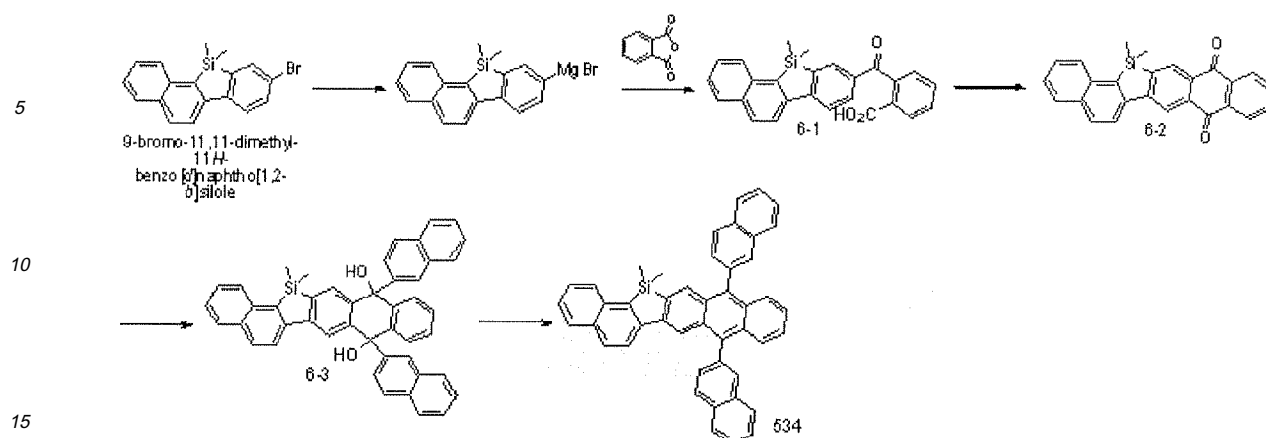
[0062] 2-Bromonaphthalene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at 78 °C. After stirring for an hour, Compound 5-2 (4.0 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with MgSO₄, Compound 5-3 (7.6 g, 11.7 mmol, 100 %) was obtained by distillation under reduced pressure.

Preparation of Compound 517

[0063] Compound 5-3 (7.6 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and NaH₂PO₂·H₂O (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, after cooling to room temperature, distilled water was added and the produced solid was filtered under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound 517 (3.0 g, 5.3 mmol, 63.9 %) was obtained by column separation.

Preparation Example 6: Preparation of Compound 534

[0064]



Preparation of Compound 6-1

20 **[0065]** Mg (1.1 g, 44.9 mmol) and I₂ (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, 9-bromo-11,11-dimethyl-11H-benzo[d]naphtho[1,2-b]silole (10.0 g, 29.5 mmol) dissolved in THF (500 mL) was added to the mixture solution of Mg and I₂. After stirring for an hour under reflux, the mixture was cooled to room temperature. Phthalic anhydride (5.1 g, 34.6 mmol) was added. After stirring at 50 °C for 5 hours, distilled water was added at room temperature. After extracting with MC, followed by drying with MgSO₄,
 25 Compound **6-1** (10.0 g, 27.9 mmol, 82.1 %) was obtained by distillation under reduced pressure and column separation.

Preparation of Compound 6-2

30 **[0066]** Compound **6-1** (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for two hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound **6-3** (4.0 g, 11.7 mmol, 43.5 %) was obtained by column separation.

Preparation of Compound 6-3

35 **[0067]** 2-Bromonaphthalene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at -78 °C. After stirring for an hour, Compound **6-2** (4.0 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with MgSO₄, Compound **6-3** (7.6 g, 11.7 mmol, 100 %) was obtained by distillation under reduced pressure.
 40

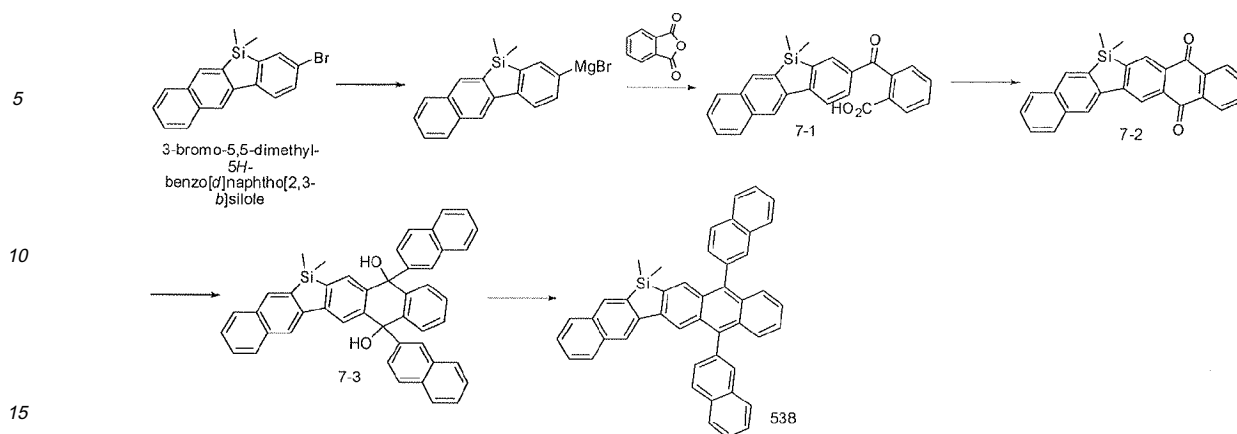
Preparation of Compound 534

45 **[0068]** Compound **6-4** (7.6 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and NaH₂PO₂·H₂O (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, after cooling to room temperature, distilled water was added and the produced solid was filtered under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound **534** (3.0 g, 5.3 mmol, 63.9 %) was obtained by column separation.

Preparation Example 7: Preparation of Compound 538

50 **[0069]**

55



Preparation of Compound 7-1

20 **[0070]** Mg (1.1 g, 44.9 mmol) and I₂ (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, 3-bromo-5,5-dimethyl-5H-benzo[d]naphtho[2,3-b]silole (10.0 g, 29.5 mmol) dissolved in THF (500 mL) was the mixture solution of Mg and I₂. After stirring for an hour under reflux, the mixture was cooled to room temperature. Phthalic anhydride (5.1 g, 34.6 mmol) was added. After stirring at 50 °C for 5 hours, distilled water was added at room temperature. After extracting with MC, followed by drying with MgSO₄, Compound 7-1 (10.0 g, 27.9 mmol, 82.1 %) was obtained by distillation under reduced pressure and column separation.

25

Preparation of Compound 7-2

30 **[0071]** Compound 7-1 (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for two hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound 7-2 (4.0 g, 11.7 mmol, 43.5 %) was obtained by column separation.

Preparation of Compound 7-3

35 **[0072]** 2-Bromonaphthalene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at -78 °C. After stirring for an hour, Compound 7-2 (4.0 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with MgSO₄, Compound 7-3 (7.6 g, 11.7 mmol, 100 %) was obtained by distillation under reduced pressure.

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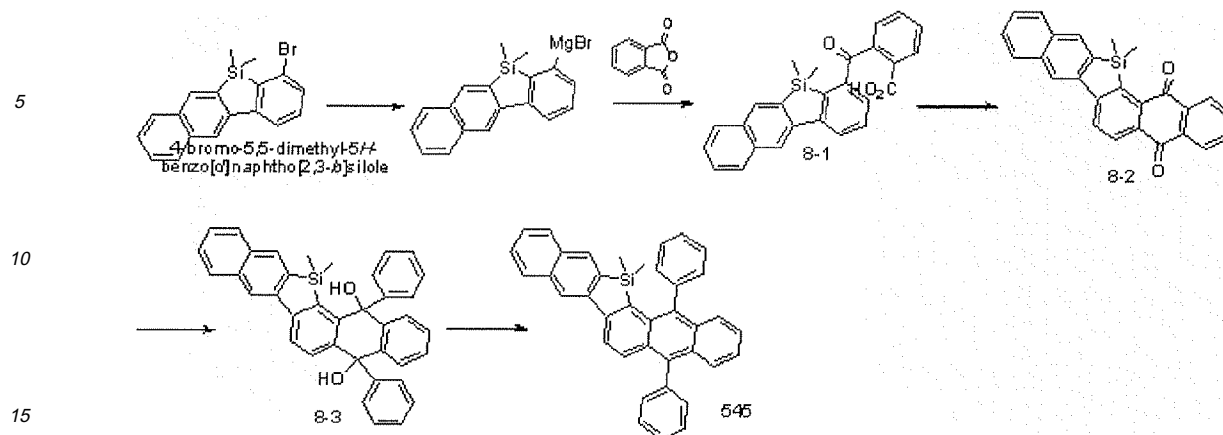
Preparation of Compound 538

45 **[0073]** Compound 7-3 (7.6 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and NaH₂PO₂·H₂O (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, after cooling to room temperature, distilled water was added and the produced solid was filtered under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound 538 (3.0 g, 5.3 mmol, 63.9 %) was obtained by column separation.

50 Preparation Example 8: Preparation of Compound 545

[0074]

55



Preparation of Compound 8-1

[0075] Mg (1.1 g, 44.9 mmol) and I_2 (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, 4-bromo-5,5-dimethyl-5H-benzo[d]naphtho[2,3-b]silole (10.0 g, 29.5 mmol) dissolved in THF (500 mL) was the mixture solution of Mg and I_2 . After stirring for an hour under reflux, the mixture was cooled to room temperature. Phthalic anhydride (5.1 g, 34.8 mmol) was added. After stirring at 50 °C for 5 hours, distilled water was added at room temperature. After extracting with MC, followed by drying with $MgSO_4$, Compound **8-1** (10.0 g, 27.9 mmol, 82.1 %) was obtained by distillation under reduced pressure and column separation.

Preparation of Compound 8-2

[0076] Compound **8-1** (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for two hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound **8-2** (4.0 g, 11.7 mmol, 43.5 %) was obtained by column separation.

Preparation of Compound 8-3

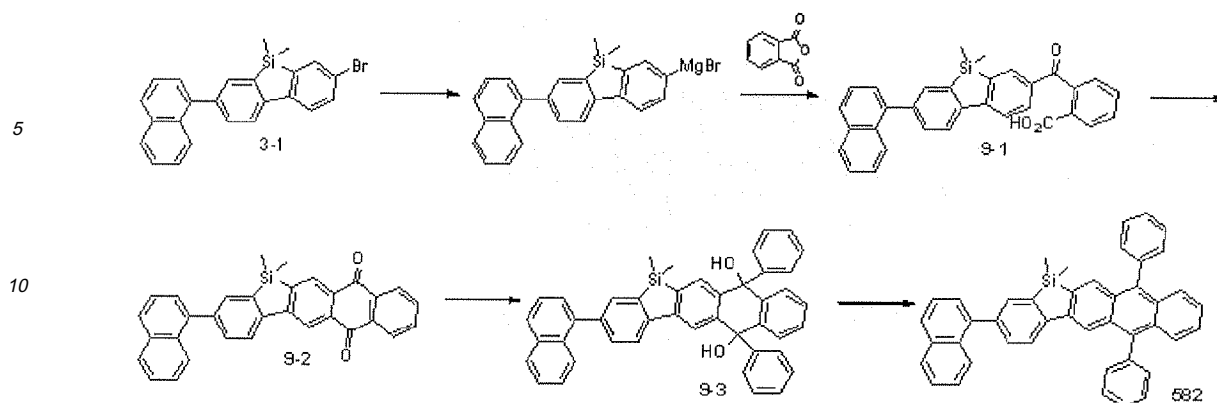
[0077] 2-Bromonaphthalene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at -78 °C. After stirring for an hour, Compound **8-2** (4.0 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with $MgSO_4$, Compound **8-3** (7.6 g, 11.7 mmol, 100 %) was obtained by distillation under reduced pressure.

Preparation of Compound 545

[0078] Compound **8-3** (7.6 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and $NaH_2PO_2 \cdot H_2O$ (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, after cooling to room temperature, distilled water was added and the produced solid was filtered under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound **545** (3.0 g, 5.3 mmol, 63.9 %) was obtained by column separation.

Preparation Example 9: Preparation of Compound 582

[0079]



Preparation of Compound 9-1

[0080] Mg (1.1 g, 44.9 mmol) and I_2 (1.7 g, 6.9 mmol) were mixed with THF (70 mL) and stirred under reflux. One hour later, after cooling to room temperature, Compound **3-1** (10.0 g, 24.1 mmol) dissolved in THF (500 mL) was added to the mixture solution of Mg and I_2 . After stirring for an hour under reflux, the mixture was cooled to room temperature. Phthalic anhydride (5.1 g, 34.8 mmol) was added. After stirring at 50 °C for 5 hours, distilled water was added at room temperature. After extracting with MC, followed by drying with $MgSO_4$, Compound **9-1** (10.0 g, 27.9 mmol, 82.1%) was obtained by distillation under reduced pressure and column separation.

Preparation of Compound 9-2

[0081] Compound **9-1** (10.0 g, 27.9 mmol) was mixed with methanesulfonic acid (70 mL) and stirred for two hours at 100 °C. After cooling to room temperature, distilled water was added. The produced solid was filtered under reduced pressure and washed with aqueous NaOH solution. Compound **9-2** (4.0 g, 11.7 mmol, 43.5 %) was obtained by column separation.

Preparation of Compound 9-3

[0082] Bromobenzene (7.2 g, 35.2 mmol) was dissolved in THF (100 mL) and n-butyllithium (14.6 mmol, 2.5M in hexane) was slowly added at -78 °C. After stirring for an hour, Compound **9-2** (4.0 g, 11.7 mmol) was added at -78 °C. After stirring for 6 hours at room temperature, distilled water was added. After extracting with MC, followed by drying with $MgSO_4$, Compound **9-3** (7.3 g, 11.7 mmol, 100 %) was obtained by distillation under reduced pressure.

Preparation of Compound 582

[0083] Compound **9-3** (7.3 g, 11.7 mmol), KI (5.5 g, 33.5 mmol) and $NaH_2PO_2 \cdot H_2O$ (7.1 g, 69.0 mmol) were mixed with acetic acid (100 mL) and stirred under reflux. 6 hours later, after cooling to room temperature, distilled water was added and the produced solid was filtered under reduced pressure. The solid was neutralized by washing with aqueous NaOH solution. Compound **582** (3.0 g, 5.3 mmol, 63.9 %) was obtained by column separation.

[0084] Organic electroluminescent compounds (Compounds **1** to **665**) were prepared according to the method of Preparation Examples 1 to 9. Table 1 shows 1H NMR and MS/FAB data of the prepared organic electroluminescent compounds.

[Table 1]

compound	1H NMR($CDCl_3$, 200 MHz)	MS/FAB	
		found	calculated
1	δ = 0.66(6H, s), 7.33~7.41 (5H, m), 7.51~7.52(9H, m), 7.61(1H, m), 7.89~7.91(3H, m), 8.23(1H, s), 8.25(1H, s)	462.66	462.18
2	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52~7.55(5H, m), 7.61(3H, m), 7.89~7.91(3H, m), 8.04~8.08(4H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	562.77	562.21

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(continued)

	compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
			found	calculated
5	6	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52(1H, m), 7.58~7.61(7H, m), 7.73(2H, m), 7.89~7.92(5H, m), 8(4H, m), 8.23(1H, s), 8.25(1H, s)	562.77	562.21
	7	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52(1H, m), 7.61(1H, m), 7.82~7.93(13H, m), 8.12(4H, m), 8.23(1H, s), 8.25(1H, s), 8.93(4H, m)	662.89	662.24
10	11	δ = 0.66(6H, s), 1.35(18H, s), 7.33~7.39(11H, m), 7.52(1H, m), 7.61(1H, m), 7.89~7.91(3H, m), 8.23(1H, s), 8.25(1H, s)	574.87	574.31
15	14	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.39(7H, m), 7.52~7.55(3H, m), 7.61~7.63(3H, m), 7.77(2H, m), 7.87~7.93(7H, m), 8.23(1H, s), 8.25(1H, s)	694.98	694.31
	20	δ = 0.66(6H, s), 7.33~7.41(7H, m), 7.51~7.52(17H, m), 7.61~7.66(7H, m), 7.89~7.91(3H, m), 8.23(1H, s), 8.25(1H, s)	767.04	766.31
20	23	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.5~7.52(5H, m), 7.61(1H, m), 7.86~7.91(5H, m), 7.98~8(6H, m), 8.23(1H, s), 8.25(1H, s), 8.45(2H, m)	674.95	674.16
	25	δ = 0.66(6H, s), 7.25(2H, m), 7.33~7.39(5H, m), 7.45~7.52(7H, m), 7.58~7.61(5H, m), 7.69(2H, m), 7.77(2H, m), 7.87~7.94(7H, m), 8.23(1H, s), 8.25(1H, s), 8.55(2H, m)	793.04	792.30
25	28	δ = 0.66(6H, s), 7.3~7.39(11H, m), 7.52(1H, m), 7.61(1H, m), 7.89~7.91(3H, m), 8.23(1H, s), 8.25(1H, s)	498.64	498.16
	34	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.39(9H, m), 7.51~7.55(5H, m), 7.61~7.63(3H, m), 7.87~7.91(5H, m), 8.23(1H, s), 8.25(1H, s)	694.98	694.31
30	43	δ = 0.66(6H, s), 7.25~7.33(7H, m), 7.4(2H, m), 7.5~7.52(3H, m), 7.61~7.63(3H, m), 7.89~7.94(5H, m), 8.12(2H, m), 8.2(1H, s), 8.3(1H, s), 8.55(2H, m)	640.85	640.23
	47	δ = 0.66(6H, s), 6.63(4H, m), 6.81(4H, m), 6.99~7.05(8H, m), 7.25(4H, m), 7.33~7.39(3H, m), 7.52(1H, m), 7.61(1H, m), 7.89~7.91(3H, m), 8.16(1H, s), 8.18(1H, s)	692.92	692.26
35	50	δ = 0.66(6H, s), 7.33~7.42(9H, m), 7.48~7.52(3H, m), 7.61(1H, m), 7.74~7.91(13H, m), 8.03~8.12(6H, m), 8.23(1H, s), 8.25(1H, s)	826.97	826.24
40	55	δ = 0.66(6H, s), 7.25(8H, m), 7.33~7.39(3H, m), 7.52(1H, m), 7.58~7.61(7H, m), 7.73(2H, m), 7.89~7.92(5H, m), 8(4H, m), 8.23(1H, s), 8.25(1H, s)	714.97	714.27
	57	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.48~7.61(14H, m), 7.7~7.73(4H, m), 7.89~7.92(5H, m), 8(4H, m), 8.23(1H, s), 8.25(1H, s)	714.97	714.27
45	61	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.39(7H, m), 7.48~7.63(12H, m), 7.7(2H, m), 7.77(2H, m), 7.87~7.93(7H, m), 8.23(1H, s), 8.25(1H, s)	847.17	846.37
	69	δ = 0.66(6H, s), 7.25(8H, m), 7.33~7.39(3H, m), 7.52(1H, m), 7.61(1H, m), 7.82~7.93(13H, m), 8.12(4H, m), 8.23(1H, s), 8.25(1H, s), 8.93(4H, m)	815.08	814.31
50	72	δ = 0.66(6H, s), 7.33~7.41(4H, m), 7.51~7.55(7H, m), 7.61(2H, m), 7.89~7.91(3H, m), 8.04~8.08(2H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	512.71	512.20
55	73	δ = 0.66(6H, s), 7.33~7.41(4H, m), 7.51~7.52(5H, m), 7.58~7.61(4H, m), 7.73(1H, m), 7.89~7.92(4H, m), 8(2H, m), 8.23(1H, s), 8.25(1H, s)	512.71	512.20

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(continued)

	compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
			found	calculated
5	74	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.41(6H, m), 7.51~7.55(6H, m), 7.61~7.63(2H, m), 7.77(1H, m), 7.87~7.93(5H, m), 8.23(1H, s), 8.25(1H, s)	578.82	578.24
10	75	δ = 0.66(6H, s), 7.33~7.41(4H, m), 7.51~7.52(5H, m), 7.61(1H, m), 7.82~7.93(8H, m), 8.12(2H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m)	562.77	562.21
	77	δ = 0.66(6H, s), 7.33~7.41(6H, m), 7.51~7.52(13H, m), 7.61~7.66(4H, m), 7.89~7.91(3H, m), 8.23(1H, s), 8.25(1H, s)	614.85	614.24
15	79	δ = 0.66(6H, s), 7.33~7.41(5H, m), 7.48~7.61(13H, m), 7.7(1H, m), 7.89~7.91(3H, m), 8.23(1H, s), 8.25(1H, s)	538.75	538.21
	87	δ = 0.66(6H, s), 7.33~7.41(5H, m), 7.51~7.55(9H, m), 7.61 (1H, m), 7.79(2H, m), 7.89~7.91(3H, m), 8.01(2H, m), 8.23(1H, s), 8.25(1H, s), 8.55(2H, m)	588.81	588.23
20	93	δ = 0.66(6H, s), 7.33~7.41(4H, m), 7.48~7.61(12H, m), 7.7(1H, m), 7.89~7.91(3H, m), 8.04~8.08(2H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	588.81	588.23
25	98	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.41(6H, m), 7.48~7.63(11H, m), 7.7 (1H, m), 7.77(1H, m), 7.87~7.93(5H, m), 8.23(1H, s), 8.25(1H, s)	654.91	654.27
	104	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.44(7H, m), 7.51~7.55(7H, m), 7.61 (1H, m), 7.83~7.91(5H, m), 8.23(1H, s), 8.25(1H, s)	578.82	578.24
30	107	δ = 0.66(6H, s), 7.33~7.41(4H, m), 7.5~7.52(7H, m), 7.61(1H, m), 7.86~7.91(4H, m), 7.98~8(3H, m), 18.23(1H, s), 8.25(1H, s), 8.45(1H, m)	568.80	568.17
	117	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52~7.61(8H, m), 7.73(1H, m), 7.89~7.92(4H, m), 8~8.08(4H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	562.77	562.21
35	118	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.39(5H, m), 7.52~7.55(4H, m), 7.61~7.63(3H, m), 7.77(1H, 7.87~7.93(5H, m), 8.04~8.08(2H, m), 8.23 (1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	m), 628.87	628.26
40	120	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52~7.55(3H, m), 7.61(2H, m), 7.82~7.93(8H, m), 8.04~8.12(4H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m), 8.93(2H, m)	612.83	612.23
	121	δ = 0.66(6H, s), 7.33~7.41(5H, m), 7.51~7.55(1H, m), 7.61~7.66(5H, m), 7.89~7.91(3H, m), 8.04~8.08(2H, m), 8.23(1H, s), 8.25(1H, s), 8.42 (1H, m), 8.55(1H, m)	664.91	664.26
45	126	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.47~7.61(10H, m), 7.73(1H, m), 7.85~7.92(6H, m), 8~8.08(4H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	638.87	638.24
50	130	δ = 0.66(6H, s), 7.33~7.41(4H, m), 7.51~7.61 (9H, m), 7.79(2H, m), 7.89~7.91(3H, m), 8~8.08(4H, m), 8.23(1H, s), 8.25(1H, s), 8.4~8.42 (3H, m), 8.55(1H, m)	638.87	638.24
	134	δ = 0.66(6H, s), 2.34(6H, s), 7.31~7.39(4H, m), 7.52~7.61(7H, m), 7.89~7.91(3H, m), 8.04~8.08(2H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	540.77	540.23
55	148	δ = 0.66(6H, s), 7.21(1H, m), 7.33~7.41(5H, m), 7.51~7.55(7H, m), 7.61 (2H, m), 7.76~7.79(5H, m), 7.89~7.91(4H, m), 8.04~8.08(2H, m), 8.23 (1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	664.91	664.26

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(continued)

	compound	¹ H NMR(CDCI ₃ , 200 MHz)	MS/FAB	
			found	calculated
5	151	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.39(5H, m), 7.52~7.63(7H, m), 7.73~7.77(2H, m), 7.87~7.93(6H, m), 8(2H, m), 8.23(1H, s), 8.25(1H, s)	628.87	628.26
10	153	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52(1H, m), 7.58~7.61(4H, m), 7.73(1H, m), 7.82~7.93(9H, m), 8(2H, m), 8.12(2H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m)	612.83	612.23
15	160	δ = 0.66(6H, s), 7.25~7.33(4H, m), 7.4(2H, m), 7.5~7.52(2H, m), 7.58~7.63(5H, m), 7.73(1H, m), 7.89~8(7H, m), 8.12(1H, m), 8.2(1H, s), 8.3(1H, s), 8.55(1H, m)	601.81	601.22
20	161	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52(1H, m), 7.58~7.61(4H, m), 7.73(1H, m), 7.82~7.92(8H, m), 8~8.04(3H, m), 8.12(2H, m), 8.18(1H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m), 9.15(1H, m)	662.89	662.24
25	166	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.39(5H, m), 7.52~7.63(7H, m), 7.73~7.77(2H, m), 7.87~7.93(6H, m), 8(2H, m), 8.23(1H, s), 8.25(1H, s)	628.87	628.26
30	167	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.39(5H, m), 7.52~7.55(4H, m), 7.61~7.63(3H, m), 7.77(1H, m), 7.87~7.93(5H, m), 8.04~8.08(2H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	628.87	628.26
35	169	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.39(5H, m), 7.52~7.55(2H, m), 7.61~7.63(2H, m), 7.77~7.93(11H, m), 8.12(2H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m)	678.93	678.27
40	170	δ = 0.66(6H, s), 1.72(6H, s), 2.34(6H, s), 7.28~7.39(6H, m), 7.52~7.63(6H, m), 7.77(1H, m), 7.87~7.93(5H, m), 8.23(1H, s), 8.25(1H, s)	606.87	606.27
45	175	δ = 0.66(6H, s), 1.72(12H, s), 7.25~7.39(11H, m), 7.52~7.55(3H, m), 7.61~7.63(3H, m), 7.77(2H, m), 7.87~7.93(7H, m), 8.23(1H, s), 8.25(1H, s)	771.07	770.34
50	176	δ = 0.66(6H, s), 7.33(1H, m), 7.41(3H, m), 7.51~7.52(13H, m), 7.61(2H, m), 7.89(1H, m), 7.97(1H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	538.75	538.21
55	177	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.55(9H, m), 7.61(4H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	638.87	638.24
	180	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.52(5H, m), 7.58~7.61(8H, m), 7.73(2H, m), 7.89~8(8H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	638.87	638.24
	181	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.52(5H, m), 7.61(2H, m), 7.82~7.97(12H, m), 8.12~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.93(4H, m)	738.99	738.27
	183	δ = 0.66(6H, s), 2.34(12H, s), 7.31~7.33(3H, m), 7.41(1H, m), 7.51~7.52(5H, m), 7.6~7.61(6H, m), 7.89(1H, m), 7.97(1H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	594.86	594.27
	187	δ = 0.66(6H, s), 7.33(1H, m), 7.52~7.55(7H, m), 7.61(5H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(7H, m), 8.23(1H, s), 8.25(1H, s), 8.42(3H, m), 8.55(3H, m)	688.93	688.26
	191	δ = 0.66(6H, s), 2.34(12H, s), 7.31~7.33(3H, m), 7.52~7.61(10H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	644.92	644.29

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(continued)

	compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
			found	calculated
5	196	δ = 0.66(6H, s), 7.33(1H, m), 7.41(2H, m), 7.51~7.52(9H, m), 7.58~7.61(5H, m), 7.73(1H, m), 7.89~8(5H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	588.81	588.23
10	197	δ = 0.66(6H, s), 7.33(1H, m), 7.52~7.61(12H, m), 7.73(1H, m), 7.89~8.13(10H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	688.93	688.26
	201	δ = 0.66(6H, s), 7.33(1H, m), 7.52(1H, m), 7.58~7.61(5H, m), 7.73(1H, m), 7.82~8(15H, m), 8.12~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.93(4H, m)	789.05	788.29
15	206	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.41(5H, m), 7.51~7.55(10H, m), 7.61~7.63(3H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	654.91	654.27
20	207	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.55(6H, m), 7.61~7.63(5H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	755.03	754.31
	208	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(11H, m), 7.73~7.77(3H, m), 7.87~8(10H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	755.03	754.31
25	214	δ = 0.66(6H, s), 1.72(6H, s), 2.34(12H, s), 7.28~7.38(5H, m), 7.52~7.63(9H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	711.02	710.34
30	216	δ = 0.66(6H, s), 1.35(18H, s), 7.33~7.41(10H, m), 7.51~7.52(5H, m), 7.61(2H, m), 7.89(1H, m), 7.97(1H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	650.96	650.34
	219	δ = 0.66(6H, s), 7.25(8H, m), 7.33(1H, m), 7.41(3H, m), 7.51~7.52(13H, m), 7.61(2H, m), 7.89(1H, m), 7.97(1H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	690.94	690.27
35	223	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.38(5H, m), 7.52~7.55(5H, m), 7.61~7.63(5H, m), 7.77(2H, m), 7.87~7.97(6H, m), 8.04~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	821.13	820.35
40	225	δ = 0.66(6H, s), 1.35(18H, s), 7.33~7.38(9H, m), 7.52(1H, m), 7.58~7.61(5H, m), 7.73(1H, m), 7.89~8(5H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	701.02	700.35
	230	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(7H, m), 7.77~7.8(5H, m), 7.87~7.97(8H, m), 8.1~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(4H, m)	903.19	902.34
45	235	δ = 0.66(6H, s), 7.25(8H, m), 7.33(1H, m), 7.41(1H, m), 7.51~7.52(5H, m), 7.58~7.61(8H, m), 7.73(2H, m), 7.89~8(8H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	791.06	790.31
50	240	δ = 0.66(6H, s), 7.33(1H, m), 7.48~7.61(18H, m), 7.7(2H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(7H, m), 8.23(1H, s), 8.25(1H, s), 8.42(3H, m), 8.55(3H, m)	841.12	840.32
	245	δ = 0.66(6H, s), 7.33(1H, m), 7.48~7.61(18H, m), 7.7~7.73(5H, m), 7.89~8(11H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	841.12	840.32
55	246	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.55(2H, m), 7.61~7.63(3H, m), 7.77~7.97(13H, m), 8.04(2H, m), 8.12~8.18(17H, m), 8.23(1H, s), 8.25(1H, s), 8.93(4H, m), 9.15(2H, m)	955.26	954.37

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(continued)

compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
		found	calculated
252	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.41(5H, m), 7.51~7.55(10H, m), 7.61~7.63(3H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	654.91	654.27
256	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.52(5H, m), 7.58~7.61(8H, m), 7.73(2H, m), 7.89~8(8H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	638.87	638.24
259	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.55(9H, m), 7.61(4H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	638.87	638.24
266	δ = 0.66(6H, s), 1.72(6H, s), 7.25~7.41(9H, m), 7.51~7.55(10H, m), 7.61~7.63(3H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	731.01	730.31
267	δ = 0.66(6H, s), 7.33(1H, m), 7.41(4H, m), 7.51~7.52(17H, m), 7.61~7.66(5H, m), 7.89(1H, m), 7.97(1H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	690.94	690.27
278	δ = 0.66(6H, s), 7.21(1H, m), 7.33(1H, m), 7.41(3H, m), 7.51~7.55(11H, m), 7.61(3H, m), 7.76~7.79(5H, m), 7.89~7.97(3H, m), 8.04~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	741.00	740.29
286	δ = 0.66(6H, s), 7.25(4H, m), 7.33(1H, m), 7.41(1H, m), 7.51~7.55(9H, m), 7.61(4H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	714.97	714.27
287	δ = 0.66(6H, s), 7.33(1H, m), 7.41(3H, m), 7.51~7.52(13H, m), 7.58~7.66(8H, m), 7.73(1H, m), 7.89~8(5H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	741.00	740.29
300	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.41(5H, m), 7.48~7.63(16H, m), 7.7(1H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	731.01	730.31
307	δ = 0.66(6H, s), 7.25(4H, m), 7.33(1H, m), 7.41(2H, m), 7.51~7.52(9H, m), 7.58~7.61(5H, m), 7.73(1H, m), 7.89~8(5H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	664.91	664.26
312	δ = 0.66(6H, s), 7.33(1H, m), 7.41(2H, m), 7.51~7.55(11H, m), 7.61(3H, m), 7.79(2H, m), 7.89(1H, m), 7.97~8.13(6H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(3H, m)	714.97	714.27
320	δ = 0.66(6H, s), 7.33(1H, m), 7.41(2H, m), 7.51~7.52(9H, m), 7.58~7.61(7H, m), 7.73(3H, m), 7.89~8(7H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	714.97	714.27
326	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.41(5H, m), 7.51~7.55(10H, m), 7.61~7.63(5H, m), 7.77(3H, m), 7.87~7.97(6H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	847.17	846.37
332	δ = 0.66(6H, s), 7.33(1H, m), 7.41(2H, m), 7.48~7.61(17H, m), 7.7~7.73(2H, m), 7.89~8(5H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	664.91	664.26
333	δ = 0.66(6H, s), 1.35(9H, s), 7.33~7.41(6H, m), 7.51~7.55(7H, m), 7.61(3H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	644.92	644.29
343	δ = 0.66(6H, s), 7.33(1H, m), 7.41~7.52(8H, m), 7.58~7.61(8H, m), 7.73(2H, m), 7.85~8(10H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	714.97	714.27

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(continued)

compound	¹ H NMR(CDCI ₃ , 200 MHz)	MS/FAB	
		found	calculated
345	δ = 0.66(6H, s), 1.35(9H, s), 1.72(6H, s), 7.28~7.41(8H, m), 7.51~7.55(6H, m), 7.61~7.63(3H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	711.02	710.34
351	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.61(11H, m), 7.79~7.8(2H, m), 7.89~7.97(4H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(3H, m), 8.55(1H, m)	712.95	712.26
352	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.55(7H, m), 7.61(3H, m), 7.82~7.97(7H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m), 8.93(2H, m)	688.93	688.26
357	δ = 0.66(6H, s), 7.33(1H, m), 7.52~7.61(10H, m), 7.79~7.8(2H, m), 7.89~7.97(4H, m), 8.04~8.13(7H, m), 8.23(1H, s), 8.25(1H, s), 8.42(4H, m), 8.55(2H, m)	763.01	762.27
358	δ = 0.66(6H, s), 7.33(1H, m), 7.52~7.55(5H, m), 7.61(4H, m), 7.82~7.97(7H, m), 8.04~8.13(7H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m), 8.93(2H, m)	738.99	738.27
359	δ = 0.66(6H, s), 7.25(4H, m), 7.33(1H, m), 7.41(1H, m), 7.51~7.55(9H, m), 7.61(4H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	714.97	714.27
364	δ = 0.66(6H, s), 7.33(1H, m), 7.52~7.61(9H, m), 7.73(1H, m), 7.82(2H, m), 7.89(1H, m), 7.92~8(10H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m), 8.93(2H, m)	738.99	738.27
366	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(11H, m), 7.73~7.77(2H, m), 7.87(1H, m), 7.89~7.97(9H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	755.03	754.31
368	δ = 0.66(6H, s), 7.33(1H, m), 7.41(2H, m), 7.51~7.66(20H, m), 7.73(1H, m), 7.89~8.13(8H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	791.06	790.31
371	δ = 0.66(6H, s), 1.72(6H, s), 7.25~7.41(8H, m), 7.51~7.55(8H, m), 7.61~7.63(4H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.04~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	781.07	780.32
373	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.8(3H, m), 7.52~7.63(11H, m), 7.73~7.77(2H, m), 7.87(1H, m), 7.89~7.97(9H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	755.03	754.31
374	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.38(5H, m), 7.52~7.55(5H, m), 7.61~7.63(5H, m), 7.77(2H, m), 7.87~7.97(6H, m), 8.04~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	821.13	820.35
376	δ = 0.66(6H, s), 7.25(4H, m), 7.33(1H, m), 7.41(1H, m), 7.51~7.61(13H, m), 7.73(1H, m), 7.89~8.13(8H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	714.97	714.27
381	δ = 0.66(6H, s), 7.25(4H, m), 7.33(1H, m), 7.52~7.55(7H, m), 7.61(5H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(7H, m), 8.23(1H, s), 8.25(1H, s), 8.42(3H, m), 8.55(3H, m)	765.02	764.29
388	δ = 0.66(6H, s), 7.25(4H, m), 7.33(1H, m), 7.52~7.61(12H, m), 7.73(2H, m), 7.89~8.13(11H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	765.02	764.29

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(continued)

compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
		found	calculated
397	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.38(5H, m), 7.48~7.63(13H, m), 7.7(1H, m), 7.77(2H, m), 7.87~7.97(6H, m), 8.04~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	897.23	896.38
403	δ = 0.66(6H, s), 1.35(9H, s), 7.33~7.38(5H, m), 7.52~7.55(5H, m), 7.61(4H, m), 7.89(1H, m), 7.97(1H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	694.98	694.31
406	δ = 0.66(6H, s), 1.72(6H, s), 2.34(6H, s), 7.28~7.38(4H, m), 7.52~7.63(10H, m), 7.77(1H, m), 7.87~7.97(4H, m), 8.04~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	733.02	732.32
408	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(11H, m), 7.73~7.77(3H, m), 7.87~8(10H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	755.03	754.31
409	δ = 0.66(6H, s), 7.33(1H, m), 7.52(1H, m), 7.58~7.61(8H, m), 7.73(2H, m), 7.82~8(13H, m), 8.12~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m)	738.99	738.27
412	δ = 0.66(6H, s), 7.33(1H, m), 7.52~7.61(10H, m), 7.73~7.8(3H, m), 7.89(1H, m), 7.9(1H, m), 7.92~8(10H, m), 8.23(1H, s), 8.25(1H, s), 8.42(3H, m), 8.55(1H, m)		762.27
416	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(9H, m), 7.77~7.8(3H, m), 7.87~7.97(6H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(3H, m), 8.55(1H, m)	829.11	828.32
417	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(8H, m), 7.73(1H, m), 7.77(1H, m), 7.82~7.89(12H, m), 8.12~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m)	805.09	804.32
422	δ = 0.66(6H, s), 1.72(6H, s), 7.25~7.38(7H, m), 7.52~7.63(11H, m), 7.73~7.77(2H, m), 7.87(1H, m), 7.89~7.97(9H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	831.12	830.34
424	δ = 0.66(6H, s), 1.72(6H, s), 7.25~7.38(7H, m), 7.52~7.63(11H, m), 7.73~7.77(3H, m), 7.87~8(10H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	831.12	830.34
427	δ = 0.66(6H, s), 1.72(12H, s), 7.25~7.41(10H, m), 7.51~7.55(7H, m), 7.61~7.63(4H, m), 7.77(2H, m), 7.87~7.97(6H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	847.17	846.37
430	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.38(5H, m), 7.52~7.55(3H, m), 7.61~7.63(4H, m), 7.77~7.97(13H, m), 8.12~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m)	871.19	870.37
431	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(11H, m), 7.73~7.77(3H, m), 7.87~8(10H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	755.03	754.31
432	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(11H, m), 7.73~7.77(2H, m), 7.87(1H, m), 7.89~7.97(9H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	755.03	754.31
434	δ = 0.66(6H, s), 1.72(6H, s), 7.28~7.38(3H, m), 7.52~7.63(8H, m), 7.73(1H, m), 7.77(1H, m), 7.82~7.89(12H, m), 8.12~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m)	805.09	804.32

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(continued)

	compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
			found	calculated
5	438	δ = 0.66(6H, s), 7.35(1H, m), 7.41(2H, m), 7.51~7.55(12H, m), 7.61(3H, m), 7.82(1H, m), 7.95~7.97(2H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	714.97	714.27
10	441	δ = 0.66(6H, s), 7.35(1H, m), 7.41(2H, m), 7.51~7.52(8H, m), 7.58~7.61(7H, m), 7.73(2H, m), 7.82(1H, m), 7.92~8(8H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	714.97	714.27
15	445	δ = 0.66(6H, s), 7.35(1H, m), 7.55(8H, m), 7.61(5H, m), 7.82(1H, m), 7.95~7.97(2H, m), 8.04~8.13(9H, m), 8.23(1H, s), 8.25(1H, s), 8.42(4H, m), 8.55(4H, m)	815.08	814.31
20	454	δ = 0.66(6H, s), 1.35(18H, s), 7.35~7.41(11H, m), 7.51~7.52(8H, m), 7.61(1H, m), 7.82(1H, m), 7.95~7.97(2H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	727.06	726.37
25	457	δ = 0.66(6H, s), 1.72(12H, s), 7.28(2H, m), 7.35~7.41(5H, m), 7.51~7.55(10H, m), 7.61~7.63(3H, m), 7.77~7.97(9H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	847.17	846.37
30	460	δ = 0.66(6H, s), 1.35(18H, s), 7.35~7.38(9H, m), 7.55(4H, m), 7.61(3H, m), 7.82(1H, m), 7.95~7.97(2H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	817.18	816.40
35	462	δ = 0.66(6H, s), 1.72(12H, s), 7.28(2H, m), 7.35~7.38(3H, m), 7.55(6H, m), 7.61~7.63(5H, m), 7.77~7.97(9H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	947.28	946.40
40	474	δ = 0.66(6H, s), 1.72(6H, s), 7.28(1H, m), 7.35~7.41(5H, m), 7.51~7.55(13H, m), 7.61~7.63(2H, m), 7.77~7.97(6H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	731.01	730.31
45	479	δ = 0.66(6H, s), 7.35(1H, m), 7.41(1H, m), 7.51~7.52(4H, m), 7.58~7.61(7H, m), 7.73(2H, m), 7.82~8(14H, m), 8.12~8.13(3H, m), 8.23(1H, s), 8.25(1H, s), 8.93(2H, m)	815.08	814.31
50	480	δ = 0.66(6H, s), 1.72(6H, s), 7.28(1H, m), 7.35~7.41(3H, m), 7.51~7.63(13H, m), 7.73(2H, m), 7.77~7.92(12H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	831.12	830.34
55	483	δ = 0.66(6H, s), 7.35(1H, m), 7.41(1H, m), 7.51~7.55(10H, m), 7.61(4H, m), 7.82(1H, m), 7.95~7.97(2H, m), 8.04~8.13(7H, m), 8.23(1H, s), 8.25(1H, s), 8.42(3H, m), 8.55(3H, m)	765.02	764.29
	487	δ = 0.66(6H, s), 7.35(1H, m), 7.41(2H, m), 7.51~7.55(10H, m), 7.61(2H, m), 7.82~7.97(8H, m), 8.04~8.13(5H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m), 8.93(2H, m)	765.02	764.29
	488	δ = 0.66(6H, s), 1.72(12H, s), 7.28(2H, m), 7.35~7.41(4H, m), 7.51~7.63(12H, m), 7.73(1H, m), 7.77~7.92(12H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s)	897.23	896.38
	493	δ = 0.66(6H, s), 7.41(1H, m), 7.51~7.66(14H, m), 7.73(2H, m), 7.92~8(7H, m), 8.08~8.14(3H, m), 8.23(1H, s), 8.25(1H, s), 8.55(1H, m)	688.93	688.26
	495	δ = 0.66(6H, s), 7.41(1H, m), 7.51~7.55(6H, m), 7.61~7.66(2H, m), 7.82~7.97(11H, m), 8.08~8.14(7H, m), 8.23(1H, s), 8.25(1H, s), 8.55(1H, m), 8.93(4H, m)	789.05	788.29
	500	δ = 0.66(6H, s), 7.33~7.41(5H, m), 7.51~7.52(9H, m), 7.61(1H, m), 7.73(1H, m), 7.89~7.97(4H, m)	462.66	462.18

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(continued)

	compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
			found	calculated
5	501	δ = 0.66(6H, s), 7.33(1H, m), 7.41(3H, m), 7.51~7.52(13H, m), 7.61(2H, m), 7.73(1H, m), 7.89(1H, m), 7.97(2H, m), 8.13(1H, m)	538.75	538.21
	502	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52(1H, m), 7.58~7.61(7H, m), 7.73(3H, m), 7.89~8(10H, m)	562.77	562.21
10	503	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.52(5H, m), 7.58~7.61(8H, m), 7.73(3H, m), 7.89~8(9H, m), 8.13(1H, m)	638.87	638.24
	505	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.39(7H, m), 7.52~7.55(3H, m), 7.61~7.63(3H, m), 7.73~7.77(3H, m), 7.87~7.97(8H, m)	694.98	694.31
15	507	δ = 0.66(6H, s), 7.33(1H, m), 7.41(1H, m), 7.51~7.55(9H, m), 7.61(4H, m), 7.73(1H, m), 7.89(1H, m), 7.97(2H, m), 8.04~8.13(5H, m), 8.42(2H, m), 8.55(2H, m)	638.87	638.24
	509	δ = 0.66(6H, s), 7.33(1H, m), 7.52(1H, m), 7.58~7.61(11H, m), 7.73(4H, m), 7.89~8(12H, m), 8.13(1H, m)	688.93	688.26
20	514	δ = 0.66(6H, s), 1.72(12H, s), 7.28~7.38(5H, m), 7.52~7.55(5H, m), 7.61~7.63(5H, m), 7.73~7.77(3H, m), 7.87~7.97(7H, m), 8.04~8.13(3H, m), 8.42(1H, m), 8.55(1H, m)	821.13	820.35
25	519	δ = 0.66(6H, s), 7.39(2H, m), 7.55(2H, m), 7.66(1H, m), 7.82~7.93(12H, m), 8.08~8.14(6H, m), 8.23(1H, s), 8.25(1H, s), 8.55(1H, m), 8.93(4H, m)	712.95	712.26
	522	δ = 0.66(6H, s), 7.55~7.66(13H, m), 7.73(2H, m), 7.92~8.14(12H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(2H, m)	738.99	738.27
30	527	δ = 0.66(6H, s), 7.55~7.66(13H, m), 7.73(1H, m), 7.92~8.14(11H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(3H, m)	738.99	738.27
	534	δ = 0.66(6H, s), 7.39(2H, m), 7.55~7.59(8H, m), 7.73(2H, m), 7.91~7.92(4H, m), 8~8.08(7H, m), 8.23(1H, s), 8.24(1H, m), 8.25(1H, s)	612.83	612.23
35	535	δ = 0.66(6H, s), 7.55~7.61(12H, m), 7.73(3H, m), 7.92~8.13(14H, m), 8.23(1H, s), 8.24(1H, m), 8.25(1H, s)	738.99	738.27
	538	δ = 0.66(6H, s), 7.39(2H, m), 7.58~7.59(8H, m), 7.73(2H, m), 7.91~7.92(4H, m), 8~8.01(7H, m), 8.23(1H, s), 8.25(1H, s), 8.44(1H, m)	612.83	612.23
40	542	δ = 0.66(6H, s), 7.58~7.61(12H, m), 7.73(3H, m), 7.92~8.01(13H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s), 8.44(1H, m)	738.99	738.27
	544	δ = 0.66(6H, s), 1.72(12H, s), 7.28(2H, m), 7.38(2H, m), 7.55~7.63(10H, m), 7.73~7.77(3H, m), 7.87~8.01(11H, m), 8.13(1H, m), 8.23(1H, s), 8.25(1H, s), 8.44(1H, m)	871.19	870.37
45	545	δ = 0.66(6H, s), 7.39~7.41(4H, m), 7.51~7.52(8H, m), 7.59(2H, m), 7.71(1H, m), 7.91(2H, m), 8~8.01(3H, m), 8.07(1H, m), 8.44(1H, m)	512.71	512.20
	551	δ = 7.39(2H, m), 7.58~7.59(6H, m), 7.67(2H, m), 7.73~7.78(3H, m), 7.86(1H, m), 7.91(4H, s), 7.91~7.92(2H, m), 8(4H, m), 8.16(2H, m)	586.74	586.18
50	554	δ = 0.66(6H, s), 1.72(6H, s), 7.28(1H, m), 7.38~7.39(3H, m), 7.55~7.63(7H, m), 7.71~7.77(3H, m), 7.87~7.93(5H, m), 8~8.01(5H, m), 8.07(1H, m), 8.44(1H, m)	678.93	678.27
55	556	δ = 7.39(2H, m), 7.58~7.59(6H, m), 7.67(2H, m), 7.73~7.8(4H, m), 7.91(4H, s), 7.91~7.92(2H, m), 8(4H, m), 8.16(1H, m), 8.54(1H, m)	586.74	586.18

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(continued)

	compound	¹ H NMR(CDCI ₃ , 200 MHz)	MS/FAB	
			found	calculated
5	558	δ = 7.39(2H, m), 7.58~7.59(6H, m), 7.67(2H, m), 7.73(2H, m), 7.83(1H, m), 7.91(4H, s), 7.91~7.92(2H, m), 8~8.05(5H, m), 8.16(2H, m)	586.74	586.18
	559	δ = 7.32~7.39(4H, m), 7.58~7.59(6H, m), 7.66(1H, m), 7.73(2H, m), 7.89(1H, m), 7.91(4H, s), 7.91~7.92(2H, m), 8(4H, m)	520.62	520.18
10	560	δ = 7.32~7.39(5H, m), 7.58~7.59(6H, m), 7.66(1H, m), 7.73(2H, m), 7.89~7.92(6H, m), 8(4H, m)	520.62	520.18
	562	δ = 7.39~7.42(4H, m), 7.49(1H, m), 7.58~7.59(6H, m), 7.67(2H, m), 7.73(2H, m), 7.91~7.92(5H, m), 8(4H, m), 8.16(2H, m)	570.68	570.20
15	565	δ = 7.36~7.42(5H, m), 7.58~7.59(6H, m), 7.73~7.84(7H, m), 7.91~8(9H, m), 8.12(1H, m), 8.46(1H, s)	612.70	612.20
	569	δ = 7.36~7.43(6H, m), 7.58~7.59(6H, m), 7.73~7.84(7H, m), 7.91~7.92(4H, m), 8(4H, m), 8.12(1H, m), 8.2(1H, m)	612.70	612.20
20	570	δ = 7.25(1H, m), 7.33~7.39(3H, m), 7.45~7.5(3H, m), 7.58~7.59(8H, m), 7.73(2H, m), 7.91(4H, s), 7.91~8(7H, m), 8.55(1H, m)	595.73	595.23
	571	δ = 7.39~7.59(15H, m), 7.67(2H, m), 7.73(2H, m), 7.91(4H, s), 7.91~7.92(2H, m), 8(4H, m), 8.16(2H, m)	645.79	645.25
25	576	6 = 0.66(6H, s), 7.35~7.41(4H, m), 7.51~7.55(8H, m), 7.61(2H, m), 7.82(1H, m), 7.91~7.95(3H, m), 8.04~8.08(4H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	638.87	638.24
	579	δ = 0.66(6H, s), 7.35~7.41(4H, m), 7.51~7.52(4H, m), 7.58~7.59(6H, m), 7.73(2H, m), 7.82(1H, m), 7.91~8(9H, m), 8.23(1H, s), 8.25(1H, s)	638.87	638.24
30	583	δ = 0.66(6H, s), 7.35~7.39(3H, m), 7.55(6H, m), 7.61(3H, m), 7.82(1H, m), 7.91~7.95(3H, m), 8.04~8.08(6H, m), 8.23(1H, s), 8.25(1H, s), 8.42(3H, m), 8.55(3H, m)	688.93	688.26
	584	δ = 0.66(6H, s), 7.35~7.39(3H, m), 7.55~7.61(9H, m), 7.73(2H, m), 7.82(1H, m), 7.91~8.08(11H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	688.93	688.26
	588	δ = 0.66(6H, s), 7.35~7.39(3H, m), 7.58~7.59(9H, m), 7.73(3H, m), 7.82(1H, m), 7.91~8(12H, m), 8.23(1H, s), 8.25(1H, s)	688.93	688.26
40	589	6 = 0.66(6H, s), 7.35~7.39(3H, m), 7.58~7.59(3H, m), 7.73(1H, m), 7.82~8(17H, m), 8.12(4H, m), 8.23(1H, s), 8.25(1H, s), 8.93(4H, m)	789.05	788.29
	590	δ = 0.66(6H, s), 1.72(2H, s), 7.28(1H, m), 7.35~7.39(4H, m), 7.55(1H, m), 7.63(1H, m), 7.77~7.95(17H, m), 8.12(4H, m), 8.23(1H, s), 8.25(1H, s), 8.93(4H, m)	855.15	854.34
45	591	δ = 0.66(6H, s), 1.72(6H, s), 7.28(1H, m), 7.35~7.39(4H, m), 7.55~7.63(8H, m), 7.73(2H, m), 7.77~7.91(13H, m), 8.23(1H, s), 8.25(1H, s)	755.03	754.31
	592	δ = 0.66(6H, s), 1.35(18H, s), 7.35~7.41(12H, m), 7.51~7.52(4H, m), 7.82(1H, m), 7.91~7.95(3H, m), 8.23(1H, s), 8.25(1H, s)	650.96	650.34
50	593	δ = 0.66(6H, s), 1.72(6H, s), 7.28(1H, m), 7.35~7.39(4H, m), 7.55(5H, m), 7.61~7.63(3H, m), 7.77~7.95(7H, m), 8.04~8.08(4H, m), 8.23(1H, s), 8.25(1H, s), 8.42(2H, m), 8.55(2H, m)	755.03	754.31
55	598	δ = 0.66(6H, s), 1.35(18H, s), 7.35~7.39(11H, m), 7.55(2H, m), 7.61(1H, m), 7.82(1H, m), 7.91~7.95(3H, m), 8.04~8.08(2H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	701.02	700.35

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(continued)

	compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
			found	calculated
5	604	δ = 0.66(6H, s), 1.72(12H, s), 7.28(2H, m), 7.35~7.39(5H, m), 7.55~7.63(7H, m), 7.73(1H, m), 7.77~7.91 (13H, m), 8.23(1H, s), 8.25(1H, s)	821.13	820.35
10	606	δ = 0.66(6H, s), 1.35(18H, s), 1.72(6H, s), 7.28(1H, m), 7.35~7.39(12H, m), 7.55(1H, m), 7.63(1H, m), 7.77~7.95(7H, m), 8.23(1H, s), 8.25(1H, s)	767.12	766.40
	609	δ = 0.66(6H, s), 1.72(18H, s), 7.28(3H, m), 7.35~7.39(6H, m), 7.55(3H, m), 7.63(3H, m), 7.77~7.95(13H, m), 8.23(1H, s), 8.25(1H, s)	887.23	886.40
15	614	δ = 0.66(6H, s), 7.35~7.41(4H, m), 7.51~7.52(4H, m), 7.58~7.59(6H, m), 7.73(2H, m), 7.82(1H, m), 7.91~8(9H, m), 8.23(1H, s), 8.25(1H, s)	638.87	638.24
	618	δ = 0.66(6H, s), 1.72(6H, s), 7.28(1H, m), 7.35~7.41(5H, m), 7.51~7.63(9H, m), 7.73(1H, m), 7.77~7.91 (10H, m), 8.23(1H, s), 8.25(1H, s)	704.97	704.29
20	621	δ = 0.66(6H, s), 7.35~7.41(4H, m), 7.51~7.55(8H, m), 7.61 (2H, m), 7.82(1H, m), 7.91~7.95(3H, m), 8.04~8.08(4H, m), 8.23(1H, s), 8.25 (1H, s), 8.42(2H, m), 8.55(2H, m)	638.87	638.24
	625	δ = 0.66(6H, s), 7.35~7.41(4H, m), 7.51~7.55(6H, m), 7.61(1H, m), 7.82~7.95(9H, m), 8.04~8.12(4H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m), 8.93(2H, m)	688.93	688.26
25	630	δ = 0.66(6H, s), 7.35~7.41(4H, m), 7.51~7.61(8H, m), 7.79~7.82(3H, m), 7.9~7.96(5H, m), 8.04~8.1(4H, m), 8.23(1H, s), 8.25(1H, s), 8.42 (3H, m), 8.55(1H, m)	712.95	712.26
30	631	δ = 0.66(6H, s), 1.72(6H, s), 7.28(1H, m), 7.35~7.41(5H, m), 7.51~7.55 (7H, m), 7.61~7.63(2H, m), 7.77~7.95(7H, m), 8.04~8.08(2H, m), 8.23 (1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	704.97 s),	704.29
	632	δ = 0.66(6H, s), 7.25(4H, m), 7.35~7.41(5H, m), 7.51~7.55(10H, m), 7.61(1H, m), 7.82(1H, m), 7.91~7.95(3H, m), 8.04~8.08(2H, m), 8.23 (1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	664.91	664.29
35	633	δ = 0.66(6H, s), 7.35~7.41(6H, m), 7.51~7.55(14H, m), 7.61~7.66(4H, m), 7.82(1H, m), 7.91~7.95(3H, m), 8.04~8.08(2H, m), 8.23(1H, s), 8.25 (1H, s), 8.42(1H, m), 8.55(1H, m)	741.00	740.29
40	634	δ = 0.66(6H, s), 7.35~7.41(4H, m), 7.51~7.61(10H, m), 7.73(1H, m), 7.82(1H, m), 7.91~8.08(8H, m), 8.23(1H, s), 8.25(1H, s), 8.42(1H, m), 8.55(1H, m)	638.87	638.24
	635	δ = 0.66(6H, s), 6.63(8H, m), 6.81(4H, m), 7.2(8H, m), 7.33~7.39(3H, m), 7.52(1H, m), 7.61(1H, m), 7.89~7.91(3H, m), 8.16(1H, s), 8.18(1H, s)	644.88	644.26
45	639	δ = 0.66(6H, s), 6.63(8H, m), 6.81(4H, m), 7.2(8H, m), 7.33(1H, m), 7.41(1H, m), 7.51~7.52(5H, m), 7.61(2H, m), 7.89(1H, m), 7.97(1H, m), 8.13(1H, m), 8.16(1H, s), 8.18(1H, s)	720.97	720.30
50	643	δ = 0.66(6H, s), 6.63(8H, m), 6.81(4H, m), 7.2(8H, m), 7.33(1H, m), 7.52(1H, m), 7.58~7.61(5H, m), 7.73(1H, m), 7.89~8(5H, m), 8.13(1H, m), 8.16(1H, s), 8.18(1H, s)	771.03	770.31
	647	δ = 0.66(6H, s), 6.63(8H, m), 6.81(4H, m), 7.2(8H, m), 7.35(1H, m), 7.41(2H, m), 7.51~7.52(8H, m), 7.61(1H, m), 7.82(1H, m), 7.95~7.97 (2H, m), 8.13(1H, m), 8.16(1H, s), 8.18(1H, s)	797.07	796.33
55	656	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52(1H, m), 7.58~7.61(7H, m), 7.71~7.73(3H, m), 7.89~7.92(5H, m), 8(4H, m), 8.07(1H, m)	562.77	562.21

(continued)

compound	¹ H NMR(CDCl ₃ , 200 MHz)	MS/FAB	
		found	calculated
657	δ = 0.66(6H, s), 7.33~7.39(3H, m), 7.52(1H, m), 7.61(1H, m), 7.71(1H, m), 7.82~7.93(13H, m), 8.07~8.12(5H, m), 8.93(4H, m)	662.89	662.24
665	δ = 0.66(6H, s), 7.25(8H, m), 7.33~7.41(5H, m), 7.51~7.52(9H, m), 7.61(1H, m), 7.71(1H, m), 7.89~7.91(3H, m), 8.07(1H, m)	614.85	614.24

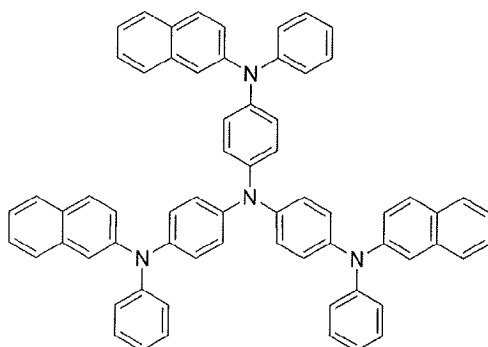
Example 1: Manufacture of OLED device using the organic electroluminescent compound according to the present invention

[0085] An OLED device was manufactured using the organic electroluminescent compound according to the present invention.

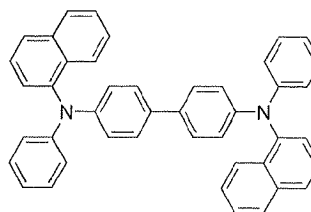
[0086] First, a transparent electrode ITO film (15 Ω/□) 2 prepared from a glass substrate for an OLED (Samsung Corning) 1 was subjected to ultrasonic washing sequentially using trichloroethylene, acetone, ethanol and distilled water, and stored in isopropanol for later use.

[0087] Next, the ITO substrate was mounted on a substrate holder of a vacuum deposition apparatus. After filling 4,4',4''-tris(N,N-(2-naphthyl)-phenylamino)triphenylamine (2-TNATA) of the following structure in a cell of the vacuum deposition apparatus, the pressure inside the chamber was reduced to 10⁻⁶ torr. Then, 2-TNATA was evaporated by applying electrical current to the cell. A hole injection layer 3 having a thickness of 60 nm was formed on the ITO substrate.

[0088] Subsequently, after filling *N,N'*-bis(α-naphthyl)-*N,N'*-diphenyl-4,4'-diamine (NPB) of the following structure in another cell of the vacuum deposition apparatus, NPB was evaporated by applying electrical current. A hole transport layer 4 having a thickness of 20 nm was formed on the hole injection layer.

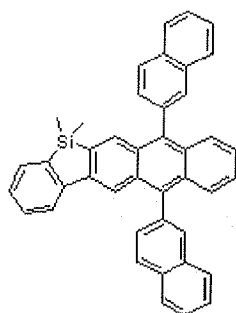


2-TNATA

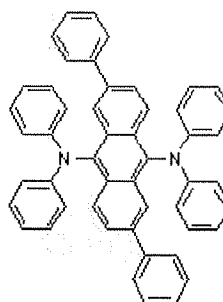


NPB

[0089] After forming the hole injection layer and the hole transport layer, an electroluminescent layer was formed thereon as follows. Compound 6 was filled in a cell of a vacuum deposition apparatus as a host, and Compound E was filled in another cell as a dopant. The two materials were evaporated at different speeds, so that an electroluminescent layer 5 having a thickness of 30 nm was formed on the hole transport layer at 2 to 5 wt% based on the host.

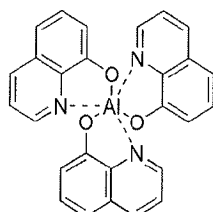


Compound 6

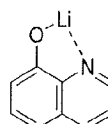


Compound E

[0090] Thereafter, tris(8-hydroxyquinoline)-aluminum(III) (Alq) of the following structure was deposited with a thickness of 20 nm as an electron transport layer 6. Then, lithium quinolate (Liq) of the following structure was deposited with a thickness of 1 to 2 nm as an electron injection layer 7. Then, an Al cathode 8 having a thickness of 150 nm was formed using another vacuum deposition apparatus to manufacture an OLED.



Alq

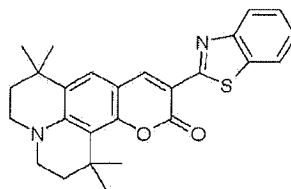


Liq

[0091] Each OLED electroluminescent material was purified by vacuum sublimation at 10^{-6} torr.

Comparative Example 1: Manufacture of OLED device using existing electroluminescent material

[0092] A hole injection layer 3 and a hole transport layer 4 were formed as in Example 1. Tris(8-hydroxyquinoline)-aluminum(III) (Alq) was filled in a cell of a vacuum deposition apparatus as an electroluminescent host material, and Coumarin 545T (C545T) of the following structure was filled in another cell. The two materials were doped by evaporating at different speeds. An electroluminescent layer having a thickness of 30 nm was formed on the hole transport layer. Preferred doping concentration is 1 to 3 wt% based on Alq.



C545T

[0093] Then, an electron transport layer 6 and an electron injection layer 7 were formed as in Example 1, and an Al cathode 8 having a thickness of 150 nm was formed using another vacuum deposition apparatus to manufacture an

OLED.

[0094] Luminous efficiency of the OLED devices manufactured in Example 1 and Comparative Example 1, which comprise the organic electroluminescent compounds according to the present invention and the existing electroluminescent compound respectively, was measured at 5,000 cd/m². The result is given in Table 2.

[Table 2]

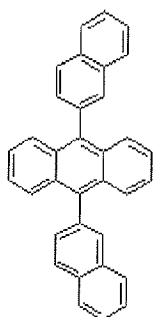
No.		Host	Dopant	Doing concentration (wt%)	Luminous efficiency (cd/A)	Color
					@5000cd/m ²	
Example 1	1	6	Compound E	3	18.5	green
	2	14	Compound E	3	18.9	green
	3	44	Compound E	3	12.5	green
	4	56	Compound E	3	19.8	green
	5	120	Compound E	3	18.2	green
	6	188	Compound E	3	18.5	green
	7	221	Compound E	3	18.3	green
	8	531	Compound E	3	18.7	green
	9	541	Compound E	3	18.8	green
	10	550	Compound E	3	19.1	green
	11	565	Compound E	3	18.9	green
	12	574	Compound E	3	19.1	green
	13	578	Compound E	3	19.3	green
	14	588	Compound E	3	19.3	green

15	592	Compound E	3	19.1	green
16	632	Compound E	3	19.4	green
17	634	Compound E	3	19.3	green
18	635	Compound E	3	17.9	green
19	636	Compound E	3	18.5	green
Comp. Ex. 1	Alq	C545T	1	10.3	green

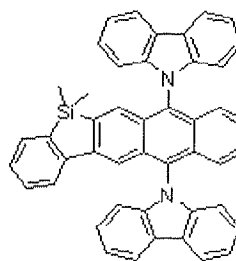
[0095] As seen in Table 2, when the compounds according to the present invention were used to manufacture green electroluminescent devices, luminous efficiency was significantly improved as compared to Comparative Example 1, while the color purity was maintained comparable or better.

Example 2: Manufacture of OLED device using the organic electroluminescent compound according to the present invention

[0096] A hole injection layer 3 and a hole transport layer 4 were formed as in Example 1, and an electroluminescent layer was formed thereupon as follows. Dinaphthylanthracene (DNA) of the following formula was filled in a cell of a vacuum deposition apparatus as a host, and Compound 43 was filled in another cell as a dopant. The two materials were doped by evaporating at different speed, at 2 to 5 wt% based on the host. An electroluminescent layer 5 having a thickness of 30 nm was formed on the hole transport layer.



DNA

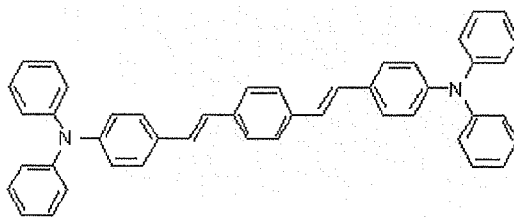


Compound 43

[0097] Subsequently, an electron transport layer and an electron injection layer were formed as in Example 1, and an Al cathode having a thickness of 150 nm was formed using another vacuum deposition apparatus to manufacture an OLED.

Comparative Example 2: Electroluminescence characteristics of OLED device manufactured using existing electroluminescent material

[0098] A hole injection layer and a hole transport layer were formed as in Example 1. Dinaphthylanthracene (DNA) was filled in a cell of a vacuum deposition apparatus as an electroluminescent host material, and Compound A, a blue electroluminescent material having the following structure, was filled in another cell. An electroluminescent layer having a thickness of 30 nm was formed on the hole transport layer at a deposition rate of 100:1.



Compound A

[0099] Subsequently, an electron transport layer and an electron injection layer were formed as in Example 1, and an Al cathode having a thickness of 150 nm was formed using another vacuum deposition apparatus to manufacture an OLED.

[0100] Luminous efficiency of the OLED devices manufactured in Example 2 and Comparative Example 2, which comprise the organic electroluminescent compounds according to the present invention and the existing electroluminescent compound respectively, was measured at 1,000 cd/m². The result is given in Table 3.

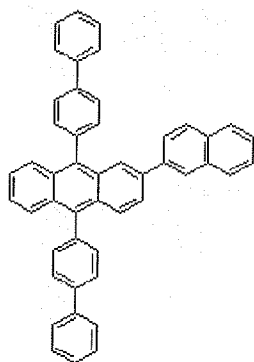
[Table 3]

No.		Host	Dopant	Doing concentration (wt%)	Luminous efficiency (cd/A)	Color
					@1000cd/m ²	
Example 2	1	DNA	Compound 43	3.0	3.1	blue
	2	DNA	Compound 638	3.0	7.1	blue
	3	DNA	Compound 642	3.0	7.2	blue
	4	DNA	Compound 650	3.0	6.5	blue
Comp. Ex. 2		DNA	Compound A	3.0	7.3	jade green

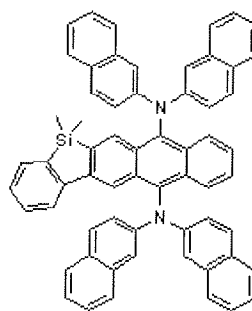
[0101] As seen in Table 3, when the compounds according to the present invention were used to manufacture blue electroluminescent devices, color purity was significantly improved as light blue to blue, as compared to jade green, and luminous efficiency was maintained comparable to or better than Comparative Example 2.

Example 3: Manufacture of OLED device using the organic electroluminescent compound according to the present invention

[0102] A hole injection layer 3 and a hole transport layer 4 were formed as in Example 1. 9,10-Di(biphenyl-4-yl)-2-(naphthalen-2-yl)anthracene (DBNA) was filled in a cell of a vacuum deposition apparatus as a host, and Compound 636 was filled in another cell as a dopant. The two materials were doped 2 to 5 wt% based on the host, by evaporating at different speed. An electroluminescent layer 5 having a thickness of 30 nm was formed on the hole transport layer.



DBNA



Compound 636

[0103] Subsequently, an electron transport layer 6 and an electron injection layer 7 were formed as in Example 1, and an Al cathode having a thickness of 150 nm was formed using another vacuum deposition apparatus to manufacture an OLED.

[0104] Luminous efficiency of the OLED devices manufactured in Example 3 and Comparative Example 1, which comprise the organic electroluminescent compounds according to the present invention and the existing electroluminescent compound respectively, was measured at 5,000 cd/m². The result is given in Table 4.

[Table 4]

No.		Host	Dopant	Doing concentration (wt%)	Luminous efficiency (cd/A)	Color
					@1000cd/m ²	
Example 3	1	DBNA	Compound 636	3	18.5	green
	2	DBNA	Compound 639	3	19.3	green
	3	DBNA	Compound 646	3	16.5	green
	4	DBNA	Compound 649	3	17.3	green
Comp. Ex. 1		Alq	C545T	1	10.3	green

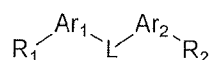
[0105] As seen in Table 4, when the compounds according to the present invention were used to manufacture green electroluminescent devices, luminous efficiency was significantly improved, and color purity was maintained comparable to or better than Comparative Example 1.

[0106] While the exemplary embodiments have been shown and described, it will be understood by those skilled in the art that various changes in form and details may be made thereto without departing from the spirit and scope of this disclosure as defined by the appended claims.

[0107] In addition, many modifications can be made to adapt a particular situation or material to the teachings of this disclosure without departing from the essential scope thereof. Therefore, it is intended that this disclosure not be limited to the particular exemplary embodiments disclosed as the best mode contemplated for carrying out this disclosure, but that this disclosure will include all embodiments falling within the scope of the appended claims.

Claims

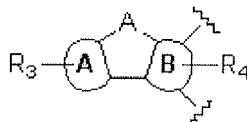
1. An organic electroluminescent compound represented by Chemical Formula 1:



(1)

In Chemical Formula 1,

L is a substituent represented by the following structural formula:



wherein

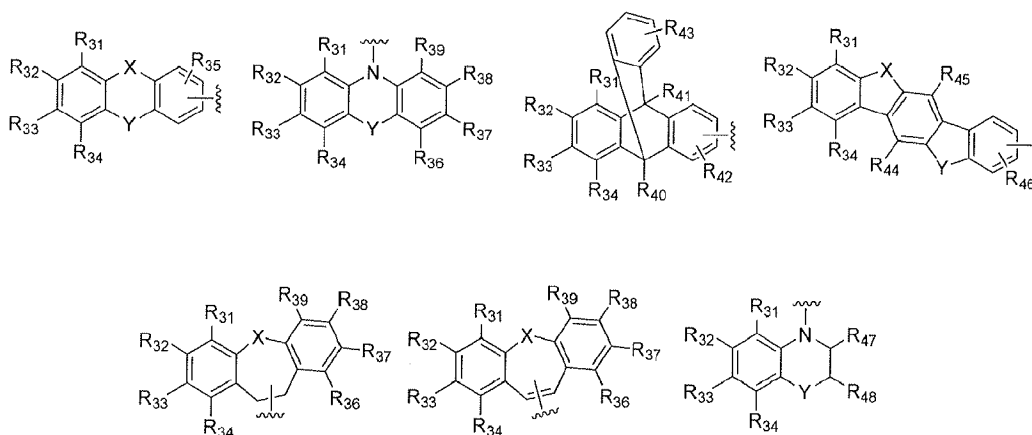
A represents -N(R₇₁)-, -S-, -O-, -Si(R₇₂)(R₇₃)-, -P(R₇₄)-, -C(=O)-, -B(R₇₅)-, -In(R₇₆)-, -Se-, -Ge(R₇₇)(R₇₈)-, -Sn(R₇₉)(R₈₀)- or -Ga(R₈₁)-;

ring A represents a monocyclic or polycyclic (C6-C60)aromatic ring;

ring B represents anthracene;

Ar₁ and Ar₂ independently represent a chemical bond, (C6-C60)arylene, (C3-C60)heteroarylene containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkylene containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkylene, (C2-C60)alkenylene, (C2-C60)alkynylene, (C1-C60)alkylenoxy, (C6-C60)arylenoxy or (C6-C60)arylenethio;

R₁ and R₂ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or a substituent selected from the following structures:



wherein

X and Y independently represent a chemical bond, -(CR₅₁R₅₂)_m-, N(R₅₃)-, -S-, -O-, -Si(R₅₄)(R₅₅)-, -P(R₅₆)-, -C(=O)-, -B(R₅₇)-, -In(R₅₈)-, -Se-, -Ge(R₅₉)(R₆₀)-, -Sn(R₆₁)(R₆₂)-, -Ga(R₆₃)- or -(R₆₄)C=C(R₆₅)-, excluding the case where both X and Y are chemical bonds at the same time;

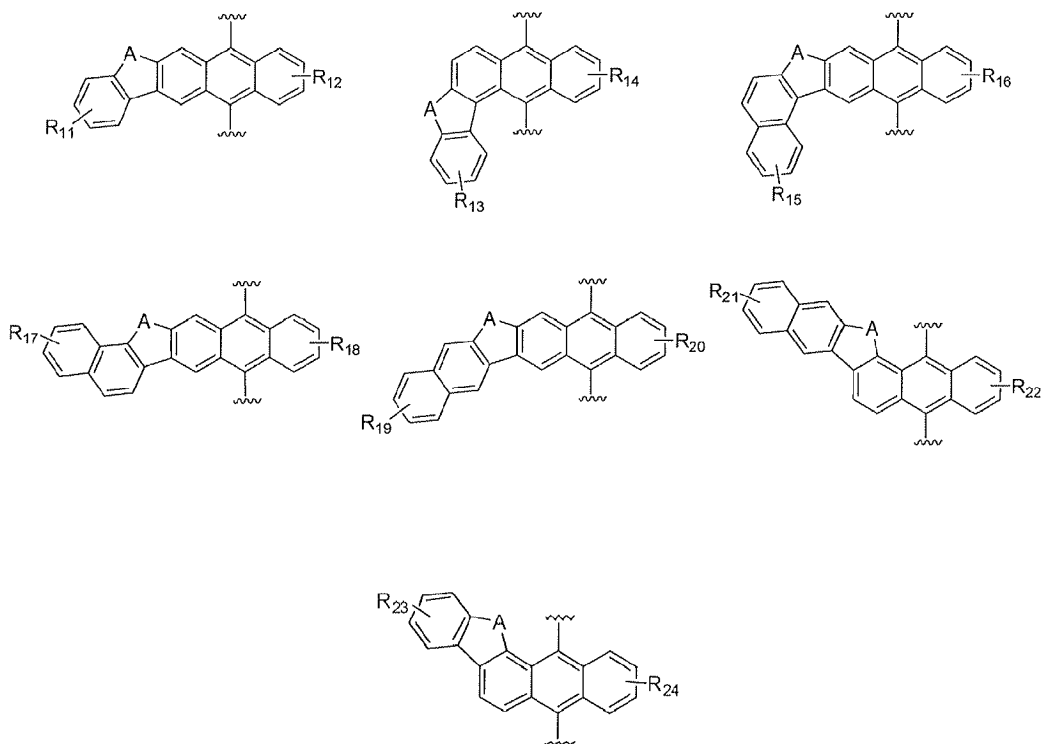
R₃, R₄ and R₃₁ through R₄₈ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)

cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or each of R₃₁ through R₄₃ may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

R₅₁ through R₆₅ and R₇₁ through R₈₁ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R₅₁ and R₅₂, R₅₄ and R₅₅, R₅₉ and R₆₀, R₆₁ and R₆₂, R₆₄ and R₆₅, R₇₂ and R₇₃, R₇₇ and R₇₈ and R₇₉ and R₈₀ may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

the arylene, heteroarylene, heterocycloalkylene, cycloalkylene or alkenylene of Ar₁ and Ar₂ or the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, alkenyl, alkynyl, amino, alkylamino or arylamino of R₁, R₂, R₃, R₄, R₃₁ through R₄₈, R₅₁ through R₆₅ and R₇₁ through R₈₁ may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl; and m represents an integer from 1 to 4.

2. The organic electroluminescent compound according to claim 1, wherein L is selected from the following structures:



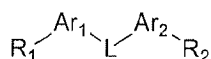
wherein

A is the same as defined in claim 1;

R₁₁ through R₂₄ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl; and the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, alkenyl, alkynyl, amino, alkylamino or arylamino of R₁₁ through R₂₄ may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl.

3. An organic electroluminescent device which comprises a first electrode; a second electrode; and at least one organic layer(s) interposed between the first electrode and the second electrode, wherein the organic layer comprises an organic electroluminescent compound(s) represented by

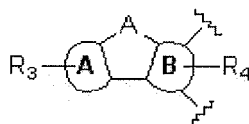
Chemical Formula 1:



(1)

In Chemical Formula 1,

L is a substituent represented by the following structural formula:



wherein

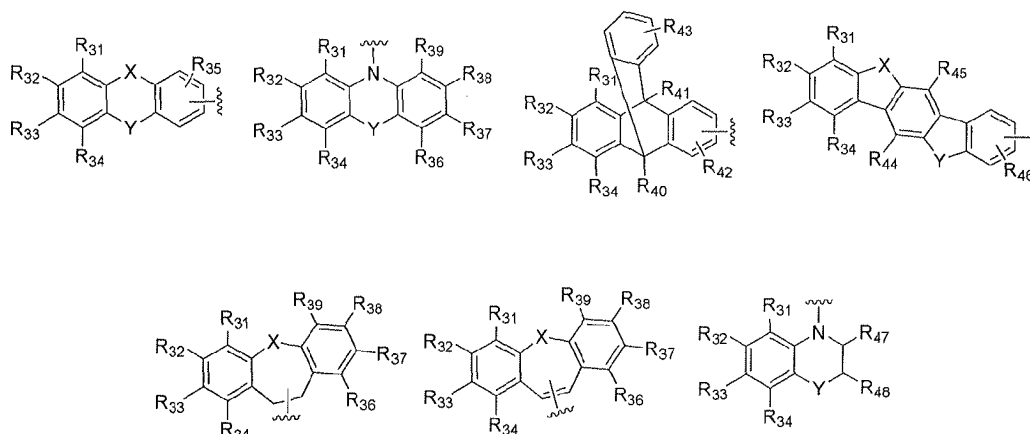
A represents -N(R₇₁)-, -S-, -O-, -Si(R₇₂)(R₇₃)-, -P(R₇₄)-, -C(=O)-, -B(R₇₅)-, -In(R₇₆)-, -Se-, -Ge(R₇₇)(R₇₈)-, -Sn(R₇₉)(R₈₀)- or -Ga(R₈₁)-;

ring A represents a monocyclic or polycyclic (C6-C60)aromatic ring;

ring B represents anthracene;

Ar₁ and Ar₂ independently represent a chemical bond, (C6-C60)arylene, (C3-C60)heteroarylene containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkylene containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkylene, (C2-C60)alkenylene, (C2-C60)alkynylene, (C1-C60)alkylenoxy, (C6-C60)arylenoxy or (C6-C60)arylenethio;

R₁ and R₂ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or a substituent selected from the following structures:



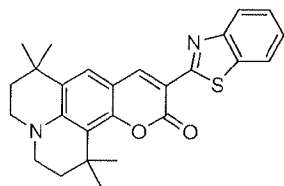
wherein

X and Y independently represent a chemical bond, $-(CR_{51}R_{52})_m-$, $-N(R_{53})-$, $-S-$, $-O-$, $-Si(R_{54})(R_{55})-$, $-P(R_{56})-$, $-C(=O)-$, $-B(R_{57})-$, $-In(R_{58})-$, $-Se-$, $-Ge(R_{59})(R_{60})-$, $-Sn(R_{61})(R_{62})-$, $-Ga(R_{63})-$ or $-(R_{64})C=C(R_{65})-$, excluding the case where both X and Y are chemical bonds at the same time;

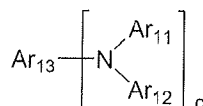
R₃, R₄ and R₃₁ through R₄₈ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or each of R₃₁ through R₄₃ may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

R₅₁ through R₆₅ and R₇₁ through R₈₁ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R₅₁ and R₅₂, R₅₄ and R₅₅, R₅₉ and R₆₀, R₆₁ and R₆₂, R₆₄ and R₆₅, R₇₂ and R₇₃, R₇₇ and R₇₈ and R₇₉ and R₈₀ may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

the arylene, heteroarylene, heterocycloalkylene, cycloalkylene or alkenylene of Ar₁ and Ar₂ or the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, alkenyl, alkynyl, amino, alkylamino or arylamino of R₁, R₂, R₃, R₄, R₃₁ through R₄₈, R₅₁ through R₆₅ and R₇₁ through R₈₁ may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl; and m represents an integer from 1 to 4 and one or more dopant(s) selected from the compounds represented by Chemical Formulas 2 to 4:



(2)

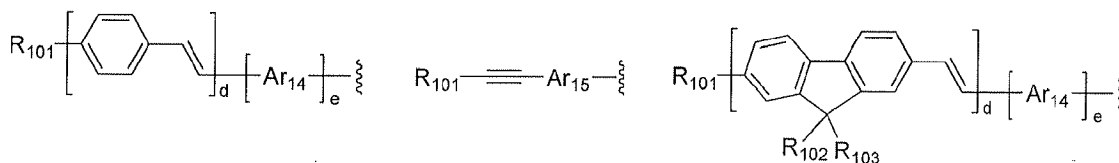


(3)

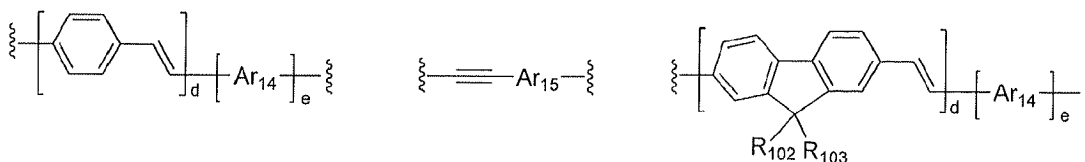
wherein

Ar_{11} and Ar_{12} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, mono- or di-(C6-C60)arylamino, mono- or di-(C1-C60)alkylamino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S or (C3-C60)cycloalkyl, or Ar_{11} and Ar_{12} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

Ar_{13} represents (C6-C60)aryl, (C4-C60)heteroaryl or aryl having one of the following structures, when c is 1:



Ar_{13} represents (C6-C60)arylene, (C4-C60)heteroarylene or aryene having one of the following structures, when c is 2:



wherein

Ar_{14} and Ar_{15} independently represent (C6-C60)arylene or (C4-C60)heteroarylene;

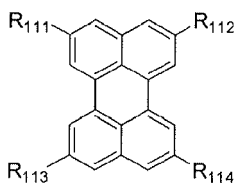
R_{101} through R_{103} independently represent hydrogen, deuterium, (C1-C60)alkyl or (C6-C60)aryl;

d represents an integer from 1 to 4;

e represents an integer 0 or 1;

the alkyl, aryl, heteroaryl, arylamino, alkylamino, cycloalkyl or heterocycloalkyl of Ar_{11} and Ar_{12} , the aryl, heteroaryl, aryene or heteroarylene of Ar_{13} , the aryene or heteroarylene of Ar_{14} and Ar_{15} , or the alkyl or aryl of R_{101} through R_{103} may be further substituted by one or more substituent(s) selected from halogen, deuterium, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, mono- or di-(C12-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C1-C60)alkyloxy, (C6-C60)arylthio, (C1-C60)alkylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl;

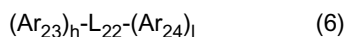
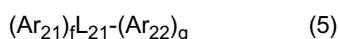
Chemical Formula 4



wherein

R₁₁₁ through R₁₁₄ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro or hydroxyl, or each of R₁₁₁ through R₁₁₄ may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring; and the alkyl, alkenyl, alkynyl, cycloalkyl, heterocycloalkyl, aryl, heteroaryl, arylsilyl, alkylsilyl, alkylamino or arylamino of R₁₁₁ through R₁₁₄, or the alicyclic ring or monocyclic or polycyclic aromatic ring formed as they are linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring may be further substituted by one or more substituent(s) selected from deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C4-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, (C1-C60)alkoxy, cyano, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, carboxyl, nitro and hydroxyl.

4. The organic electroluminescent device according to claim 3, which comprises a first electrode; a second electrode; and at least one organic layer(s) interposed between the first electrode and the second electrode, wherein the organic layer comprises one or more organic electroluminescent compound(s) according to claim 1 or 2 and one or more host(s) selected from the compounds represented by Chemical Formulas 5 and 6:



wherein

L₂₁ represents (C6-C60)arylene or (C4-C60)heteroarylene;

L₂₂ represents anthracenylene;

Ar₂₁ through Ar₂₄ independently represent hydrogen, (C1-C60)alkyl, (C1-C60)alkoxy, halogen, (C4-C60)heteroaryl, (C5-C60)cycloalkyl or (C6-C60)aryl, and the cycloalkyl, aryl or heteroaryl of Ar₂₁ through Ar₂₄ may be further substituted by one or more substituent(s) selected from a group consisting of (C6-C60)aryl or (C4-C60)heteroaryl with or without one or more substituent(s) selected from a group consisting of deuterium, (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, (C3-C60)cycloalkyl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl, (C1-C60)alkyl with or without halogen substituent(s), (C1-C60)alkoxy, (C3-C60)cycloalkyl, halogen, cyano, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl and tri(C6-C60)arylsilyl; and

f, g, h and i independently represent an integer from 0 to 4.

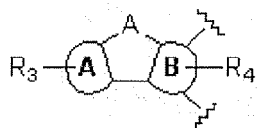
5. The organic electroluminescent device according to claim 3, wherein the organic layer comprises one or more compound(s) selected from a group consisting of arylamine compounds and styrylarylamine compounds.
6. The organic electroluminescent device according to claim 3, wherein the organic layer further comprises one or more metal(s) selected from a group consisting of organic metals of Group 1, Group 2, 4th period and 5th period transition metals, lanthanide metals and d-transition elements.

7. The organic electroluminescent device according to claim 3, wherein the organic layer comprises an electroluminescent layer and a charge generating layer.
8. A white electroluminescent device comprising the organic electroluminescent compound represented by Chemical Formula 1:



In Chemical Formula 1,

L is a substituent represented by the following structural formula:



wherein

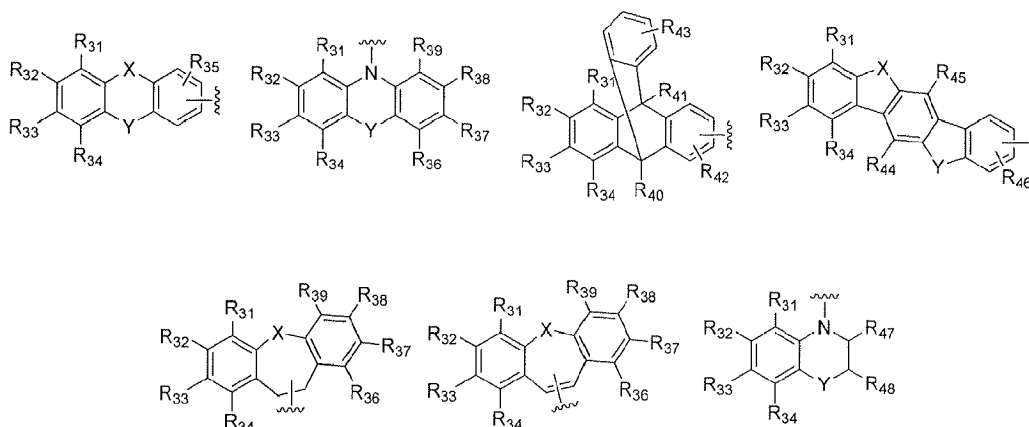
A represents -N(R₇₁)-, -S-, -O-, -Si(R₇₂)(R₇₃)-, -P(R₇₄)-, -C(=O)-, -B(R₇₅)-, -In(R₇₆)-, -Se-, -Ge(R₇₇)(R₇₈)-, -Sn(R₇₉)(R₈₀)- or -Ga(R₈₁)-;

ring A represents a monocyclic or polycyclic (C6-C60)aromatic ring;

ring B represents anthracene;

Ar₁ and Ar₂ independently represent a chemical bond, (C6-C60)arylene, (C3-C60)heteroarylene containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkylene containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkylene, (C2-C60)alkenylene, (C2-C60)alkynylene, (C1-C60)alkylenoxy, (C6-C60)arylenoxy or (C6-C60)arylenethio;

R₁ and R₂ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or a substituent selected from the following structures:



wherein

X and Y independently represent a chemical bond, -(CR₅₁R₅₂)_m-, -N(R₅₃)-, -S-, -O-, -Si(R₅₄)(R₆₅)-, -P(R₅₆)-, -C

(=O)-, -B(R₅₇)-, -In(R₅₈)-, -Se-, -Ge(R₅₉)(R₆₀)-, -Sn(R₆₁)(R₆₂)-, -Ga(R₆₃)- or -(R₆₄)C=C(R₆₅)-, excluding the case where both X and Y are chemical bonds at the same time;

R₃, R₄ and R₃₁ through R₄₈ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or each of R₃₁ through R₄₃ may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

R₅₁ through R₆₅ and R₇₁ through R₈₁ independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R₅₁ and R₅₂, R₅₄ and R₅₅, R₅₉ and R₆₀, R₆₁ and R₆₂, R₆₄ and R₆₅, R₇₂ and R₇₃, R₇₇ and R₇₈ and R₇₉ and R₈₀ may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

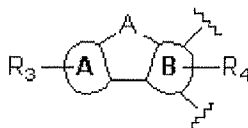
the arylene, heteroarylene, heterocycloalkylene, cycloalkylene or alkenylene of Ar₁ and Ar₂ or the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, alkenyl, alkynyl, amino, alkylamino or arylamino of R₁, R₂, R₃, R₄, R₃₁ through R₄₈, R₅₁ through R₆₅ and R₇₁ through R₈₁ may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl; and m represents an integer from 1 to 4.

9. An organic solar cell comprising the organic electroluminescent compound represented by Chemical Formula 1:



In Chemical Formula 1,

L is a substituent represented by the following structural formula:



wherein

A represents -N(R₇₁)-, -S-, -O-, -Si(R₇₂)(R₇₃)-, -P(R₇₄)-, -C(=O)-, -B(R₇₅)-, -In(R₇₆)-, -Se-, -Ge(R₇₇)(R₇₈)-, -Sn(R₇₉)(R₈₀)- or -Ga(R₈₁)-;

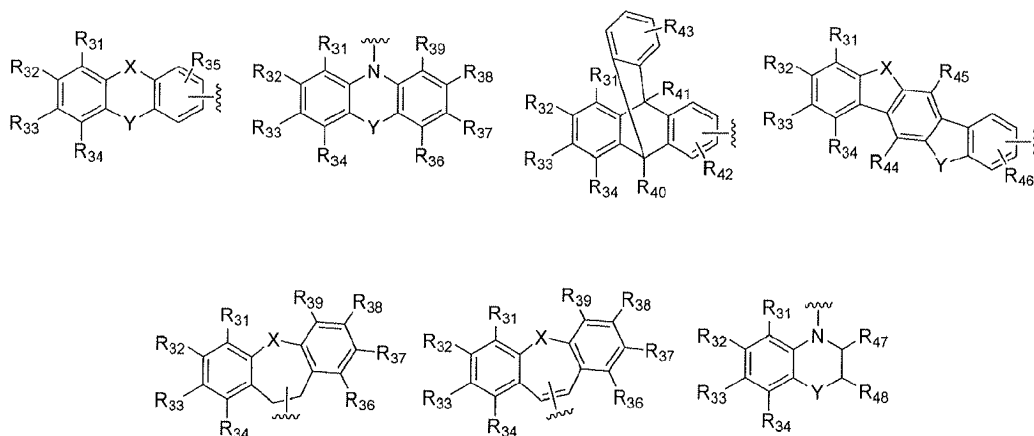
ring A represents a monocyclic or polycyclic (C6-C60)aromatic ring;

ring B represents anthracene;

Ar₁ and Ar₂ independently represent a chemical bond, (C6-C60)arylene, (C3-C60)heteroarylene containing one or more heteroatom(s) selected from N, O and S, 5- or 6-membered heterocycloalkylene containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkylene, (C2-C60)alkenylene, (C2-C60)alkynylene, (C1-

(C60)alkylenoxy, (C6-C60)arylenoxy or (C6-C60)arylenethio;

R_1 and R_2 independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or a substituent selected from the following structures:



wherein

X and Y independently represent a chemical bond, $-(CR_{51}R_{52})_m-$, $-N(R_{53})-$, $-S-$, $-O-$, $-Si(R_{54})(R_{55})-$, $-P(R_{56})-$, $-C(=O)-$, $-B(R_{57})-$, $-In(R_{58})-$, $-Se-$, $-Ge(R_{59})(R_{60})-$, $-Sn(R_{61})(R_{62})-$, $-Ga(R_{63})-$ or $-(R_{64})C=C(R_{65})-$, excluding the case where both X and Y are chemical bonds at the same time;

R_3 , R_4 and R_{31} through R_{48} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or each of R_{31} through R_{43} may be linked to an adjacent substituent via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

R_{51} through R_{65} and R_{71} through R_{81} independently represent hydrogen, deuterium, halogen, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro or hydroxyl, or R_{51} and R_{52} , R_{54} and R_{55} , R_{59} and R_{60} , R_{61} and R_{62} , R_{64} and R_{65} , R_{72} and R_{73} , R_{77} and R_{78} and R_{79} and R_{80} may be linked via (C3-C60)alkylene or (C3-C60)alkenylene with or without a fused ring to form an alicyclic ring or a monocyclic or polycyclic aromatic ring;

the arylene, heteroarylene, heterocycloalkylene, cycloalkylene or alkenylene of Ar_1 and Ar_2 or the alkyl, aryl, heteroaryl, heterocycloalkyl, cycloalkyl, trialkylsilyl, dialkylarylsilyl, triarylsilyl, adamantyl, alkenyl, alkynyl, amino, alkylamino or arylamino of R_1 , R_2 , R_3 , R_4 , R_{31} through R_{48} , R_{51} through R_{65} and R_{71} through R_{81} may be further substituted by one or more substituent(s) selected from deuterium, halogen, halo(C1-C60)alkyl, (C1-C60)alkyl, (C6-C60)aryl, (C3-C60)heteroaryl containing one or more heteroatom(s) selected from N, O and S, morpholino, thiomorpholino, 5- or 6-membered heterocycloalkyl containing one or more heteroatom(s) selected from N, O and S, (C3-C60)cycloalkyl, tri(C1-C60)alkylsilyl, di(C1-C60)alkyl(C6-C60)arylsilyl, tri(C6-C60)arylsilyl, adamantyl, (C7-C60)bicycloalkyl, (C2-C60)alkenyl, (C2-C60)alkynyl, cyano, amino, mono- or di-(C1-C60)alkylamino, mono- or

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di-(C6-C60)arylamino, (C6-C60)ar(C1-C60)alkyl, (C1-C60)alkyloxy, (C1-C60)alkylthio, (C6-C60)aryloxy, (C6-C60)arylthio, (C1-C60)alkoxycarbonyl, (C1-C60)alkylcarbonyl, (C6-C60)arylcarbonyl, carboxyl, nitro and hydroxyl; and m represents an integer from 1 to 4.

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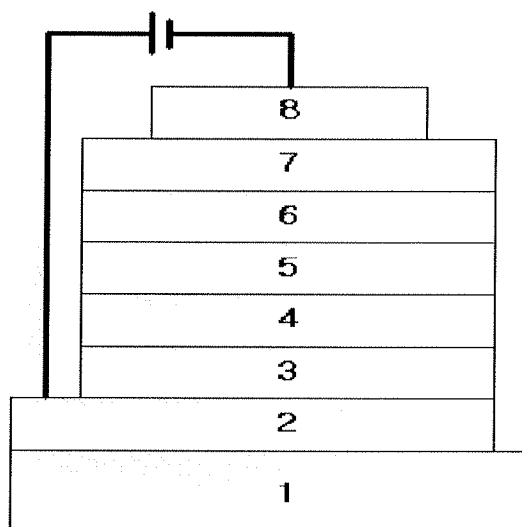
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FIG. 1





EUROPEAN SEARCH REPORT

Application Number
EP 09 15 6605

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
E	WO 2009/127307 A1 (MERCK PATENT GMBH [DE]; BUESING ARNE [DE]; HEIL HOLGER [DE]; STOESEL) 22 October 2009 (2009-10-22) * page 25 - page 37 * * page 43 - page 48 * * claims 1-14 *	1-8	INV. C09K11/06
X	EP 1 020 510 A1 (SANYO ELECTRIC CO [JP]) 19 July 2000 (2000-07-19) * page 4 - page 11 * * claims 1-9 *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			C09K
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		5 March 2010	Mehdaoui, Imed
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EPO FORM 1503 03.82 (P04C01)

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

EP 09 15 6605

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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05-03-2010

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Patent documents cited in the description

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专利名称(译)	新型机电致发光化合物和使用其的机电致发光器件		
公开(公告)号	EP2202283A1	公开(公告)日	2010-06-30
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申请(专利权)人(译)	GRACEL显示增量.		
当前申请(专利权)人(译)	GRACEL显示增量.		
[标]发明人	KIM CHI SIK SHIN HYO NIM CHO YOUNG JUN KWON HYUCK JOO KIM BONG OK KIM SUNG MIN YOON SEUNG SOO		
发明人	KIM, CHI-SIK SHIN, HYO NIM CHO, YOUNG JUN KWON, HYUCK JOO KIM, BONG OK KIM, SUNG MIN YOON, SEUNG SOO		
IPC分类号	C09K11/06		
CPC分类号	C09K11/06 C07F7/0807 C07F7/0812 C09B1/00 C09B3/78 C09B57/00 C09B57/008 C09B69/008 C09K2211/1007 C09K2211/1011 C09K2211/1029 C09K2211/1044 C09K2211/1059 C09K2211/1088 C09K2211/1092 C09K2211/1096 C09K2211/185 C09K2211/186 C09K2211/188 H01L51/0058 H01L51/ /0077 H01L51/0081 H01L51/0094 Y02E10/549		
优先权	1020080123276 2008-12-05 KR		
外部链接	Espacenet		

摘要(译)

本发明提供新型机电致发光化合物，以及包含其的机电致发光器件和有机太阳能电池。机电致发光化合物由化学式1表示：其中L是由以下结构式表示的取代基：环A表示单环或多环（C6-C60）芳环；和环B代表蒽。机电致发光化合物提供优异的发光效率和优异的材料色纯度和寿命特性。因此，它可以用于制造具有非常好的使用寿命的OLED。

