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(54) **HOST MATERIALS FOR ELECTROLUMINESCENT DEVICES**

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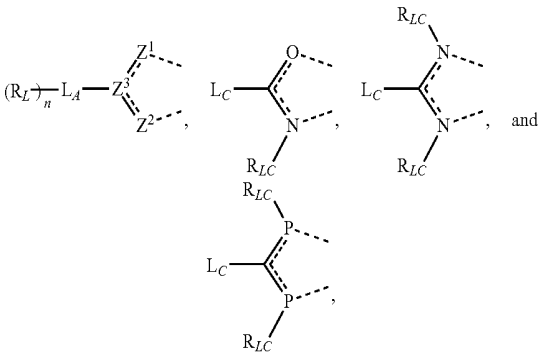
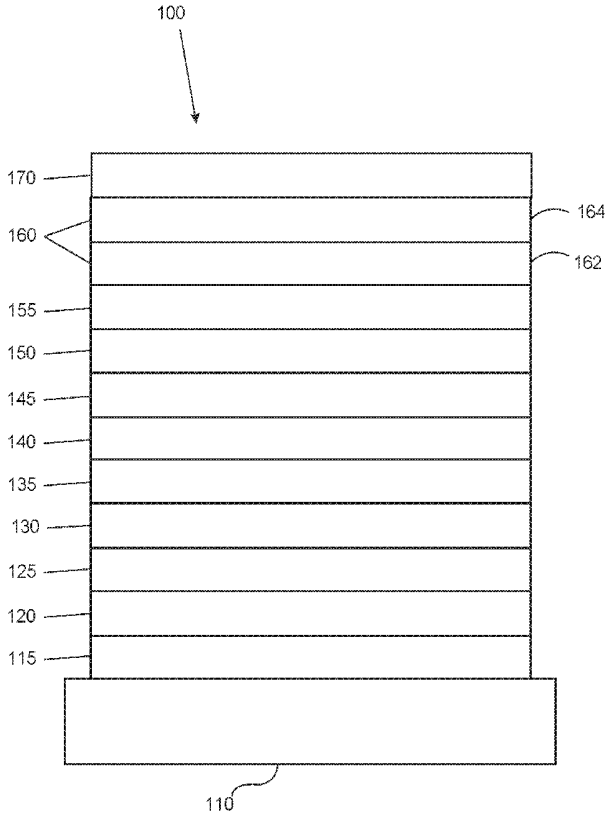
(57) **ABSTRACT**

A compound having a stoichiometry formula of BiL_3, where each L has a formula of



where each Z^1 and Z^2 is O, S, NR, or PR; Z^3 is C; Z^1, Z^2, the single dashed line represent a bond to Bi; and n is an integer. In these structures, L_A can be aryl or heteroaryl, which can be substituted. Substituents R_L, R, L_C, and R_{LC} can be selected from a variety of substituents. In the first formula, at least one of the following is true: (1) L_A includes a 5-membered ring; (2) L_A includes a condensed ring system of at least three rings; (3) at least one R_L is a non-fused aryl or heteroaryl moiety; or (4) n is at least 2 with two different R_L's and L_A-(R_L)n is assymmetrical. Organic light emitting devices, consumer products, formulations, and chemical structures containing the compounds are also disclosed.



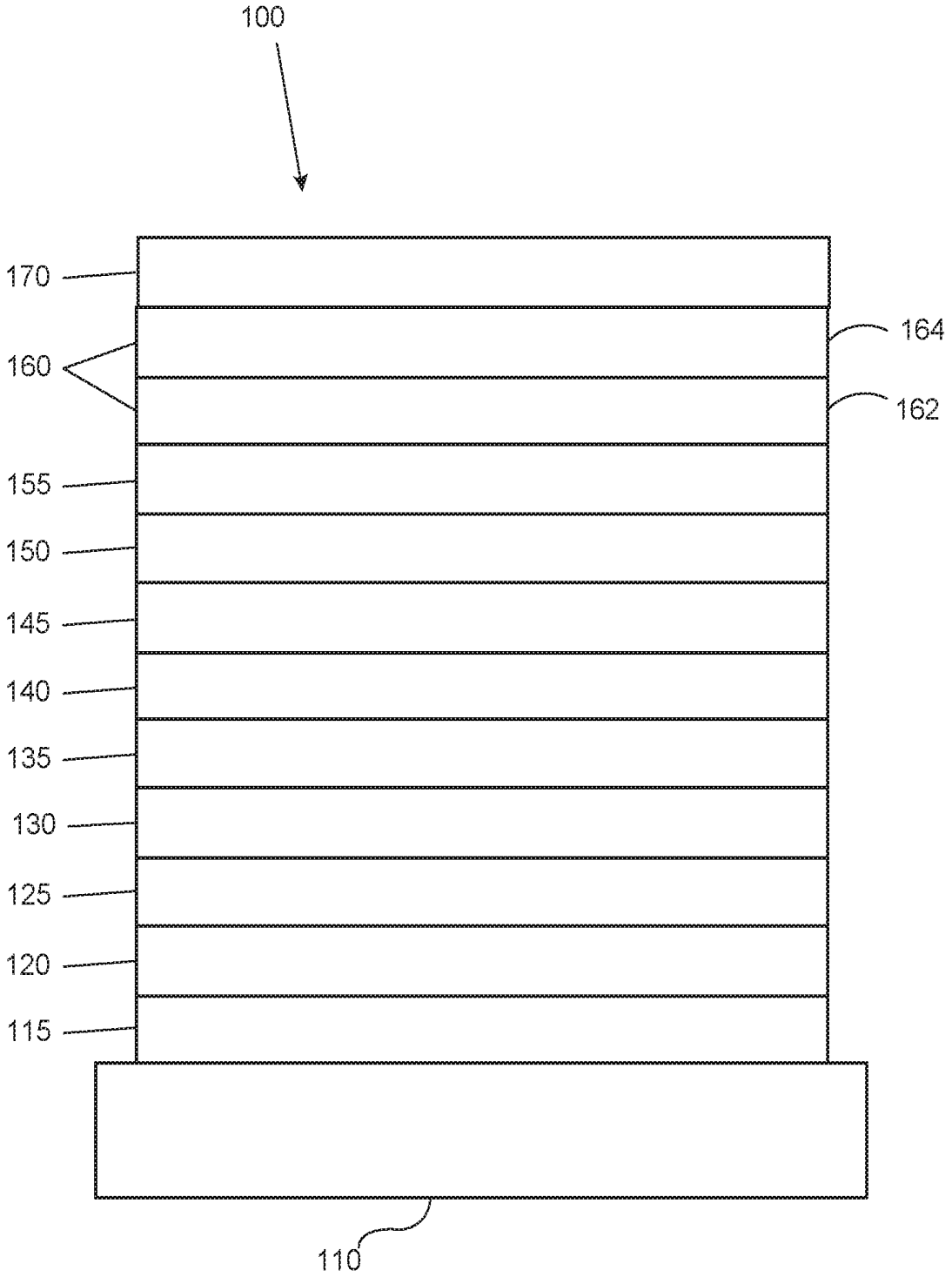


FIG. 1

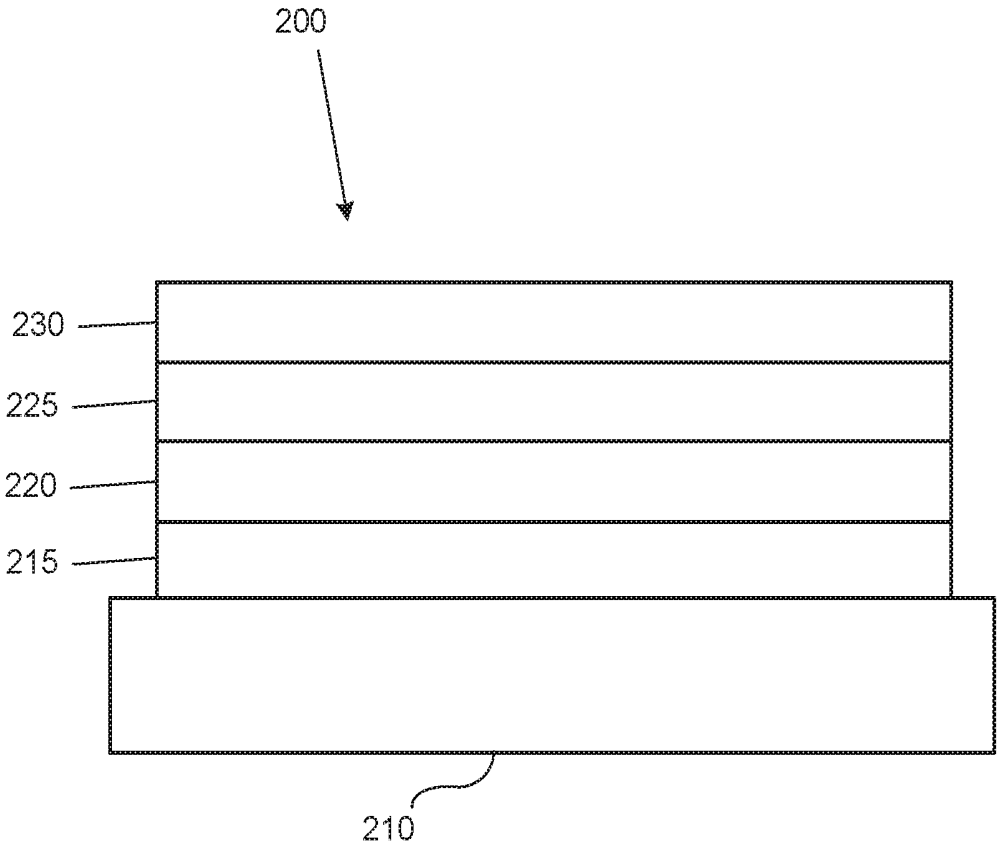


FIG. 2

HOST MATERIALS FOR ELECTROLUMINESCENT DEVICES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority under 35 U.S.C. § 119(e) to U.S. Provisional Application No. 62/677,911, filed May 30, 2018, the entire contents of which are incorporated herein by reference.

FIELD

[0002] The present invention relates to compounds for use as hosts and devices, such as organic light emitting diodes, including the same.

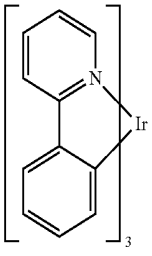
BACKGROUND

[0003] Opto-electronic devices that make use of organic materials are becoming increasingly desirable for a number of reasons. Many of the materials used to make such devices are relatively inexpensive, so organic opto-electronic devices have the potential for cost advantages over inorganic devices. In addition, the inherent properties of organic materials, such as their flexibility, may make them well suited for particular applications such as fabrication on a flexible substrate. Examples of organic opto-electronic devices include organic light emitting diodes/devices (OLEDs), organic phototransistors, organic photovoltaic cells, and organic photodetectors. For OLEDs, the organic materials may have performance advantages over conventional materials. For example, the wavelength at which an organic emissive layer emits light may generally be readily tuned with appropriate dopants.

[0004] OLEDs make use of thin organic films that emit light when voltage is applied across the device. OLEDs are becoming an increasingly interesting technology for use in applications such as flat panel displays, illumination, and backlighting. Several OLED materials and configurations are described in U.S. Pat. Nos. 5,844,363, 6,303,238, and 5,707,745, which are incorporated herein by reference in their entirety.

[0005] One application for phosphorescent emissive molecules is a full color display. Industry standards for such a display call for pixels adapted to emit particular colors, referred to as "saturated" colors. In particular, these standards call for saturated red, green, and blue pixels. Alternatively the OLED can be designed to emit white light. In conventional liquid crystal displays emission from a white backlight is filtered using absorption filters to produce red, green and blue emission. The same technique can also be used with OLEDs. The white OLED can be either a single EML device or a stack structure. Color may be measured using CIE coordinates, which are well known to the art.

[0006] One example of a green emissive molecule is tris(2-phenylpyridine) iridium, denoted $Ir(ppy)_3$, which has the following structure:



[0007] In this, and later figures herein, we depict the dative bond from nitrogen to metal (here, Ir) as a straight line.

[0008] As used herein, the term "organic" includes polymeric materials as well as small molecule organic materials that may be used to fabricate organic opto-electronic devices. "Small molecule" refers to any organic material that is not a polymer, and "small molecules" may actually be quite large. Small molecules may include repeat units in some circumstances. For example, using a long chain alkyl group as a substituent does not remove a molecule from the "small molecule" class. Small molecules may also be incorporated into polymers, for example as a pendent group on a polymer backbone or as a part of the backbone. Small molecules may also serve as the core moiety of a dendrimer, which consists of a series of chemical shells built on the core moiety. The core moiety of a dendrimer may be a fluorescent or phosphorescent small molecule emitter. A dendrimer may be a "small molecule," and it is believed that all dendrimers currently used in the field of OLEDs are small molecules.

[0009] As used herein, "top" means furthest away from the substrate, while "bottom" means closest to the substrate. Where a first layer is described as "disposed over" a second layer, the first layer is disposed further away from substrate. There may be other layers between the first and second layer, unless it is specified that the first layer is "in contact with" the second layer. For example, a cathode may be described as "disposed over" an anode, even though there are various organic layers in between.

[0010] As used herein, "solution processable" means capable of being dissolved, dispersed, or transported in and/or deposited from a liquid medium, either in solution or suspension form.

[0011] A ligand may be referred to as "photoactive" when it is believed that the ligand directly contributes to the photoactive properties of an emissive material. A ligand may be referred to as "ancillary" when it is believed that the ligand does not contribute to the photoactive properties of an emissive material, although an ancillary ligand may alter the properties of a photoactive ligand.

[0012] As used herein, and as would be generally understood by one skilled in the art, a first "Highest Occupied Molecular Orbital" (HOMO) or "Lowest Unoccupied Molecular Orbital" (LUMO) energy level is "greater than" or "higher than" a second HOMO or LUMO energy level if the first energy level is closer to the vacuum energy level. Since ionization potentials (IP) are measured as a negative energy relative to a vacuum level, a higher HOMO energy level corresponds to an IP having a smaller absolute value (an IP that is less negative). Similarly, a higher LUMO energy level corresponds to an electron affinity (EA) having a smaller absolute value (an EA that is less negative). On a conventional energy level diagram, with the vacuum level at the top, the LUMO energy level of a material is higher than the HOMO energy level of the same material. A "higher" HOMO or LUMO energy level appears closer to the top of such a diagram than a "lower" HOMO or LUMO energy level.

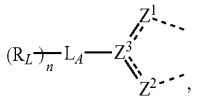
[0013] As used herein, and as would be generally understood by one skilled in the art, a first work function is "greater than" or "higher than" a second work function if the first work function has a higher absolute value. Because work functions are generally measured as negative numbers relative to vacuum level, this means that a "higher" work function is more negative. On a conventional energy level

diagram, with the vacuum level at the top, a "higher" work function is illustrated as further away from the vacuum level in the downward direction. Thus, the definitions of HOMO and LUMO energy levels follow a different convention than work functions.

[0014] More details on OLEDs, and the definitions described above, can be found in U.S. Pat. No. 7,279,704, which is incorporated herein by reference in its entirety.

SUMMARY

[0015] According to an aspect of the present disclosure, a compound having a stoichiometry formula of BiL_3, where Bi is Bi (III), L is mono-anionic bidentate ligand, and each L can be same or different is disclosed. In such embodiments, L has the formula



in which:

[0016] each Z^1 and Z^2 is independently selected from the group consisting of O, S, NR, and PR;

[0017] Z^3 is C;

[0018] Z^1 and Z^2 coordinate to Bi atom;

[0019] L_A is aryl or heteroaryl, which can be further substituted by one or more substituent R_L;

[0020] each R is independently hydrogen or a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, heteroaryl, and combinations thereof;

[0021] each R_L is independently a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, heteroaryl, and combinations thereof;

[0022] n is an integer from 0 to the maximum allowable substitutions; and

[0023] at least one of the following conditions is true:

[0024] (1) L_A comprises at least one 5-membered ring;

[0025] (2) L_A comprises a condensed ring system having at least three rings fused together;

[0026] (3) n is at least 1 and at least one R_L is a non-fused aryl or heteroaryl moiety; or

[0027] (4) n is at least 2 with two different R_L and the L_A-(R_L)n moiety is not symmetrical along the axis of Z^3 and the atom from L_A attaching to Z^3.

[0028] An OLED comprising the compound of the present disclosure in an organic layer therein is also disclosed.

[0029] A consumer product comprising the OLED is also disclosed.

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] FIG. **1** shows an organic light emitting device.

[0031] FIG. **2** shows an inverted organic light emitting device that does not have a separate electron transport layer.

DETAILED DESCRIPTION

[0032] Generally, an OLED comprises at least one organic layer disposed between and electrically connected to an anode and a cathode. When a current is applied, the anode injects holes and the cathode injects electrons into the organic layer(s). The injected holes and electrons each migrate toward the oppositely charged electrode. When an electron and hole localize on the same molecule, an "exciton," which is a localized electron-hole pair having an excited energy state, is formed. Light is emitted when the exciton relaxes via a photoemissive mechanism. In some cases, the exciton may be localized on an excimer or an exciplex. Non-radiative mechanisms, such as thermal relaxation, may also occur, but are generally considered undesirable.

[0033] The initial OLEDs used emissive molecules that emitted light from their singlet states ("fluorescence") as disclosed, for example, in U.S. Pat. No. 4,769,292, which is incorporated by reference in its entirety. Fluorescent emission generally occurs in a time frame of less than 10 nanoseconds.

[0034] More recently, OLEDs having emissive materials that emit light from triplet states ("phosphorescence") have been demonstrated. Baldo et al., "Highly Efficient Phosphorescent Emission from Organic Electroluminescent Devices," Nature, vol. 395, 151-154, 1998; ("Baldo-I") and Baldo et al., "Very high-efficiency green organic light-emitting devices based on electrophosphorescence," Appl. Phys. Lett., vol. 75, No. 3, 4-6 (1999) ("Baldo-II"), are incorporated by reference in their entireties. Phosphorescence is described in more detail in U.S. Pat. No. 7,279,704 at cols. 5-6, which are incorporated by reference.

[0035] FIG. **1** shows an organic light emitting device **100**. The figures are not necessarily drawn to scale. Device **100** may include a substrate **110**, an anode **115**, a hole injection layer **120**, a hole transport layer **125**, an electron blocking layer **130**, an emissive layer **135**, a hole blocking layer **140**, an electron transport layer **145**, an electron injection layer **150**, a protective layer **155**, a cathode **160**, and a barrier layer **170**. Cathode **160** is a compound cathode having a first conductive layer **162** and a second conductive layer **164**. Device **100** may be fabricated by depositing the layers described, in order. The properties and functions of these various layers, as well as example materials, are described in more detail in U.S. Pat. No. 7,279,704 at cols. 6-10, which are incorporated by reference.

[0036] More examples for each of these layers are available. For example, a flexible and transparent substrate-anode combination is disclosed in U.S. Pat. No. 5,844,363, which is incorporated by reference in its entirety. An example of a p-doped hole transport layer is m-MTDATA doped with F_4-TCNQ at a molar ratio of 50:1, as disclosed in U.S. Patent Application Publication No. 2003/0230980, which is incorporated by reference in its entirety. Examples of emissive and host materials are disclosed in U.S. Pat. No. 6,303,238 to Thompson et al., which is incorporated by reference in its entirety. An example of an n-doped electron transport layer is BPhen doped with Li at a molar ratio of 1:1, as disclosed in U.S. Patent Application Publication No. 2003/0230980, which is incorporated by reference in its entirety. U.S. Pat. Nos. 5,703,436 and 5,707,745, which are incorporated by reference in their entireties, disclose examples of cathodes including compound cathodes having a thin layer of metal such as Mg:Ag with an overlying transparent, electrically-conductive, sputter-deposited ITO layer. The theory and use of blocking layers is described in more detail in U.S. Pat. No. 6,097,147 and U.S. Patent Application Publication No. 2003/0230980, which are incorporated by reference in their entireties. Examples of injection layers are provided in U.S.

Patent Application Publication No. 2004/0174116, which is incorporated by reference in its entirety. A description of protective layers may be found in U.S. Patent Application Publication No. 2004/0174116, which is incorporated by reference in its entirety.

[0037] FIG. **2** shows an inverted OLED **200**. The device includes a substrate **210**, a cathode **215**, an emissive layer **220**, a hole transport layer **225**, and an anode **230**. Device **200** may be fabricated by depositing the layers described, in order. Because the most common OLED configuration has a cathode disposed over the anode, and device **200** has cathode **215** disposed under anode **230**, device **200** may be referred to as an "inverted" OLED. Materials similar to those described with respect to device **100** may be used in the corresponding layers of device **200**. FIG. **2** provides one example of how some layers may be omitted from the structure of device **100**.

[0038] The simple layered structure illustrated in FIGS. **1** and **2** is provided by way of non-limiting example, and it is understood that embodiments of the invention may be used in connection with a wide variety of other structures. The specific materials and structures described are exemplary in nature, and other materials and structures may be used. Functional OLEDs may be achieved by combining the various layers described in different ways, or layers may be omitted entirely, based on design, performance, and cost factors. Other layers not specifically described may also be included. Materials other than those specifically described may be used. Although many of the examples provided herein describe various layers as comprising a single material, it is understood that combinations of materials, such as a mixture of host and dopant, or more generally a mixture, may be used. Also, the layers may have various sublayers. The names given to the various layers herein are not intended to be strictly limiting. For example, in device **200**, hole transport layer **225** transports holes and injects holes into emissive layer **220**, and may be described as a hole transport layer or a hole injection layer. In one embodiment, an OLED may be described as having an "organic layer" disposed between a cathode and an anode. This organic layer may comprise a single layer, or may further comprise multiple layers of different organic materials as described, for example, with respect to FIGS. **1** and **2**.

[0039] Structures and materials not specifically described may also be used, such as OLEDs comprised of polymeric materials (PLEDs) such as disclosed in U.S. Pat. No. 5,247,190 to Friend et al., which is incorporated by reference in its entirety. By way of further example, OLEDs having a single organic layer may be used. OLEDs may be stacked, for example as described in U.S. Pat. No. 5,707,745 to Forrest et al, which is incorporated by reference in its entirety. The OLED structure may deviate from the simple layered structure illustrated in FIGS. **1** and **2**. For example, the substrate may include an angled reflective surface to improve outcoupling, such as a mesa structure as described in U.S. Pat. No. 6,091,195 to Forrest et al., and/or a pit structure as described in U.S. Pat. No. 5,834,893 to Bulovic et al., which are incorporated by reference in their entireties.

[0040] Unless otherwise specified, any of the layers of the various embodiments may be deposited by any suitable method. For the organic layers, preferred methods include thermal evaporation, ink-jet, such as described in U.S. Pat. Nos. 6,013,982 and 6,087,196, which are incorporated by reference in their entireties, organic vapor phase deposition (OVPD), such as described in U.S. Pat. No. 6,337,102 to Forrest et al., which is incorporated by reference in its entirety, and deposition by organic vapor jet printing (OVJP), such as described in U.S. Pat. No. 7,431,968, which is incorporated by reference in its entirety. Other suitable deposition methods include spin coating and other solution based processes. Solution based processes are preferably carried out in nitrogen or an inert atmosphere. For the other layers, preferred methods include thermal evaporation. Preferred patterning methods include deposition through a mask, cold welding such as described in U.S. Pat. Nos. 6,294,398 and 6,468,819, which are incorporated by reference in their entireties, and patterning associated with some of the deposition methods such as ink-jet and organic vapor jet printing (OVJP). Other methods may also be used. The materials to be deposited may be modified to make them compatible with a particular deposition method. For example, substituents such as alkyl and aryl groups, branched or unbranched, and preferably containing at least 3 carbons, may be used in small molecules to enhance their ability to undergo solution processing. Substituents having 20 carbons or more may be used, and 3-20 carbons is a preferred range. Materials with asymmetric structures may have better solution processability than those having symmetric structures, because asymmetric materials may have a lower tendency to recrystallize. Dendrimer substituents may be used to enhance the ability of small molecules to undergo solution processing.

[0041] Devices fabricated in accordance with embodiments of the present invention may further optionally comprise a barrier layer. One purpose of the barrier layer is to protect the electrodes and organic layers from damaging exposure to harmful species in the environment including moisture, vapor and/or gases, etc. The barrier layer may be deposited over, under or next to a substrate, an electrode, or over any other parts of a device including an edge. The barrier layer may comprise a single layer, or multiple layers. The barrier layer may be formed by various known chemical vapor deposition techniques and may include compositions having a single phase as well as compositions having multiple phases. Any suitable material or combination of materials may be used for the barrier layer. The barrier layer may incorporate an inorganic or an organic compound or both. The preferred barrier layer comprises a mixture of a polymeric material and a non-polymeric material as described in U.S. Pat. No. 7,968,146, PCT Pat. Application Nos. PCT/US2007/023098 and PCT/US2009/042829, which are herein incorporated by reference in their entireties. To be considered a "mixture", the aforesaid polymeric and non-polymeric materials comprising the barrier layer should be deposited under the same reaction conditions and/or at the same time. The weight ratio of polymeric to non-polymeric material may be in the range of 95:5 to 5:95. The polymeric material and the non-polymeric material may be created from the same precursor material. In one example, the mixture of a polymeric material and a non-polymeric material consists essentially of polymeric silicon and inorganic silicon.

[0042] Devices fabricated in accordance with embodiments of the invention can be incorporated into a wide variety of electronic component modules (or units) that can be incorporated into a variety of electronic products or intermediate components. Examples of such electronic products or intermediate components include display screens,

lighting devices such as discrete light source devices or lighting panels, etc. that can be utilized by the end-user product manufacturers. Such electronic component modules can optionally include the driving electronics and/or power source(s). Devices fabricated in accordance with embodiments of the invention can be incorporated into a wide variety of consumer products that have one or more of the electronic component modules (or units) incorporated therein. A consumer product comprising an OLED that includes the compound of the present disclosure in the organic layer in the OLED is disclosed. Such consumer products would include any kind of products that include one or more light source(s) and/or one or more of some type of visual displays. Some examples of such consumer products include flat panel displays, curved displays, computer monitors, medical monitors, televisions, billboards, lights for interior or exterior illumination and/or signaling, heads-up displays, fully or partially transparent displays, flexible displays, rollable displays, foldable displays, stretchable displays, laser printers, telephones, mobile phones, tablets, phablets, personal digital assistants (PDAs), wearable devices, laptop computers, digital cameras, camcorders, viewfinders, micro-displays (displays that are less than 2 inches diagonal), 3-D displays, virtual reality or augmented reality displays, vehicles, video walls comprising multiple displays tiled together, theater or stadium screen, a light therapy device, and a sign. Various control mechanisms may be used to control devices fabricated in accordance with the present invention, including passive matrix and active matrix. Many of the devices are intended for use in a temperature range comfortable to humans, such as 18 degrees C. to 30 degrees C., and more preferably at room temperature (20-25 degrees C.), but could be used outside this temperature range, for example, from −40 degree C. to +80 degree C.

[0043] The materials and structures described herein may have applications in devices other than OLEDs. For example, other optoelectronic devices such as organic solar cells and organic photodetectors may employ the materials and structures. More generally, organic devices, such as organic transistors, may employ the materials and structures.

[0044] The terms "halo," "halogen," or "halide" as used interchangeably and refer to fluorine, chlorine, bromine, and iodine.

[0045] The term "acyl" refers to a substituted carbonyl radical (C(O)—R_s).

[0046] The term "ester" refers to a substituted oxycarbonyl (—O—C(O)—R_s or —C(O)—O—R_s) radical.

[0047] The term "ether" refers to an —OR_s radical.

[0048] The terms "sulfanyl" or "thio-ether" are used interchangeably and refer to a —SR_s radical.

[0049] The term "sulfinyl" refers to a —S(O)—R_s radical.

[0050] The term "sulfonyl" refers to a —SO_2—R_s radical.

[0051] The term "phosphino" refers to a —$P(R_s)_3$ radical, wherein each R_s can be same or different.

[0052] The term "silyl" refers to a —$Si(R_s)_3$ radical, wherein each R_s can be same or different.

[0053] In each of the above, R_s can be hydrogen or a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, and combination thereof. Preferred R_s is selected from the group consisting of alkyl, cycloalkyl, aryl, heteroaryl, and combination thereof.

[0054] The term "alkyl" refers to and includes both straight and branched chain alkyl radicals. Preferred alkyl groups are those containing from one to fifteen carbon atoms and includes methyl, ethyl, propyl, 1-methylethyl, butyl, 1-methylpropyl, 2-methylpropyl, pentyl, 1-methylbutyl, 2-methylbutyl, 3-methylbutyl, 1,1-dimethylpropyl, 1,2-dimethylpropyl, 2,2-dimethylpropyl, and the like. Additionally, the alkyl group may be optionally substituted.

[0055] The term "cycloalkyl" refers to and includes monocyclic, polycyclic, and spiro alkyl radicals. Preferred cycloalkyl groups are those containing 3 to 12 ring carbon atoms and includes cyclopropyl, cyclopentyl, cyclohexyl, bicyclo[3.1.1]heptyl, spiro[4.5]decyl, spiro[5.5]undecyl, adamantyl, and the like. Additionally, the cycloalkyl group may be optionally substituted.

[0056] The terms "heteroalkyl" or "heterocycloalkyl" refer to an alkyl or a cycloalkyl radical, respectively, having at least one carbon atom replaced by a heteroatom. Optionally the at least one heteroatom is selected from O, S, N, P, B, Si and Se, preferably, O, S or N. Additionally, the heteroalkyl or heterocycloalkyl group is optionally substituted.

[0057] The term "alkenyl" refers to and includes both straight and branched chain alkene radicals. Alkenyl groups are essentially alkyl groups that include at least one carbon-carbon double bond in the alkyl chain. Cycloalkenyl groups are essentially cycloalkyl groups that include at least one carbon-carbon double bond in the cycloalkyl ring. The term "heteroalkenyl" as used herein refers to an alkenyl radical having at least one carbon atom replaced by a heteroatom. Optionally the at least one heteroatom is selected from O, S, N, P, B, Si and Se, preferably, O, S or N. Preferred alkenyl, cycloalkenyl, or heteroalkenyl groups are those containing two to fifteen carbon atoms. Additionally, the alkenyl, cycloalkenyl, or heteroalkenyl group is optionally substituted.

[0058] The term "alkynyl" refers to and includes both straight and branched chain alkyne radicals. Preferred alkynyl groups are those containing two to fifteen carbon atoms. Additionally, the alkynyl group is optionally substituted.

[0059] The terms "aralkyl" or "arylalkyl" are used interchangeably and refer to an alkyl group that is substituted with an aryl group. Additionally, the aralkyl group is optionally substituted.

[0060] The term "heterocyclic group" refers to and includes aromatic and non-aromatic cyclic radicals containing at least one heteroatom. Optionally the at least one heteroatom is selected from O, S, N, P, B, Si and Se, preferably, O, S or N. Hetero-aromatic cyclic radicals may be used interchangeably with heteroaryl. Preferred hetero-non-aromatic cyclic groups are those containing 3 to 7 ring atoms which includes at least one hetero atom, and includes cyclic amines such as morpholino, piperidino, pyrrolidino, and the like, and cyclic ethers/thio-ethers, such as tetrahydrofuran, tetrahydropyran, tetrahydrothiophene, and the like. Additionally, the heterocyclic group may be optionally substituted.

[0061] The term "aryl" refers to and includes both single-ring aromatic hydrocarbyl groups and polycyclic aromatic ring systems. The polycyclic rings may have two or more rings in which two carbons are common to two adjoining

rings (the rings are "fused") wherein at least one of the rings is an aromatic hydrocarbyl group, e.g., the other rings can be cycloalkyls, cycloalkenyls, aryl, heterocycles, and/or heteroaryls. Preferred aryl groups are those containing six to thirty carbon atoms, preferably six to twenty carbon atoms, more preferably six to twelve carbon atoms. Especially preferred is an aryl group having six carbons, ten carbons or twelve carbons. Suitable aryl groups include phenyl, biphenyl, triphenyl, triphenylene, tetraphenylene, naphthalene, anthracene, phenalene, phenanthrene, fluorene, pyrene, chrysene, perylene, and azulene, preferably phenyl, biphenyl, triphenyl, triphenylene, fluorene, and naphthalene. Additionally, the aryl group may be optionally substituted.

[0062] The term "heteroaryl" refers to and includes both single-ring hetero-aromatic groups and polycyclic aromatic ring systems that include at least one heteroatom. The heteroatoms include, but are not limited to O, S, N, P, B, Si and Se. In many instances, O, S or N are the preferred heteroatoms. Hetero-single ring aromatic systems are preferably single rings with 5 or 6 ring atoms, and the ring can have from one to six heteroatoms. The hetero-polycyclic ring systems can have two or more rings in which two atoms are common to two adjoining rings (the rings are "fused") wherein at least one of the rings is a heteroaryl, e.g., the other rings can be cycloalkyls, cycloalkenyls, aryl, heterocycles, and/or heteroaryls. The hetero-polycyclic aromatic ring systems can have from one to six heteroatoms per ring of the polycyclic aromatic ring system. Preferred heteroaryl groups are those containing three to thirty carbon atoms, preferably three to twenty carbon atoms, more preferably three to twelve carbon atoms. Suitable heteroaryl groups include dibenzothiophene, dibenzofuran, dibenzoselenophene, furan, thiophene, benzofuran, benzothiophene, benzoselenophene, carbazole, indolocarbazole, pyridylindole, pyrrolodipyridine, pyrazole, imidazole, triazole, oxazole, thiazole, oxadiazole, oxatriazole, dioxazole, thiadiazole, pyridine, pyridazine, pyrimidine, pyrazine, triazine, oxazine, oxathiazine, oxadiazine, indole, benzimidazole, indazole, indoxazine, benzoxazole, benzisoxazole, benzothiazole, quinoline, isoquinoline, cinnoline, quinazoline, quinoxaline, naphthyridine, phthalazine, pteridine, xanthene, acridine, phenazine, phenothiazine, phenoxazine, benzofuropyridine, furodipyridine, benzothienopyridine, thienodipyridine, benzoselenophenopyridine, and selenophenodipyridine, preferably dibenzothiophene, dibenzofuran, dibenzoselenophene, carbazole, indolocarbazole, imidazole, pyridine, triazine, benzimidazole, 1,2-azaborine, 1,3-azaborine, 1,4-azaborine, borazine, and aza-analogs thereof. Additionally, the heteroaryl group may be optionally substituted.

[0063] Of the aryl and heteroaryl groups listed above, the groups of triphenylene, naphthalene, anthracene, dibenzothiophene, dibenzofuran, dibenzoselenophene, carbazole, indolocarbazole, imidazole, pyridine, pyrazine, pyrimidine, triazine, and benzimidazole, and the respective aza-analogs of each thereof are of particular interest.

[0064] The terms alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aralkyl, heterocyclic group, aryl, and heteroaryl, as used herein, are independently unsubstituted or substituted with one or more general substituents.

[0065] In many instances, the general substituents are selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, cyclic amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carbonyl, carboxylic acid, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, and combinations thereof.

[0066] In some instances, the preferred general substituents are selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, and combinations thereof.

[0067] In some instances, the preferred general substituents are selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, alkoxy, aryloxy, amino, silyl, aryl, heteroaryl, sulfanyl, and combinations thereof.

[0068] In yet other instances, the more preferred general substituents are selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, aryl, heteroaryl, and combinations thereof.

[0069] The terms "substituted" and "substitution" refer to a substituent other than H that is bonded to the relevant position, e.g., a carbon or nitrogen. For example, when R^1 represents mono-substitution, then one R^1 must be other than H (i.e., a substitution). Similarly, when R^1 represents di-substitution, then two of R^1 must be other than H. Similarly, when R^1 represents no substitution, R^1, for example, can be a hydrogen for available valencies of ring atoms, as in carbon atoms for benzene and the nitrogen atom in pyrrole, or simply represents nothing for ring atoms with fully filled valencies, e.g., the nitrogen atom in pyridine. The maximum number of substitutions possible in a ring structure will depend on the total number of available valencies in the ring atoms.

[0070] As used herein, "combinations thereof" indicates that one or more members of the applicable list are combined to form a known or chemically stable arrangement that one of ordinary skill in the art can envision from the applicable list. For example, an alkyl and deuterium can be combined to form a partial or fully deuterated alkyl group; a halogen and alkyl can be combined to form a halogenated alkyl substituent; and a halogen, alkyl, and aryl can be combined to form a halogenated arylalkyl. In one instance, the term substitution includes a combination of two to four of the listed groups. In another instance, the term substitution includes a combination of two to three groups. In yet another instance, the term substitution includes a combination of two groups. Preferred combinations of substituent groups are those that contain up to fifty atoms that are not hydrogen or deuterium, or those which include up to forty atoms that are not hydrogen or deuterium, or those that include up to thirty atoms that are not hydrogen or deuterium. In many instances, a preferred combination of substituent groups will include up to twenty atoms that are not hydrogen or deuterium.

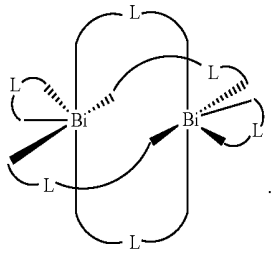
[0071] The "aza" designation in the fragments described herein, i.e. aza-dibenzofuran, aza-dibenzothiophene, etc. means that one or more of the C—H groups in the respective aromatic ring can be replaced by a nitrogen atom, for example, and without any limitation, azatriphenylene encompasses both dibenzo[f,h]quinoxaline and dibenzo[f,h]quinoline. One of ordinary skill in the art can readily envision other nitrogen analogs of the aza-derivatives described above, and all such analogs are intended to be encompassed by the terms as set forth herein.

[0072] As used herein, "deuterium" refers to an isotope of hydrogen. Deuterated compounds can be readily prepared using methods known in the art. For example, U.S. Pat. No. 8,557,400, Patent Pub. No. WO 2006/095951, and U.S. Pat. Application Pub. No. US 2011/0037057, which are hereby incorporated by reference in their entireties, describe the making of deuterium-substituted organometallic complexes. Further reference is made to Ming Yan, et al., *Tetrahedron* 2015, 71, 1425-30 and Atzrodt et al., *Angew. Chem. Int. Ed.* (*Reviews*) 2007, 46, 7744-65, which are incorporated by reference in their entireties, describe the deuteration of the methylene hydrogens in benzyl amines and efficient pathways to replace aromatic ring hydrogens with deuterium, respectively.

[0073] It is to be understood that when a molecular fragment is described as being a substituent or otherwise attached to another moiety, its name may be written as if it were a fragment (e.g. phenyl, phenylene, naphthyl, dibenzofuryl) or as if it were the whole molecule (e.g. benzene, naphthalene, dibenzofuran). As used herein, these different ways of designating a substituent or attached fragment are considered to be equivalent.

[0074] In some instance, a pair of adjacent substituents can be optionally joined or fused into a ring. The preferred ring is a five, six, or seven-membered carbocyclic or heterocyclic ring, includes both instances where the portion of the ring formed by the pair of substituents is saturated and where the portion of the ring formed by the pair of substituents is unsaturated. As used herein, "adjacent" means that the two substituents involved can be on the same ring next to each other, or on two neighboring rings having the two closest available substitutable positions, such as 2, 2' positions in a biphenyl, or 1, 8 position in a naphthalene, as long as they can form a stable fused ring system.

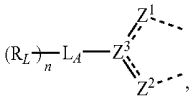
[0075] A series of compounds having a stoichiometry formula of BiL_3 are disclosed. Each L is a mono-anionic bidentate ligand and can be same or different. These compounds can adopt mono or polynuclear form in the solid state. In some instances, they exist as a BiL_3 molecule. In some instances, they can adopt a paddle-wheel structure with Bi_2L_6 formula as shown below.



In some instances, the two axial ligands will adopt monodentate structure.

[0076] By applying different ligands L, the HOMO and/or LUMO levels of these Bi compounds can be widely tuned. They can be used as a neat film in hole injection layers (HIL), hole transport layers (HTL), or any other layers in an OLED device. They can also be used as a p-dopant (acceptor material) in HIL, HTL, or any other layers in an OLED. By doping hole transport material with a suitable Bi acceptor material, the charge carrier density, and hence the conductivity in the film, can be enhanced considerably.

[0077] According to an aspect of the present disclosure, a compound having a stoichiometry formula of BiL_3, where Bi is Bi (III), L is mono-anionic bidentate ligand, and each L can be same or different. In such embodiments, L has the formula



in which:

[0078] each Z^1 and Z^2 is independently selected from the group consisting of O, S, NR, and PR;

[0079] Z^3 is C;

[0080] Z^1 and Z^2 coordinate to Bi atom;

[0081] L_A is aryl or heteroaryl, which can be further substituted by one or more substituent R_L;

[0082] each R is independently hydrogen or a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, heteroaryl, and combinations thereof;

[0083] each R_L is independently a general substituent;

[0084] n is an integer from 0 to the maximum allowable substitutions.

[0085] In some embodiments, at least one of the following conditions is true:

[0086] (1) L_A comprises at least one 5-membered ring;

[0087] (2) L_A comprises a condensed ring system having at least three rings fused together;

[0088] (3) n is at least 1 and at least one R_L is a non-fused aryl or heteroaryl moiety; or

[0089] (4) n is at least 2 with two different R_L and the L_A-(R_L)n moiety is not symmetrical along the axis of Z^3 and the atom from L_A attaching to Z^3.

[0090] In some embodiments, each R_L is independently selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, heteroaryl, nitrile, and combinations thereof.

[0091] In some embodiments, R_L is not fused to the L_A moiety.

[0092] In some embodiments, Z^1 and Z^2 are O. In some embodiments, Z^1 and Z^2 are NR. In some embodiments, one of Z^1 and Z^2 is O, the other one of Z^1 and Z^2 is NR.

[0093] In some embodiments, each R is independently selected from the group consisting of aryl, heteroaryl, and combination thereof.

[0094] In some embodiments, L_A comprises at least one 5-membered ring. In some embodiments, L_A comprises a condensed ring system having at least three rings fused together.

[0095] In some embodiments, L_A comprises a condensed ring system having at least four rings fused together. In some embodiments, L_A comprises a condensed ring system having at least five rings fused together.

[0096] In some embodiments, n is at least 1 and at least one R_L is a non-fused aryl or heteroaryl moiety.

[0097] In some embodiments, the compound has a formula of BiL_3, or Bi_2L_6.

[0098] In some embodiments, L_A is a benzene ring, n is at least 1, and a sum of Hammett constants of all the substitu-

ents R_L is larger than 0.50 and smaller than 1.20. In some embodiments, the sum of Hammett constant of all the substituents R_L is larger than 0.60 and smaller than 1.10. In some embodiments, the sum of Hammett constant of all the substituents R_L is larger than 0.70 and smaller than 1.00. In some embodiments, the sum of Hammett constant of all the substituents R_L is larger than 0.80 and smaller than 0.90.

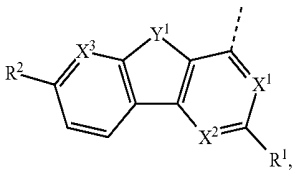
[0099] In some embodiments, all three Ls of the stoichiometric formula BiL_3 are the same.

[0100] In some embodiments, at least one L of the stoichiometric formula BiL_3 is different from the other two L. In some embodiments, all three Ls of the stoichiometric formula BiL_3 are different from each other.

[0101] In some embodiments, L_A comprises at least one of the chemical moiety selected from the group consisting of phenyl, biphenyl, terphenyl, carbazole, indolocarbazole, triphenylene, fluorene, benzothiophene, benzofuran, benzoselenophene, dibenzothiophene, dibenzofuran, dibenzoselenophene, nitrile, isonitrile, borane, fluoride, pyridine, pyrimidine, pyrazine, triazine, aza-carbazole, aza-dibenzothiophene, aza-dibenzofuran, aza-dibenzoseleno phene, aza-triphenylene, imidazole, pyrazole, oxazole, thiazole, isoxazole, isothiazole, triazole, thiadiazole, and oxadiazole.

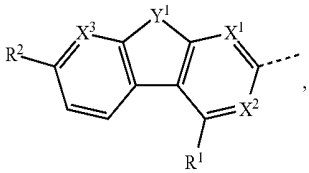
[0102] In some embodiments, the L_A-(R_L)n moiety is selected from the group consisting of L_{Ai}, where i is an integer from 1 to 3735; wherein

[0103] ligands L_{A1} to L_{A408} are based on a structure of Formula I,



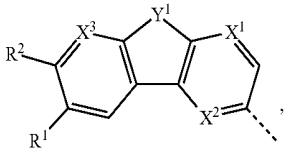
where i=m;

[0104] ligands L_{A409} to L_{A816} are based on a structure of Formula II



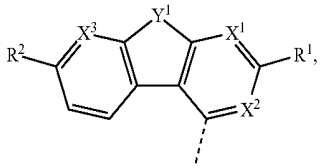
where i=408+m;

[0105] ligands L_{A817} to L_{A1224} are based on a structure of Formula III



where i=816+m;

[0106] ligands L_{A1225} to L_{A1632} are based on a structure of Formula IV



where i=1224+m;

[0107] wherein m is an integer from 1 to 408 and for each m, X^1, X^2, X^3, R^1, R^2, and Y^1 are defined in formulas I, II, III, and IV as follows:

m	X^1	X^2	X^3	R^1	R^2	Y^1
1	CH	CH	CH	H	H	S
2	CH	CH	CH	R^{A1}	H	S
3	CH	CH	CH	R^{A2}	H	S
4	CH	CH	CH	R^{A3}	H	S
5	CH	CH	CH	R^{A4}	H	S
6	CH	CH	CH	R^{A5}	H	S
7	CH	CH	CH	R^{A6}	H	S
8	CH	CH	CH	R^{A7}	H	S
9	CH	CH	CH	R^{A8}	H	S
10	CH	CH	CH	H	R^{A1}	S
11	CH	CH	CH	H	R^{A2}	S
12	CH	CH	CH	H	R^{A3}	S
13	CH	CH	CH	H	R^{A4}	S
14	CH	CH	CH	H	R^{A5}	S
15	CH	CH	CH	H	R^{A6}	S
16	CH	CH	CH	H	R^{A7}	S
17	CH	CH	CH	H	R^{A8}	S
18	N	CH	CH	H	H	S
19	N	CH	CH	R^{A1}	H	S
20	N	CH	CH	R^{A2}	H	S
21	N	CH	CH	R^{A3}	H	S
22	N	CH	CH	R^{A4}	H	S
23	N	CH	CH	R^{A5}	H	S
24	N	CH	CH	R^{A6}	H	S
25	N	CH	CH	R^{A7}	H	S
26	N	CH	CH	R^{A8}	H	S
27	N	CH	CH	H	R^{A1}	S
28	N	CH	CH	H	R^{A2}	S
29	N	CH	CH	H	R^{A3}	S
30	N	CH	CH	H	R^{A4}	S
31	N	CH	CH	H	R^{A5}	S
32	N	CH	CH	H	R^{A6}	S
33	N	CH	CH	H	R^{A7}	5
34	N	CH	CH	H	R^{A8}	S
35	N	N	CH	H	H	S
36	N	N	CH	R^{A1}	H	S
37	N	N	CH	R^{A2}	H	S
38	N	N	CH	R^{A3}	H	S
39	N	N	CH	R^{A4}	H	S
40	N	N	CH	R^{A5}	H	S
41	N	N	CH	R^{A6}	H	S
42	N	N	CH	R^{A7}	H	S
43	N	N	CH	R^{A8}	H	S
44	N	N	CH	H	R^{A1}	S
45	N	N	CH	H	R^{A2}	S
46	N	N	CH	H	R^{A3}	S
47	N	N	CH	H	R^{A4}	S
48	N	N	CH	H	R^{A5}	S
49	N	N	CH	H	R^{A6}	S
50	N	N	CH	H	R^{A7}	S
51	N	N	CH	H	R^{A8}	S
52	CH	N	CH	H	H	S
53	CH	N	CH	R^{A1}	H	S
54	CH	N	CH	R^{A2}	H	S
55	CH	N	CH	R^{A3}	H	S

-continued

m	X^1	X^2	X^3	R^1	R^2	Y^1
56	CH	N	CH	R^{A4}	H	S
57	CH	N	CH	R^{A5}	H	S
58	CH	N	CH	R^{A6}	H	S
59	CH	N	CH	R^{A7}	H	S
60	CH	N	CH	R^{A8}	H	S
61	CH	N	CH	H	R^{A1}	S
62	CH	N	CH	H	R^{A2}	S
63	CH	N	CH	H	R^{A3}	S
64	CH	N	CH	H	R^{A4}	S
65	CH	N	CH	H	R^{A5}	S
66	CH	N	CH	H	R^{A6}	S
67	CH	N	CH	H	R^{A7}	S
68	CH	N	CH	H	R^{A8}	S
69	CH	CH	N	H	H	S
70	CH	CH	N	R^{A1}	H	S
71	CH	CH	N	R^{A2}	H	S
72	CH	CH	N	R^{A3}	H	S
73	CH	CH	N	R^{A4}	H	S
74	CH	CH	N	R^{A5}	H	S
75	CH	CH	N	R^{A6}	H	S
76	CH	CH	N	R^{A7}	H	S
77	CH	CH	N	R^{A8}	H	S
78	CH	CH	N	H	R^{A1}	S
79	CH	CH	N	H	R^{A2}	S
80	CH	CH	N	H	R^{A3}	S
81	CH	CH	N	H	R^{A4}	S
82	CH	CH	N	H	R^{A5}	S
83	CH	CH	N	H	R^{A6}	S
84	CH	CH	N	H	R^{A7}	S
85	CH	CH	N	H	R^{A8}	S
86	N	CH	N	H	H	S
87	N	CH	N	R^{A1}	H	S
88	N	CH	N	R^{A2}	H	S
89	N	CH	N	R^{A3}	H	S
90	N	CH	N	R^{A4}	H	S
91	N	CH	N	R^{A5}	H	S
92	N	CH	N	R^{A6}	H	S
93	N	CH	N	R^{A7}	H	S
94	N	CH	N	R^{A8}	H	S
95	N	CH	N	H	R^{A1}	S
96	N	CH	N	H	R^{A2}	S
97	N	CH	N	H	R^{A3}	S
98	N	CH	N	H	R^{A4}	S
99	N	CH	N	H	R^{A5}	S
100	N	CH	N	H	R^{A6}	S
101	N	CH	N	H	R^{A7}	S
102	N	CH	N	H	R^{A8}	S
103	CH	CH	CH	H	H	O
104	CH	CH	CH	R^{A1}	H	O
105	CH	CH	CH	R^{A2}	H	O
106	CH	CH	CH	R^{A3}	H	O
107	CH	CH	CH	R^{A4}	H	O
108	CH	CH	CH	R^{A5}	H	O
109	CH	CH	CH	R^{A6}	H	O
110	CH	CH	CH	R^{A7}	H	O
111	CH	CH	CH	R^{A8}	H	O
112	CH	CH	CH	H	R^{A1}	O
113	CH	CH	CH	H	R^{A2}	O
114	CH	CH	CH	H	R^{A3}	O
115	CH	CH	CH	H	R^{A4}	O
116	CH	CH	CH	H	R^{A5}	O
117	CH	CH	CH	H	R^{A6}	O
118	CH	CH	CH	H	R^{A7}	O
119	CH	CH	CH	H	R^{A8}	O
120	N	CH	CH	H	H	O
121	N	CH	CH	R^{A1}	H	O
122	N	CH	CH	R^{A2}	H	O
123	N	CH	CH	R^{A3}	H	O
124	N	CH	CH	R^{A4}	H	O
125	N	CH	CH	R^{A5}	H	O
126	N	CH	CH	R^{A6}	H	O
127	N	CH	CH	R^{A7}	H	O
128	N	CH	CH	R^{A8}	H	O
129	N	CH	CH	H	R^{A1}	O

-continued

m	X^1	X^2	X^3	R^1	R^2	Y^1
130	N	CH	CH	H	R^{A2}	O
131	N	CH	CH	H	R^{A3}	O
132	N	CH	CH	H	R^{A4}	O
133	N	CH	CH	H	R^{A5}	O
134	N	CH	CH	H	R^{A6}	O
135	N	CH	CH	H	R^{A7}	O
136	N	CH	CH	H	R^{A8}	O
137	N	N	CH	H	H	O
138	N	N	CH	R^{A1}	H	O
139	N	N	CH	R^{A2}	H	O
140	N	N	CH	R^{A3}	H	O
141	N	N	CH	R^{A4}	H	O
142	N	N	CH	R^{A5}	H	O
143	N	N	CH	R^{A6}	H	O
144	N	N	CH	R^{A7}	H	O
145	N	N	CH	R^{A8}	H	O
146	N	N	CH	H	R^{A1}	O
147	N	N	CH	H	R^{A2}	O
148	N	N	CH	H	R^{A3}	O
149	N	N	CH	H	R^{A4}	O
150	N	N	CH	H	R^{A5}	O
151	N	N	CH	H	R^{A6}	O
152	N	N	CH	H	R^{A7}	O
153	N	N	CH	H	R^{A8}	O
154	CH	N	CH	H	H	O
155	CH	N	CH	R^{A1}	H	O
156	CH	N	CH	R^{A2}	H	O
157	CH	N	CH	R^{A3}	H	O
158	CH	N	CH	R^{A4}	H	O
159	CH	N	CH	R^{A5}	H	O
160	CH	N	CH	R^{A6}	H	O
161	CH	N	CH	R^{A7}	H	O
162	CH	N	CH	R^{A8}	H	O
163	CH	N	CH	H	R^{A1}	O
164	CH	N	CH	H	R^{A2}	O
165	CH	N	CH	H	R^{A3}	O
166	CH	N	CH	H	R^{A4}	O
167	CH	N	CH	H	R^{A5}	O
168	CH	N	CH	H	R^{A6}	O
169	CH	N	CH	H	R^{A7}	O
170	CH	N	CH	H	R^{A8}	O
171	CH	CH	N	H	H	O
172	CH	CH	N	R^{A1}	H	O
173	CH	CH	N	R^{A2}	H	O
174	CH	CH	N	R^{A3}	H	O
175	CH	CH	N	R^{A4}	H	O
176	CH	CH	N	R^{A5}	H	O
177	CH	CH	N	R^{A6}	H	O
178	CH	CH	N	R^{A7}	H	O
179	CH	CH	N	R^{A8}	H	O
180	CH	CH	N	H	R^{A1}	O
181	CH	CH	N	H	R^{A2}	O
182	CH	CH	N	H	R^{A3}	O
183	CH	CH	N	H	R^{A4}	O
184	CH	CH	N	H	R^{A5}	O
185	CH	CH	N	H	R^{A6}	O
186	CH	CH	N	H	R^{A7}	O
187	CH	CH	N	H	R^{A8}	O
188	N	CH	N	H	H	O
189	N	CH	N	R^{A1}	H	O
190	N	CH	N	R^{A2}	H	O
191	N	CH	N	R^{A3}	H	O
192	N	CH	N	R^{A4}	H	O
193	N	CH	N	R^{A5}	H	O
194	N	CH	N	R^{A6}	H	O
195	N	CH	N	R^{A7}	H	O
196	N	CH	N	R^{A8}	H	O
197	N	CH	N	H	R^{A1}	O
198	N	CH	N	H	R^{A2}	O
199	N	CH	N	H	R^{A3}	O
200	N	CH	N	H	R^{A4}	O
201	N	CH	N	H	R^{A5}	O
202	N	CH	N	H	R^{A6}	O
203	N	CH	N	H	R^{A7}	O

-continued

m	X^1	X^2	X^3	R^1	R^2	Y^1
204	N	CH	N	H	R^{A8}	O
205	CH	CH	CH	H	H	NCH_3
206	CH	CH	CH	R^{A1}	H	NCH_3
207	CH	CH	CH	R^{A2}	H	NCH_3
208	CH	CH	CH	R^{A3}	H	NCH_3
209	CH	CH	CH	R^{A4}	H	NCH_3
210	CH	CH	CH	R^{A5}	H	NCH_3
211	CH	CH	CH	R^{A6}	H	NCH_3
212	CH	CH	CH	R^{A7}	H	NCH_3
213	CH	CH	CH	R^{A8}	H	NCH_3
214	CH	CH	CH	H	R^{A1}	NCH_3
215	CH	CH	CH	H	R^{A2}	NCH_3
216	CH	CH	CH	H	R^{A3}	NCH_3
217	CH	CH	CH	H	R^{A4}	NCH_3
218	CH	CH	CH	H	R^{A5}	NCH_3
219	CH	CH	CH	H	R^{A6}	NCH_3
220	CH	CH	CH	H	R^{A7}	NCH_3
221	CH	CH	CH	H	R^{A8}	NCH_3
222	N	CH	CH	H	H	NCH_3
223	N	CH	CH	R^{A1}	H	NCH_3
224	N	CH	CH	R^{A2}	H	NCH_3
225	N	CH	CH	R^{A3}	H	NCH_3
226	N	CH	CH	R^{A4}	H	NCH_3
227	N	CH	CH	R^{A5}	H	NCH_3
228	N	CH	CH	R^{A6}	H	NCH_3
229	N	CH	CH	R^{A7}	H	NCH_3
230	N	CH	CH	R^{A8}	H	NCH_3
231	N	CH	CH	H	R^{A1}	NCH_3
232	N	CH	CH	H	R^{A2}	NCH_3
233	N	CH	CH	H	R^{A3}	NCH_3
234	N	CH	CH	H	R^{A4}	NCH_3
235	N	CH	CH	H	R^{A5}	NCH_3
236	N	CH	CH	H	R^{A6}	NCH_3
237	N	CH	CH	H	R^{A7}	NCH_3
238	N	CH	CH	H	R^{A8}	NCH_3
239	N	N	CH	H	H	NCH_3
240	N	N	CH	R^{A1}	H	NCH_3
241	N	N	CH	R^{A2}	H	NCH_3
242	N	N	CH	R^{A3}	H	NCH_3
243	N	N	CH	R^{A4}	H	NCH_3
244	N	N	CH	R^{A5}	H	NCH_3
245	N	N	CH	R^{A6}	H	NCH_3
246	N	N	CH	R^{A7}	H	NCH_3
247	N	N	CH	R^{A8}	H	NCH_3
248	N	N	CH	H	R^{A1}	NCH_3
249	N	N	CH	H	R^{A2}	NCH_3
250	N	N	CH	H	R^{A3}	NCH_3
251	N	N	CH	H	R^{A4}	NCH_3
252	N	N	CH	H	R^{A5}	NCH_3
253	N	N	CH	H	R^{A6}	NCH_3
254	N	N	CH	H	R^{A7}	NCH_3
255	N	N	CH	H	R^{A8}	NCH_3
256	CH	N	CH	H	H	NCH_3
257	CH	N	CH	R^{A1}	H	NCH_3
258	CH	N	CH	R^{A2}	H	NCH_3
259	CH	N	CH	R^{A3}	H	NCH_3
260	CH	N	CH	R^{A4}	H	NCH_3
261	CH	N	CH	R^{A5}	H	NCH_3
262	CH	N	CH	R^{A6}	H	NCH_3
263	CH	N	CH	R^{A7}	H	NCH_3
264	CH	N	CH	R^{A8}	H	NCH_3
265	CH	N	CH	H	R^{A1}	NCH_3
266	CH	N	CH	H	R^{A2}	NCH_3
267	CH	N	CH	H	R^{A3}	NCH_3
268	CH	N	CH	H	R^{A4}	NCH_3
269	CH	N	CH	H	R^{A5}	NCH_3
270	CH	N	CH	H	R^{A6}	NCH_3
271	CH	N	CH	H	R^{A7}	NCH_3
272	CH	N	CH	H	R^{A8}	NCH_3
273	CH	CH	N	H	H	NCH_3
274	CH	CH	N	R^{A1}	H	NCH_3
275	CH	CH	N	R^{A2}	H	NCH_3
276	CH	CH	N	R^{A3}	H	NCH_3
277	CH	CH	N	R^{A4}	H	NCH_3

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m	X^1	X^2	X^3	R^1	R^2	Y^1
278	CH	CH	N	R^{A5}	H	NCH_3
279	CH	CH	N	R^{A6}	H	NCH_3
280	CH	CH	N	R^{A7}	H	NCH_3
281	CH	CH	N	R^{A8}	H	NCH_3
282	CH	CH	N	H	R^{A1}	NCH_3
283	CH	CH	N	H	R^{A2}	NCH_3
284	CH	CH	N	H	R^{A3}	NCH_3
285	CH	CH	N	H	R^{A4}	NCH_3
286	CH	CH	N	H	R^{A5}	NCH_3
287	CH	CH	N	H	R^{A6}	NCH_3
288	CH	CH	N	H	R^{A7}	NCH_3
289	CH	CH	N	H	R^{A8}	NCH_3
290	N	CH	N	H	H	NCH_3
291	N	CH	N	R^{A1}	H	NCH_3
292	N	CH	N	R^{A2}	H	NCH_3
293	N	CH	N	R^{A3}	H	NCH_3
294	N	CH	N	R^{A4}	H	NCH_3
295	N	CH	N	R^{A5}	H	NCH_3
296	N	CH	N	R^{A6}	H	NCH_3
297	N	CH	N	R^{A7}	H	NCH_3
298	N	CH	N	R^{A8}	H	NCH_3
299	N	CH	N	H	R^{A1}	NCH_3
300	N	CH	N	H	R^{A2}	NCH_3
301	N	CH	N	H	R^{A3}	NCH_3
302	N	CH	N	H	R^{A4}	NCH_3
303	N	CH	N	H	R^{A5}	NCH_3
304	N	CH	N	H	R^{A6}	NCH_3
305	N	CH	N	H	R^{A7}	NCH_3
306	N	CH	N	H	R^{A8}	NCH_3
307	CH	CH	CH	H	H	$C(CH_3)_2$
308	CH	CH	CH	R^{A1}	H	$C(CH_3)_2$
309	CH	CH	CH	R^{A2}	H	$C(CH_3)_2$
310	CH	CH	CH	R^{A3}	H	$C(CH_3)_2$
311	CH	CH	CH	R^{A4}	H	$C(CH_3)_2$
312	CH	CH	CH	R^{A5}	H	$C(CH_3)_2$
313	CH	CH	CH	R^{A6}	H	$C(CH_3)_2$
314	CH	CH	CH	R^{A7}	H	$C(CH_3)_2$
315	CH	CH	CH	R^{A8}	H	$C(CH_3)_2$
316	CH	CH	CH	H	R^{A1}	$C(CH_3)_2$
317	CH	CH	CH	H	R^{A2}	$C(CH_3)_2$
318	CH	CH	CH	H	R^{A3}	$C(CH_3)_2$
319	CH	CH	CH	H	R^{A4}	$C(CH_3)_2$
320	CH	CH	CH	H	R^{A5}	$C(CH_3)_2$
321	CH	CH	CH	H	R^{A6}	$C(CH_3)_2$
322	CH	CH	CH	H	R^{A7}	$C(CH_3)_2$
323	CH	CH	CH	H	R^{A8}	$C(CH_3)_2$
324	N	CH	CH	H	H	$C(CH_3)_2$
325	N	CH	CH	R^{A1}	H	$C(CH_3)_2$
326	N	CH	CH	R^{A2}	H	$C(CH_3)_2$
327	N	CH	CH	R^{A3}	H	$C(CH_3)_2$
328	N	CH	CH	R^{A4}	H	$C(CH_3)_2$
329	N	CH	CH	R^{A5}	H	$C(CH_3)_2$
330	N	CH	CH	R^{A6}	H	$C(CH_3)_2$
331	N	CH	CH	R^{A7}	H	$C(CH_3)_2$
332	N	CH	CH	R^{A8}	H	$C(CH_3)_2$
333	N	CH	CH	H	R^{A1}	$C(CH_3)_2$
334	N	CH	CH	H	R^{A2}	$C(CH_3)_2$
335	N	CH	CH	H	R^{A3}	$C(CH_3)_2$
336	N	CH	CH	H	R^{A4}	$C(CH_3)_2$
337	N	CH	CH	H	R^{A5}	$C(CH_3)_2$
338	N	CH	CH	H	R^{A6}	$C(CH_3)_2$
339	N	CH	CH	H	R^{A7}	$C(CH_3)_2$
340	N	CH	CH	H	R^{A8}	$C(CH_3)_2$
341	N	N	CH	H	H	$C(CH_3)_2$
342	N	N	CH	R^{A1}	H	$C(CH_3)_2$
343	N	N	CH	R^{A2}	H	$C(CH_3)_2$
344	N	N	CH	R^{A3}	H	$C(CH_3)_2$
345	N	N	CH	R^{A4}	H	$C(CH_3)_2$
346	N	N	CH	R^{A5}	H	$C(CH_3)_2$
347	N	N	CH	R^{A6}	H	$C(CH_3)_2$
348	N	N	CH	R^{A7}	H	$C(CH_3)_2$
349	N	N	CH	R^{A8}	H	$C(CH_3)_2$
350	N	N	CH	H	R^{A1}	$C(CH_3)_2$
351	N	N	CH	H	R^{A2}	$C(CH_3)_2$

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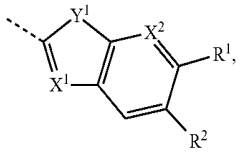
m	X^1	X^2	X^3	R^1	R^2	Y^1
352	N	N	CH	H	R^{43}	$C(CH_3)_2$
353	N	N	CH	H	R^{44}	$C(CH_3)_2$
354	N	N	CH	H	R^{45}	$C(CH_3)_2$
355	N	N	CH	H	R^{46}	$C(CH_3)_2$
356	N	N	CH	H	R^{47}	$C(CH_3)_2$
357	N	N	CH	H	R^{48}	$C(CH_3)_2$
358	CH	N	CH	H	H	$C(CH_3)_2$
359	CH	N	CH	R^{41}	H	$C(CH_3)_2$
360	CH	N	CH	R^{42}	H	$C(CH_3)_2$
361	CH	N	CH	R^{43}	H	$C(CH_3)_2$
362	CH	N	CH	R^{44}	H	$C(CH_3)_2$
363	CH	N	CH	R^{45}	H	$C(CH_3)_2$
364	CH	N	CH	R^{46}	H	$C(CH_3)_2$
365	CH	N	CH	R^{47}	H	$C(CH_3)_2$
366	CH	N	CH	R^{48}	H	$C(CH_3)_2$
367	CH	N	CH	H	R^{41}	$C(CH_3)_2$
368	CH	N	CH	H	R^{42}	$C(CH_3)_2$
369	CH	N	CH	H	R^{43}	$C(CH_3)_2$
370	CH	N	CH	H	R^{44}	$C(CH_3)_2$
371	CH	N	CH	H	R^{45}	$C(CH_3)_2$
372	CH	N	CH	H	R^{46}	$C(CH_3)_2$
373	CH	N	CH	H	R^{47}	$C(CH_3)_2$
374	CH	N	CH	H	R^{48}	$C(CH_3)_2$
375	CH	CH	N	H	H	$C(CH_3)_2$
376	CH	CH	N	R^{41}	H	$C(CH_3)_2$
377	CH	CH	N	R^{42}	H	$C(CH_3)_2$
378	CH	CH	N	R^{43}	H	$C(CH_3)_2$
379	CH	CH	N	R^{44}	H	$C(CH_3)_2$
380	CH	CH	N	R^{45}	H	$C(CH_3)_2$
381	CH	CH	N	R^{46}	H	$C(CH_3)_2$
382	CH	CH	N	R^{47}	H	$C(CH_3)_2$
383	CH	CH	N	R^{48}	H	$C(CH_3)_2$
384	CH	CH	N	H	R^{41}	$C(CH_3)_2$
385	CH	CH	N	H	R^{42}	$C(CH_3)_2$
386	CH	CH	N	H	R^{43}	$C(CH_3)_2$
387	CH	CH	N	H	R^{44}	$C(CH_3)_2$
388	CH	CH	N	H	R^{45}	$C(CH_3)_2$
389	CH	CH	N	H	R^{46}	$C(CH_3)_2$
390	CH	CH	N	H	R^{47}	$C(CH_3)_2$
391	CH	CH	N	H	R^{48}	$C(CH_3)_2$
392	N	CH	N	H	H	$C(CH_3)_2$
393	N	CH	N	R^{41}	H	$C(CH_3)_2$
394	N	CH	N	R^{42}	H	$C(CH_3)_2$
395	N	CH	N	R^{43}	H	$C(CH_3)_2$
396	N	CH	N	R^{44}	H	$C(CH_3)_2$
397	N	CH	N	R^{45}	H	$C(CH_3)_2$
398	N	CH	N	R^{46}	H	$C(CH_3)_2$
399	N	CH	N	R^{47}	H	$C(CH_3)_2$
400	N	CH	N	R^{48}	H	$C(CH_3)_2$
401	N	CH	N	H	R^{41}	$C(CH_3)_2$
402	N	CH	N	H	R^{42}	$C(CH_3)_2$
403	N	CH	N	H	R^{43}	$C(CH_3)_2$
404	N	CH	N	H	R^{44}	$C(CH_3)_2$
405	N	CH	N	H	R^{45}	$C(CH_3)_2$
406	N	CH	N	H	R^{46}	$C(CH_3)_2$
407	N	CH	N	H	R^{47}	$C(CH_3)_2$
408	N	CH	N	H	R^{48}	$C(CH_3)_2$

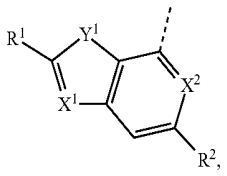
[0108] wherein:

[0109] ligands L_{A1633} to L_{A2040} are based on a structure of Formula V



where i=1224+m;

[0110] ligands L_{A2041} to L_{A2448} are based on a structure of Formula VI



where i=1632+m;

[0111] wherein m is an integer from 409 to 816 and for each m, X^1, X^2, R^1, R^2, and Y^1 are defined in formulas V and VI as follows:

m	X^1	X^2	R^1	R^2	Y^1
409	CH	CH	H	H	S
410	CH	CH	R^{41}	H	S
411	CH	CH	R^{42}	H	S
412	CH	CH	R^{43}	H	S
413	CH	CH	R^{44}	H	S
414	CH	CH	R^{45}	H	S
415	CH	CH	R^{46}	H	S
416	CH	CH	R^{47}	H	S
417	CH	CH	R^{48}	H	S
418	CH	CH	H	R^{41}	S
419	CH	CH	H	R^{42}	S
420	CH	CH	H	R^{43}	S
421	CH	CH	H	R^{44}	S
422	CH	CH	H	R^{45}	S
423	CH	CH	H	R^{46}	S
424	CH	CH	H	R^{47}	S
425	CH	CH	H	R^{48}	S
426	N	CH	H	H	S
427	N	CH	R^{41}	H	S
428	N	CH	R^{42}	H	S
429	N	CH	R^{43}	H	S
430	N	CH	R^{44}	H	S
431	N	CH	R^{45}	H	S
432	N	CH	R^{46}	H	S
433	N	CH	R^{47}	H	S
434	N	CH	R^{48}	H	S
435	N	CH	H	R^{41}	S
436	N	CH	H	R^{42}	S
437	N	CH	H	R^{43}	S
438	N	CH	H	R^{44}	S
439	N	CH	H	R^{45}	S
440	N	CH	H	R^{46}	S
441	N	CH	H	R^{47}	S
442	N	CH	H	R^{48}	S
443	N	N	H	H	S
444	N	N	R^{41}	H	S
445	N	N	R^{42}	H	S
446	N	N	R^{43}	H	S
447	N	N	R^{44}	H	S
448	N	N	R^{45}	H	S
449	N	N	R^{46}	H	S
450	N	N	R^{47}	H	S
451	N	N	R^{48}	H	S
452	N	N	H	R^{41}	S
453	N	N	H	R^{42}	S
454	N	N	H	R^{43}	S
455	N	N	H	R^{44}	S
456	N	N	H	R^{45}	S
457	N	N	H	R^{46}	S
458	N	N	H	R^{47}	S
459	N	N	H	R^{48}	S
460	CH	N	H	H	S
461	CH	N	R^{41}	H	S
462	CH	N	R^{42}	H	S
463	CH	N	R^{43}	H	S

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m	X^1	X^2	R^1	R^2	Y^1
464	CH	N	R^{A4}	H	S
465	CH	N	R^{A5}	H	S
466	CH	N	R^{A6}	H	S
467	CH	N	R^{A7}	H	S
468	CH	N	R^{A8}	H	S
469	CH	N	H	R^{A1}	S
470	CH	N	H	R^{A2}	S
471	CH	N	H	R^{A3}	S
472	CH	N	H	R^{A4}	S
473	CH	N	H	R^{A5}	S
474	CH	N	H	R^{A6}	S
475	CH	N	H	R^{A7}	S
476	CH	N	H	R^{A8}	S
477	CH	CH	H	H	O
478	CH	CH	R^{A1}	H	O
479	CH	CH	R^{A2}	H	O
480	CH	CH	R^{A3}	H	O
481	CH	CH	R^{A4}	H	O
482	CH	CH	R^{A5}	H	O
483	CH	CH	R^{A6}	H	O
484	CH	CH	R^{A7}	H	O
485	CH	CH	R^{A8}	H	O
486	CH	CH	H	R^{A1}	O
487	CH	CH	H	R^{A2}	O
488	CH	CH	H	R^{A3}	O
489	CH	CH	H	R^{A4}	O
490	CH	CH	H	R^{A5}	O
491	CH	CH	H	R^{A6}	O
492	CH	CH	H	R^{A7}	O
493	CH	CH	H	R^{A8}	O
494	N	CH	H	H	O
495	N	CH	R^{A1}	H	O
496	N	CH	R^{A2}	H	O
497	N	CH	R^{A3}	H	O
498	N	CH	R^{A4}	H	O
499	N	CH	R^{A5}	H	O
500	N	CH	R^{A6}	H	O
501	N	CH	R^{A7}	H	O
502	N	CH	R^{A8}	H	O
503	N	CH	H	R^{A1}	O
504	N	CH	H	R^{A2}	O
505	N	CH	H	R^{A3}	O
506	N	CH	H	R^{A4}	O
507	N	CH	H	R^{A5}	O
508	N	CH	H	R^{A6}	O
509	N	CH	H	R^{A7}	O
510	N	CH	H	R^{A8}	O
511	N	N	H	H	O
512	N	N	R^{A1}	H	O
513	N	N	R^{A2}	H	O
514	N	N	R^{A3}	H	O
515	N	N	R^{A4}	H	O
516	N	N	R^{A5}	H	O
517	N	N	R^{A6}	H	O
518	N	N	R^{A7}	H	O
519	N	N	R^{A8}	H	O
520	N	N	H	R^{A1}	O
521	N	N	H	R^{A2}	O
522	N	N	H	R^{A3}	O
523	N	N	H	R^{A4}	O
524	N	N	H	R^{A5}	O
525	N	N	H	R^{A6}	O
526	N	N	H	R^{A7}	O
527	N	N	H	R^{A8}	O
528	CH	N	H	H	O
529	CH	N	R^{A1}	H	O
530	CH	N	R^{A2}	H	O
531	CH	N	R^{A3}	H	O
532	CH	N	R^{A4}	H	O
533	CH	N	R^{A5}	H	O
534	CH	N	R^{A6}	H	O
535	CH	N	R^{A7}	H	O
536	CH	N	R^{A8}	H	O
537	CH	N	H	R^{A1}	O

-continued

m	X^1	X^2	R^1	R^2	Y^1
538	CH	N	H	R^{A2}	O
539	CH	N	H	R^{A3}	O
540	CH	N	H	R^{A4}	O
541	CH	N	H	R^{A5}	O
542	CH	N	H	R^{A6}	O
543	CH	N	H	R^{A7}	O
544	CH	N	H	R^{A8}	O
545	CH	CH	H	H	$C(CH_3)_2$
546	CH	CH	R^{A1}	H	$C(CH_3)_2$
547	CH	CH	R^{A2}	H	$C(CH_3)_2$
548	CH	CH	R^{A3}	H	$C(CH_3)_2$
549	CH	CH	R^{A4}	H	$C(CH_3)_2$
550	CH	CH	R^{A5}	H	$C(CH_3)_2$
551	CH	CH	R^{A6}	H	$C(CH_3)_2$
552	CH	CH	R^{A7}	H	$C(CH_3)_2$
553	CH	CH	R^{A8}	H	$C(CH_3)_2$
554	CH	CH	H	R^{A1}	$C(CH_3)_2$
555	CH	CH	H	R^{A2}	$C(CH_3)_2$
556	CH	CH	H	R^{A3}	$C(CH_3)_2$
557	CH	CH	H	R^{A4}	$C(CH_3)_2$
558	CH	CH	H	R^{A5}	$C(CH_3)_2$
559	CH	CH	H	R^{A6}	$C(CH_3)_2$
560	CH	CH	H	R^{A7}	$C(CH_3)_2$
561	CH	CH	H	R^{A8}	$C(CH_3)_2$
562	N	CH	H	H	$C(CH_3)_2$
563	N	CH	R^{A1}	H	$C(CH_3)_2$
564	N	CH	R^{A2}	H	$C(CH_3)_2$
565	N	CH	R^{A3}	H	$C(CH_3)_2$
566	N	CH	R^{A4}	H	$C(CH_3)_2$
567	N	CH	R^{A5}	H	$C(CH_3)_2$
568	N	CH	R^{A6}	H	$C(CH_3)_2$
569	N	CH	R^{A7}	H	$C(CH_3)_2$
570	N	CH	R^{A8}	H	$C(CH_3)_2$
571	N	CH	H	R^{A1}	$C(CH_3)_2$
572	N	CH	H	R^{A2}	$C(CH_3)_2$
573	N	CH	H	R^{A3}	$C(CH_3)_2$
574	N	CH	H	R^{A4}	$C(CH_3)_2$
575	N	CH	H	R^{A5}	$C(CH_3)_2$
576	N	CH	H	R^{A6}	$C(CH_3)_2$
577	N	CH	H	R^{A7}	$C(CH_3)_2$
578	N	CH	H	R^{A8}	$C(CH_3)_2$
579	N	N	H	H	$C(CH_3)_2$
580	N	N	R^{A1}	H	$C(CH_3)_2$
581	N	N	R^{A2}	H	$C(CH_3)_2$
582	N	N	R^{A3}	H	$C(CH_3)_2$
583	N	N	R^{A4}	H	$C(CH_3)_2$
584	N	N	R^{A5}	H	$C(CH_3)_2$
585	N	N	R^{A6}	H	$C(CH_3)_2$
586	N	N	R^{A7}	H	$C(CH_3)_2$
587	N	N	R^{A8}	H	$C(CH_3)_2$
588	N	N	H	R^{A1}	$C(CH_3)_2$
589	N	N	H	R^{A2}	$C(CH_3)_2$
590	N	N	H	R^{A3}	$C(CH_3)_2$
591	N	N	H	R^{A4}	$C(CH_3)_2$
592	N	N	H	R^{A5}	$C(CH_3)_2$
593	N	N	H	R^{A6}	$C(CH_3)_2$
594	N	N	H	R^{A7}	$C(CH_3)_2$
595	N	N	H	R^{A8}	$C(CH_3)_2$
596	CH	N	H	H	$C(CH_3)_2$
597	CH	N	R^{A1}	H	$C(CH_3)_2$
598	CH	N	R^{A2}	H	$C(CH_3)_2$
599	CH	N	R^{A3}	H	$C(CH_3)_2$
600	CH	N	R^{A4}	H	$C(CH_3)_2$
601	CH	N	R^{A5}	H	$C(CH_3)_2$
602	CH	N	R^{A6}	H	$C(CH_3)_2$
603	CH	N	R^{A7}	H	$C(CH_3)_2$
604	CH	N	R^{A8}	H	$C(CH_3)_2$
605	CH	N	H	R^{A1}	$C(CH_3)_2$
606	CH	N	H	R^{A2}	$C(CH_3)_2$
607	CH	N	H	R^{A3}	$C(CH_3)_2$
608	CH	N	H	R^{A4}	$C(CH_3)_2$
609	CH	N	H	R^{A5}	$C(CH_3)_2$
610	CH	N	H	R^{A6}	$C(CH_3)_2$
611	CH	N	H	R^{A7}	$C(CH_3)_2$

-continued

m	X^1	X^2	R^1	R^2	Y^1
612	CH	N	H	R^{A8}	$C(CH_3)_2$
613	CH	CH	H	H	NCH_3
614	CH	CH	R^{A1}	H	NCH_3
615	CH	CH	R^{A2}	H	NCH_3
616	CH	CH	R^{A3}	H	NCH_3
617	CH	CH	R^{A4}	H	NCH_3
618	CH	CH	R^{A5}	H	NCH_3
619	CH	CH	R^{A6}	H	NCH_3
620	CH	CH	R^{A7}	H	NCH_3
621	CH	CH	R^{A8}	H	NCH_3
622	CH	CH	H	R^{A1}	NCH_3
623	CH	CH	H	R^{A2}	NCH_3
624	CH	CH	H	R^{A3}	NCH_3
625	CH	CH	H	R^{A4}	NCH_3
626	CH	CH	H	R^{A5}	NCH_3
627	CH	CH	H	R^{A6}	NCH_3
628	CH	CH	H	R^{A7}	NCH_3
629	CH	CH	H	R^{A8}	NCH_3
630	N	CH	H	H	NCH_3
631	N	CH	R^{A1}	H	NCH_3
632	N	CH	R^{A2}	H	NCH_3
633	N	CH	R^{A3}	H	NCH_3
634	N	CH	R^{A4}	H	NCH_3
635	N	CH	R^{A5}	H	NCH_3
636	N	CH	R^{A6}	H	NCH_3
637	N	CH	R^{A7}	H	NCH_3
638	N	CH	R^{A8}	H	NCH_3
639	N	CH	H	R^{A1}	NCH_3
640	N	CH	H	R^{A2}	NCH_3
641	N	CH	H	R^{A3}	NCH_3
642	N	CH	H	R^{A4}	NCH_3
643	N	CH	H	R^{A5}	NCH_3
644	N	CH	H	R^{A6}	NCH_3
645	N	CH	H	R^{A7}	NCH_3
646	N	CH	H	R^{A8}	NCH_3
647	N	N	H	H	NCH_3
648	N	N	R^{A1}	H	NCH_3
649	N	N	R^{A2}	H	NCH_3
650	N	N	R^{A3}	H	NCH_3
651	N	N	R^{A4}	H	NCH_3
652	N	N	R^{A5}	H	NCH_3
653	N	N	R^{A6}	H	NCH_3
654	N	N	R^{A7}	H	NCH_3
655	N	N	R^{A8}	H	NCH_3
656	N	N	H	R^{A1}	NCH_3
657	N	N	H	R^{A2}	NCH_3
658	N	N	H	R^{A3}	NCH_3
659	N	N	H	R^{A4}	NCH_3
660	N	N	H	R^{A5}	NCH_3
661	N	N	H	R^{A6}	NCH_3
662	N	N	H	R^{A7}	NCH_3
663	N	N	H	R^{A8}	NCH_3
664	CH	N	H	H	NCH_3
665	CH	N	R^{A1}	H	NCH_3
666	CH	N	R^{A2}	H	NCH_3
667	CH	N	R^{A3}	H	NCH_3
668	CH	N	R^{A4}	H	NCH_3
669	CH	N	R^{A5}	H	NCH_3
670	CH	N	R^{A6}	H	NCH_3
671	CH	N	R^{A7}	H	NCH_3
672	CH	N	R^{A8}	H	NCH_3
673	CH	N	H	R^{A1}	NCH_3
674	CH	N	H	R^{A2}	NCH_3
675	CH	N	H	R^{A3}	NCH_3
676	CH	N	H	R^{A4}	NCH_3
677	CH	N	H	R^{A5}	NCH_3
678	CH	N	H	R^{A6}	NCH_3
679	CH	N	H	R^{A7}	NCH_3
680	CH	N	H	R^{A8}	NCH_3
681	CH	CH	H	H	$N(R_{A6})$
682	CH	CH	R^{A1}	H	$N(R_{A6})$
683	CH	CH	R^{A2}	H	$N(R_{A6})$
684	CH	CH	R^{A3}	H	$N(R_{A6})$
685	CH	CH	R^{A4}	H	$N(R_{A6})$

-continued

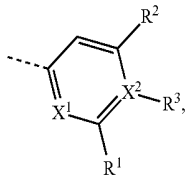
m	X^1	X^2	R^1	R^2	Y^1
686	CH	CH	R^{A5}	H	$N(R_{A6})$
687	CH	CH	R^{A6}	H	$N(R_{A6})$
688	CH	CH	R^{A7}	H	$N(R_{A6})$
689	CH	CH	R^{A8}	H	$N(R_{A6})$
690	CH	CH	H	R^{A1}	$N(R_{A6})$
691	CH	CH	H	R^{A2}	$N(R_{A6})$
692	CH	CH	H	R^{A3}	$N(R_{A6})$
693	CH	CH	H	R^{A4}	$N(R_{A6})$
694	CH	CH	H	R^{A5}	$N(R_{A6})$
695	CH	CH	H	R^{A6}	$N(R_{A6})$
696	CH	CH	H	R^{A7}	$N(R_{A6})$
697	CH	CH	H	R^{A8}	$N(R_{A6})$
698	N	CH	H	H	$N(R_{A6})$
699	N	CH	R^{A1}	H	$N(R_{A6})$
700	N	CH	R^{A2}	H	$N(R_{A6})$
701	N	CH	R^{A3}	H	$N(R_{A6})$
702	N	CH	R^{A4}	H	$N(R_{A6})$
703	N	CH	R^{A5}	H	$N(R_{A6})$
704	N	CH	R^{A6}	H	$N(R_{A6})$
705	N	CH	R^{A7}	H	$N(R_{A6})$
706	N	CH	R^{A8}	H	$N(R_{A6})$
707	N	CH	H	R^{A1}	$N(R_{A6})$
708	N	CH	H	R^{A2}	$N(R_{A6})$
709	N	CH	H	R^{A3}	$N(R_{A6})$
710	N	CH	H	R^{A4}	$N(R_{A6})$
711	N	CH	H	R^{A5}	$N(R_{A6})$
712	N	CH	H	R^{A6}	$N(R_{A6})$
713	N	CH	H	R^{A7}	$N(R_{A6})$
714	N	CH	H	R^{A8}	$N(R_{A6})$
715	N	N	H	H	$N(R_{A6})$
716	N	N	R^{A1}	H	$N(R_{A6})$
717	N	N	R^{A2}	H	$N(R_{A6})$
718	N	N	R^{A3}	H	$N(R_{A6})$
719	N	N	R^{A4}	H	$N(R_{A6})$
720	N	N	R^{A5}	H	$N(R_{A6})$
721	N	N	R^{A6}	H	$N(R_{A6})$
722	N	N	R^{A7}	H	$N(R_{A6})$
723	N	N	R^{A8}	H	$N(R_{A6})$
724	N	N	H	R^{A1}	$N(R_{A6})$
725	N	N	H	R^{A2}	$N(R_{A6})$
726	N	N	H	R^{A3}	$N(R_{A6})$
727	N	N	H	R^{A4}	$N(R_{A6})$
728	N	N	H	R^{A5}	$N(R_{A6})$
729	N	N	H	R^{A6}	$N(R_{A6})$
730	N	N	H	R^{A7}	$N(R_{A6})$
731	N	N	H	R^{A8}	$N(R_{A6})$
732	CH	N	H	H	$N(R_{A6})$
733	CH	N	R^{A1}	H	$N(R_{A6})$
734	CH	N	R^{A2}	H	$N(R_{A6})$
735	CH	N	R^{A3}	H	$N(R_{A6})$
736	CH	N	R^{A4}	H	$N(R_{A6})$
737	CH	N	R^{A5}	H	$N(R_{A6})$
738	CH	N	R^{A6}	H	$N(R_{A6})$
739	CH	N	R^{A7}	H	$N(R_{A6})$
740	CH	N	R^{A8}	H	$N(R_{A6})$
741	CH	N	H	R^{A1}	$N(R_{A6})$
742	CH	N	H	R^{A2}	$N(R_{A6})$
743	CH	N	H	R^{A3}	$N(R_{A6})$
744	CH	N	H	R^{A4}	$N(R_{A6})$
745	CH	N	H	R^{A5}	$N(R_{A6})$
746	CH	N	H	R^{A6}	$N(R_{A6})$
747	CH	N	H	R^{A7}	$N(R_{A6})$
748	CH	N	H	R^{A8}	$N(R_{A6})$
749	CH	CH	H	H	$Si(CH_3)_2$
750	CH	CH	R^{A1}	H	$Si(CH_3)_2$
751	CH	CH	R^{A2}	H	$Si(CH_3)_2$
752	CH	CH	R^{A3}	H	$Si(CH_3)_2$
753	CH	CH	R^{A4}	H	$Si(CH_3)_2$
754	CH	CH	R^{A5}	H	$Si(CH_3)_2$
755	CH	CH	R^{A6}	H	$Si(CH_3)_2$
756	CH	CH	R^{A7}	H	$Si(CH_3)_2$
757	CH	CH	R^{A8}	H	$Si(CH_3)_2$
758	CH	CH	H	R^{A1}	$Si(CH_3)_2$
759	CH	CH	H	R^{A2}	$Si(CH_3)_2$

-continued

m	X^1	X^2	R^1	R^2	Y^1
760	CH	CH	H	R^{A3}	$Si(CH_3)_2$
761	CH	CH	H	R^{A4}	$Si(CH_3)_2$
762	CH	CH	H	R^{A5}	$Si(CH_3)_2$
763	CH	CH	H	R^{A6}	$Si(CH_3)_2$
764	CH	CH	H	R^{A7}	$Si(CH_3)_2$
765	CH	CH	H	R^{A8}	$Si(CH_3)_2$
766	N	CH	H	H	$Si(CH_3)_2$
767	N	CH	R^{A1}	H	$Si(CH_3)_2$
768	N	CH	R^{A2}	H	$Si(CH_3)_2$
769	N	CH	R^{A3}	H	$Si(CH_3)_2$
770	N	CH	R^{A4}	H	$Si(CH_3)_2$
771	N	CH	R^{A5}	H	$Si(CH_3)_2$
772	N	CH	R^{A6}	H	$Si(CH_3)_2$
773	N	CH	R^{A7}	H	$Si(CH_3)_2$
774	N	CH	R^{A8}	H	$Si(CH_3)_2$
775	N	CH	H	R^{A1}	$Si(CH_3)_2$
776	N	CH	H	R^{A2}	$Si(CH_3)_2$
777	N	CH	H	R^{A3}	$Si(CH_3)_2$
778	N	CH	H	R^{A4}	$Si(CH_3)_2$
779	N	CH	H	R^{A5}	$Si(CH_3)_2$
780	N	CH	H	R^{A6}	$Si(CH_3)_2$
781	N	CH	H	R^{A7}	$Si(CH_3)_2$
782	N	CH	H	R^{A8}	$Si(CH_3)_2$
783	N	N	H	H	$Si(CH_3)_2$
784	N	N	R^{A1}	H	$Si(CH_3)_2$
785	N	N	R^{A2}	H	$Si(CH_3)_2$
786	N	N	R^{A3}	H	$Si(CH_3)_2$
787	N	N	R^{A4}	H	$Si(CH_3)_2$
788	N	N	R^{A5}	H	$Si(CH_3)_2$
789	N	N	R^{A6}	H	$Si(CH_3)_2$
790	N	N	R^{A7}	H	$Si(CH_3)_2$
791	N	N	R^{A8}	H	$Si(CH_3)_2$
792	N	N	H	R^{A1}	$Si(CH_3)_2$
793	N	N	H	R^{A2}	$Si(CH_3)_2$
794	N	N	H	R^{A3}	$Si(CH_3)_2$
795	N	N	H	R^{A4}	$Si(CH_3)_2$
796	N	N	H	R^{A5}	$Si(CH_3)_2$
797	N	N	H	R^{A6}	$Si(CH_3)_2$
798	N	N	H	R^{A7}	$Si(CH_3)_2$
799	N	N	H	R^{A8}	$Si(CH_3)_2$
800	CH	N	H	H	$Si(CH_3)_2$
801	CH	N	R^{A1}	H	$Si(CH_3)_2$
802	CH	N	R^{A2}	H	$Si(CH_3)_2$
803	CH	N	R^{A3}	H	$Si(CH_3)_2$
804	CH	N	R^{A4}	H	$Si(CH_3)_2$
805	CH	N	R^{A5}	H	$Si(CH_3)_2$
806	CH	N	R^{A6}	H	$Si(CH_3)_2$
807	CH	N	R^{A7}	H	$Si(CH_3)_2$
808	CH	N	R^{A8}	H	$Si(CH_3)_2$
809	CH	N	H	R^{A1}	$Si(CH_3)_2$
810	CH	N	H	R^{A2}	$Si(CH_3)_2$
811	CH	N	H	R^{A3}	$Si(CH_3)_2$
812	CH	N	H	R^{A4}	$Si(CH_3)_2$
813	CH	N	H	R^{A5}	$Si(CH_3)_2$
814	CH	N	H	R^{A6}	$Si(CH_3)_2$
815	CH	N	H	R^{A7}	$Si(CH_3)_2$
816	CH	N	H	R^{A8}	$Si(CH_3)_2$

[0112] wherein:

[0113] ligands L_{A2449} to L_{A2850} are based on a structure of Formula VII



where i=1632+m

[0114] wherein m is an integer from 817 to 1218 and for each m, X^1, X^2, R^1, R^2, and R^3 are defined in formula VII as follows:

m	X^1	X^2	R^1	R^2	R^3
817	CH	CH	R^{A1}	H	H
818	CH	CH	R^{A1}	R^{A2}	H
819	CH	CH	R^{A1}	R^{A3}	H
820	CH	CH	R^{A1}	R^{A4}	H
821	CH	CH	R^{A1}	R^{A5}	H
822	CH	CH	R^{A1}	R^{A6}	H
823	CH	CH	R^{A1}	R^{A7}	H
824	CH	CH	R^{A1}	R^{A8}	H
825	CH	CH	R^{A2}	H	H
826	CH	CH	R^{A2}	R^{A1}	H
827	CH	CH	R^{A2}	R^{A3}	H
828	CH	CH	R^{A2}	R^{A4}	H
829	CH	CH	R^{A2}	R^{A5}	H
830	CH	CH	R^{A2}	R^{A6}	H
831	CH	CH	R^{A2}	R^{A7}	H
832	CH	CH	R^{A2}	R^{A8}	H
833	CH	CH	R^{A3}	H	H
834	CH	CH	R^{A3}	R^{A1}	H
835	CH	CH	R^{A3}	R^{A2}	H
836	CH	CH	R^{A3}	R^{A4}	H
837	CH	CH	R^{A3}	R^{A5}	H
838	CH	CH	R^{A3}	R^{A6}	H
839	CH	CH	R^{A3}	R^{A7}	H
840	CH	CH	R^{A3}	R^{A8}	H
841	CH	CH	R^{A4}	H	H
842	CH	CH	R^{A4}	R^{A1}	H
843	CH	CH	R^{A4}	R^{A2}	H
844	CH	CH	R^{A4}	R^{A3}	H
845	CH	CH	R^{A4}	R^{A5}	H
846	CH	CH	R^{A4}	R^{A6}	H
847	CH	CH	R^{A4}	R^{A7}	H
848	CH	CH	R^{A4}	R^{A8}	H
849	CH	CH	R^{A5}	H	H
850	CH	CH	R^{A5}	R^{A1}	H
851	CH	CH	R^{A5}	R^{A2}	H
852	CH	CH	R^{A5}	R^{A3}	H
853	CH	CH	R^{A5}	R^{A4}	H
854	CH	CH	R^{A5}	R^{A6}	H
855	CH	CH	R^{A5}	R^{A7}	H
856	CH	CH	R^{A5}	R^{A8}	H
857	CH	CH	R^{A6}	H	H
858	CH	CH	R^{A6}	R^{A1}	H
859	CH	CH	R^{A6}	R^{A2}	H
860	CH	CH	R^{A6}	R^{A3}	H
861	CH	CH	R^{A6}	R^{A4}	H
862	CH	CH	R^{A6}	R^{A5}	H
863	CH	CH	R^{A6}	R^{A7}	H
864	CH	CH	R^{A6}	R^{A8}	H
865	CH	CH	R^{A7}	H	H
866	CH	CH	R^{A7}	R^{A1}	H
867	CH	CH	R^{A7}	R^{A2}	H
868	CH	CH	R^{A7}	R^{A3}	H
869	CH	CH	R^{A7}	R^{A4}	H
870	CH	CH	R^{A7}	R^{A5}	H
871	CH	CH	R^{A7}	R^{A6}	H
872	CH	CH	R^{A7}	R^{A8}	H
873	CH	CH	R^{A8}	H	H
874	CH	CH	R^{A8}	R^{A1}	H
875	CH	CH	R^{A8}	R^{A2}	H
876	CH	CH	R^{A8}	R^{A3}	H
877	CH	CH	R^{A8}	R^{A4}	H
878	CH	CH	R^{A8}	R^{A5}	H
879	CH	CH	R^{A8}	R^{A6}	H
880	CH	CH	R^{A8}	R^{A8}	H
881	N	CH	H	H	H
882	N	CH	R^{A1}	H	H
883	N	CH	R^{A1}	R^{A2}	H
884	N	CH	R^{A1}	R^{A3}	H
885	N	CH	R^{A1}	R^{A4}	H
886	N	CH	R^{A1}	R^{A5}	H
887	N	CH	R^{A1}	R^{A6}	H

-continued

m	X^1	X^2	R^1	R^2	R^3
888	N	CH	R^{A1}	R^{A1}	H
889	N	CH	R^{A1}	R^{A8}	H
890	N	CH	R^{A2}	H	H
891	N	CH	R^{A2}	R^{A1}	H
892	N	CH	R^{A2}	R^{A3}	H
893	N	CH	R^{A2}	R^{A4}	H
894	N	CH	R^{A2}	R^{A5}	H
895	N	CH	R^{A2}	R^{A6}	H
896	N	CH	R^{A2}	R^{A7}	H
897	N	CH	R^{A2}	R^{A8}	H
898	N	CH	R^{A3}	H	H
899	N	CH	R^{A3}	R^{A1}	H
900	N	CH	R^{A3}	R^{A2}	H
901	N	CH	R^{A3}	R^{A4}	H
902	N	CH	R^{A3}	R^{A5}	H
903	N	CH	R^{A3}	R^{A6}	H
904	N	CH	R^{A3}	R^{A7}	H
905	N	CH	R^{A3}	R^{A8}	H
906	N	CH	R^{A4}	H	H
907	N	CH	R^{A4}	R^{A1}	H
908	N	CH	R^{A4}	R^{A2}	H
909	N	CH	R^{A4}	R^{A3}	H
910	N	CH	R^{A4}	R^{A5}	H
911	N	CH	R^{A4}	R^{A6}	H
912	N	CH	R^{A4}	R^{A7}	H
913	N	CH	R^{A4}	R^{A8}	H
914	N	CH	R^{A5}	H	H
915	N	CH	R^{A5}	R^{A1}	H
916	N	CH	R^{A5}	R^{A2}	H
917	N	CH	R^{A5}	R^{A3}	H
918	N	CH	R^{A5}	R^{A4}	H
919	N	CH	R^{A5}	R^{A6}	H
920	N	CH	R^{A5}	R^{A7}	H
921	N	CH	R^{A5}	R^{A8}	H
922	N	CH	R^{A6}	H	H
923	N	CH	R^{A6}	R^{A1}	H
924	N	CH	R^{A6}	R^{A2}	H
925	N	CH	R^{A6}	R^{A3}	H
926	N	CH	R^{A6}	R^{A4}	H
927	N	CH	R^{A6}	R^{A5}	H
928	N	CH	R^{A6}	R^{A7}	H
929	N	CH	R^{A6}	R^{A8}	H
930	N	CH	R^{A7}	H	H
931	N	CH	R^{A7}	R^{A1}	H
932	N	CH	R^{A7}	R^{A2}	H
933	N	CH	R^{A7}	R^{A3}	H
934	N	CH	R^{A7}	R^{A4}	H
935	N	CH	R^{A7}	R^{A5}	H
936	N	CH	R^{A7}	R^{A6}	H
937	N	CH	R^{A7}	R^{A8}	H
938	N	CH	R^{A8}	H	H
939	N	CH	R^{A8}	R^{A1}	H
940	N	CH	R^{A8}	R^{A2}	H
941	N	CH	R^{A8}	R^{A3}	H
942	N	CH	R^{A8}	R^{A4}	H
943	N	CH	R^{A8}	R^{A5}	H
944	N	CH	R^{A8}	R^{A6}	H
945	N	CH	R^{A8}	R^{A7}	H
946	N	CH	R^{A1}	R^{A1}	H
947	N	CH	R^{A2}	R^{A2}	H
948	N	CH	R^{A3}	R^{A3}	H
949	N	CH	R^{A4}	R^{A4}	H
950	N	CH	R^{A5}	R^{A5}	H
951	N	CH	R^{A6}	R^{A6}	H
952	N	CH	R^{A7}	R^{A7}	H
953	N	CH	R^{A8}	R^{A8}	H
954	N	N	H	H	—
955	N	N	R^{A1}	H	—
956	N	N	R^{A1}	R^{A2}	—
957	N	N	R^{A1}	R^{A3}	—
958	N	N	R^{A1}	R^{A4}	—
959	N	N	R^{A1}	R^{A5}	—
960	N	N	R^{A1}	R^{A6}	—
961	N	N	R^{A1}	R^{A7}	—

-continued

m	X^1	X^2	R^1	R^2	R^3
962	N	N	R^{A1}	R^{A8}	—
963	N	N	R^{A2}	H	—
964	N	N	R^{A2}	R^{A1}	—
965	N	N	R^{A2}	R^{A3}	—
966	N	N	R^{A2}	R^{A4}	—
967	N	N	R^{A2}	R^{A5}	—
968	N	N	R^{A2}	R^{A6}	—
969	N	N	R^{A2}	R^{A7}	—
970	N	N	R^{A2}	R^{A8}	—
971	N	N	R^{A3}	H	—
972	N	N	R^{A3}	R^{A1}	—
973	N	N	R^{A3}	R^{A2}	—
974	N	N	R^{A3}	R^{A4}	—
975	N	N	R^{A3}	R^{A5}	—
976	N	N	R^{A3}	R^{A6}	—
977	N	N	R^{A3}	R^{A7}	—
978	N	N	R^{A3}	R^{A8}	—
979	N	N	R^{A4}	H	—
980	N	N	R^{A4}	R^{A1}	—
981	N	N	R^{A4}	R^{A2}	—
982	N	N	R^{A4}	R^{A3}	—
983	N	N	R^{A4}	R^{A5}	—
984	N	N	R^{A4}	R^{A6}	—
985	N	N	R^{A4}	R^{A7}	—
986	N	N	R^{A4}	R^{A8}	—
987	N	N	R^{A5}	H	—
988	N	N	R^{A5}	R^{A1}	—
989	N	N	R^{A5}	R^{A2}	—
990	N	N	R^{A5}	R^{A3}	—
991	N	N	R^{A5}	R^{A4}	—
992	N	N	R^{A5}	R^{A6}	—
993	N	N	R^{A5}	R^{A7}	—
994	N	N	R^{A5}	R^{A8}	—
995	N	N	R^{A6}	H	—
996	N	N	R^{A6}	R^{A1}	—
997	N	N	R^{A6}	R^{A2}	—
998	N	N	R^{A6}	R^{A3}	—
999	N	N	R^{A6}	R^{A4}	—
1000	N	N	R^{A6}	R^{A5}	—
1001	N	N	R^{A6}	R^{A7}	—
1002	N	N	R^{A6}	R^{A8}	—
1003	N	N	R^{A7}	H	—
1004	N	N	R^{A7}	R^{A1}	—
1005	N	N	R^{A7}	R^{A2}	—
1006	N	N	R^{A7}	R^{A3}	—
1007	N	N	R^{A7}	R^{A4}	—
1008	N	N	R^{A7}	R^{A5}	—
1009	N	N	R^{A7}	R^{A6}	—
1010	N	N	R^{A7}	R^{A8}	—
1011	N	N	R^{A8}	H	—
1012	N	N	R^{A8}	R^{A1}	—
1013	N	N	R^{A8}	R^{A2}	—
1014	N	N	R^{A8}	R^{A3}	—
1015	N	N	R^{A8}	R^{A4}	—
1016	N	N	R^{A8}	R^{A5}	—
1017	N	N	R^{A8}	R^{A6}	—
1018	N	N	R^{A8}	R^{A1}	—
1019	N	N	R^{A1}	R^{A1}	—
1020	N	N	R^{A2}	R^{A2}	—
1021	N	N	R^{A3}	R^{A3}	—
1022	N	N	R^{A4}	R^{A4}	—
1023	N	N	R^{A5}	R^{A5}	—
1024	N	N	R^{A6}	R^{A6}	—
1025	N	N	R^{A7}	R^{A7}	—
1026	N	N	R^{A8}	R^{A8}	—
1027	CH	C	R^{A1}	H	R^{A6}
1028	CH	C	R^{A1}	R^{A2}	R^{A6}
1029	CH	C	R^{A1}	R^{A3}	R^{A6}
1030	CH	C	R^{A1}	R^{A4}	R^{A6}
1031	CH	C	R^{A1}	R^{A5}	R^{A6}
1032	CH	C	R^{A1}	R^{A6}	R^{A6}
1033	CH	C	R^{A1}	R^{A7}	R^{A6}
1034	CH	C	R^{A1}	R^{A8}	R^{A6}
1035	CH	C	R^{A2}	H	R^{A6}

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m	X^1	X^2	R^1	R^2	R^3
1036	CH	C	R^{A2}	R^{A1}	R^{A6}
1037	CH	C	R^{A2}	R^{A3}	R^{A6}
1038	CH	C	R^{A2}	R^{A4}	R^{A6}
1039	CH	C	R^{A2}	R^{A5}	R^{A6}
1040	CH	C	R^{A2}	R^{A6}	R^{A6}
1041	CH	C	R^{A2}	R^{A7}	R^{A6}
1042	CH	C	R^{A2}	R^{A8}	R^{A6}
1043	CH	C	R^{A3}	H	R^{A6}
1044	CH	C	R^{A3}	R^{A1}	R^{A6}
1045	CH	C	R^{A3}	R^{A2}	R^{A6}
1046	CH	C	R^{A3}	R^{A4}	R^{A6}
1047	CH	C	R^{A3}	R^{A5}	R^{A6}
1048	CH	C	R^{A3}	R^{A6}	R^{A6}
1049	CH	C	R^{A3}	R^{A7}	R^{A6}
1050	CH	C	R^{A3}	R^{A8}	R^{A6}
1051	CH	C	R^{A4}	H	R^{A6}
1052	CH	C	R^{A4}	R^{A1}	R^{A6}
1053	CH	C	R^{A4}	R^{A2}	R^{A6}
1054	CH	C	R^{A4}	R^{A3}	R^{A6}
1055	CH	C	R^{A4}	R^{A5}	R^{A6}
1056	CH	C	R^{A4}	R^{A6}	R^{A6}
1057	CH	C	R^{A4}	R^{A7}	R^{A6}
1058	CH	C	R^{A4}	R^{A8}	R^{A6}
1059	CH	C	R^{A5}	H	R^{A6}
1060	CH	C	R^{A5}	R^{A1}	R^{A6}
1061	CH	C	R^{A5}	R^{A2}	R^{A6}
1062	CH	C	R^{A5}	R^{A3}	R^{A6}
1063	CH	C	R^{A5}	R^{A4}	R^{A6}
1064	CH	C	R^{A5}	R^{A6}	R^{A6}
1065	CH	C	R^{A5}	R^{A7}	R^{A6}
1066	CH	C	R^{A5}	R^{A8}	R^{A6}
1067	CH	C	R^{A6}	H	R^{A6}
1068	CH	C	R^{A6}	R^{A1}	R^{A6}
1069	CH	C	R^{A6}	R^{A2}	R^{A6}
1070	CH	C	R^{A6}	R^{A3}	R^{A6}
1071	CH	C	R^{A6}	R^{A4}	R^{A6}
1072	CH	C	R^{A6}	R^{A5}	R^{A6}
1073	CH	C	R^{A6}	R^{A7}	R^{A6}
1074	CH	C	R^{A6}	R^{A8}	R^{A6}
1075	CH	C	R^{A7}	H	R^{A6}
1076	CH	C	R^{A7}	R^{A1}	R^{A6}
1077	CH	C	R^{A7}	R^{A2}	R^{A6}
1078	CH	C	R^{A7}	R^{A3}	R^{A6}
1079	CH	C	R^{A7}	R^{A4}	R^{A6}
1080	CH	C	R^{A7}	R^{A5}	R^{A6}
1081	CH	C	R^{A7}	R^{A6}	R^{A6}
1082	CH	C	R^{A7}	R^{A8}	R^{A6}
1083	CH	C	R^{A8}	H	R^{A6}
1084	CH	C	R^{A8}	R^{A1}	R^{A6}
1085	CH	C	R^{A8}	R^{A2}	R^{A6}
1086	CH	C	R^{A8}	R^{A3}	R^{A6}
1087	CH	C	R^{A8}	R^{A4}	R^{A6}
1088	CH	C	R^{A8}	R^{A5}	R^{A6}
1089	CH	C	R^{A8}	R^{A6}	R^{A6}
1090	CH	C	R^{A8}	R^{A8}	R^{A6}
1091	N	C	R^{A1}	H	R^{A6}
1092	N	C	R^{A1}	R^{A2}	R^{A6}
1093	N	C	R^{A1}	R^{A3}	R^{A6}
1094	N	C	R^{A1}	R^{A4}	R^{A6}
1095	N	C	R^{A1}	R^{A5}	R^{A6}
1096	N	C	R^{A1}	R^{A6}	R^{A6}
1097	N	C	R^{A1}	R^{A7}	R^{A6}
1098	N	C	R^{A1}	R^{A8}	R^{A6}
1099	N	C	R^{A2}	H	R^{A6}
1100	N	C	R^{A2}	R^{A1}	R^{A6}
1101	N	C	R^{A2}	R^{A3}	R^{A6}
1102	N	C	R^{A2}	R^{A4}	R^{A6}
1103	N	C	R^{A2}	R^{A5}	R^{A6}
1104	N	C	R^{A2}	R^{A6}	R^{A6}
1105	N	C	R^{A2}	R^{A7}	R^{A6}
1106	N	C	R^{A2}	R^{A8}	R^{A6}
1107	N	C	R^{A3}	H	R^{A6}
1108	N	C	R^{A3}	R^{A1}	R^{A6}
1109	N	C	R^{A3}	R^{A2}	R^{A6}

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m	X^1	X^2	R^1	R^2	R^3
1110	N	C	R^{A3}	R^{A4}	R^{A6}
1111	N	C	R^{A3}	R^{A5}	R^{A6}
1112	N	C	R^{A3}	R^{A6}	R^{A6}
1113	N	C	R^{A3}	R^{A7}	R^{A6}
1114	N	C	R^{A3}	R^{A8}	R^{A6}
1115	N	C	R^{A4}	H	R^{A6}
1116	N	C	R^{A4}	R^{A1}	R^{A6}
1117	N	C	R^{A4}	R^{A2}	R^{A6}
1118	N	C	R^{A4}	R^{A3}	R^{A6}
1119	N	C	R^{A4}	R^{A5}	R^{A6}
1120	N	C	R^{A4}	R^{A6}	R^{A6}
1121	N	C	R^{A4}	R^{A7}	R^{A6}
1122	N	C	R^{A4}	R^{A8}	R^{A6}
1123	N	C	R^{A5}	H	R^{A6}
1124	N	C	R^{A5}	R^{A1}	R^{A6}
1125	N	C	R^{A5}	R^{A2}	R^{A6}
1126	N	C	R^{A5}	R^{A3}	R^{A6}
1127	N	C	R^{A5}	R^{A4}	R^{A6}
1128	N	C	R^{A5}	R^{A6}	R^{A6}
1129	N	C	R^{A5}	R^{A7}	R^{A6}
1130	N	C	R^{A5}	R^{A8}	R^{A6}
1131	N	C	R^{A6}	H	R^{A6}
1132	N	C	R^{A6}	R^{A1}	R^{A6}
1133	N	C	R^{A6}	R^{A2}	R^{A6}
1134	N	C	R^{A6}	R^{A3}	R^{A6}
1135	N	C	R^{A6}	R^{A4}	R^{A6}
1136	N	C	R^{A6}	R^{A5}	R^{A6}
1137	N	C	R^{A6}	R^{A7}	R^{A6}
1138	N	C	R^{A6}	R^{A8}	R^{A6}
1139	N	C	R^{A7}	H	R^{A6}
1140	N	C	R^{A7}	R^{A1}	R^{A6}
1141	N	C	R^{A7}	R^{A2}	R^{A6}
1142	N	C	R^{A7}	R^{A3}	R^{A6}
1143	N	C	R^{A7}	R^{A4}	R^{A6}
1144	N	C	R^{A7}	R^{A5}	R^{A6}
1145	N	C	R^{A7}	R^{A6}	R^{A6}
1146	N	C	R^{A7}	R^{A8}	R^{A6}
1147	N	C	R^{A8}	H	R^{A6}
1148	N	C	R^{A8}	R^{A1}	R^{A6}
1149	N	C	R^{A8}	R^{A2}	R^{A6}
1150	N	C	R^{A8}	R^{A3}	R^{A6}
1151	N	C	R^{A8}	R^{A4}	R^{A6}
1152	N	C	R^{A8}	R^{A5}	R^{A6}
1153	N	C	R^{A8}	R^{A6}	R^{A6}
1154	N	C	R^{A8}	R^{A8}	R^{A6}
1155	CH	C	R^{A1}	H	R^{A8}
1156	CH	C	R^{A1}	R^{A2}	R^{A8}
1157	CH	C	R^{A1}	R^{A3}	R^{A8}
1158	CH	C	R^{A1}	R^{A4}	R^{A8}
1159	CH	C	R^{A1}	R^{A5}	R^{A8}
1160	CH	C	R^{A1}	R^{A6}	R^{A8}
1161	CH	C	R^{A1}	R^{A7}	R^{A8}
1162	CH	C	R^{A1}	R^{A8}	R^{A8}
1163	CH	C	R^{A2}	H	R^{A8}
1164	CH	C	R^{A2}	R^{A1}	R^{A8}
1165	CH	C	R^{A2}	R^{A3}	R^{A8}
1166	CH	C	R^{A2}	R^{A4}	R^{A8}
1167	CH	C	R^{A2}	R^{A5}	R^{A8}
1168	CH	C	R^{A2}	R^{A6}	R^{A8}
1169	CH	C	R^{A2}	R^{A7}	R^{A8}
1170	CH	C	R^{A2}	R^{A8}	R^{A8}
1171	CH	C	R^{A3}	H	R^{A8}
1172	CH	C	R^{A3}	R^{A1}	R^{A8}
1173	CH	C	R^{A3}	R^{A2}	R^{A8}
1174	CH	C	R^{A3}	R^{A4}	R^{A8}
1175	CH	C	R^{A3}	R^{A5}	R^{A8}
1176	CH	C	R^{A3}	R^{A6}	R^{A8}
1177	CH	C	R^{A3}	R^{A7}	R^{A8}
1178	CH	C	R^{A3}	R^{A8}	R^{A8}
1179	CH	C	R^{A4}	H	R^{A8}
1180	CH	C	R^{A4}	R^{A1}	R^{A8}
1181	CH	C	R^{A4}	R^{A2}	R^{A8}
1182	CH	C	R^{A4}	R^{A3}	R^{A8}
1183	CH	C	R^{A4}	R^{A5}	R^{A8}

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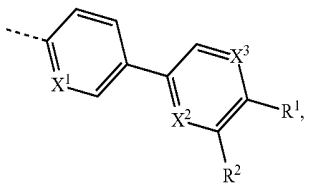
m	X^1	X^2	R^1	R^2	R^3
1184	CH	C	R^{A4}	R^{A6}	R^{A8}
1185	CH	C	R^{A4}	R^{A7}	R^{A8}
1186	CH	C	R^{A4}	R^{A8}	R^{A8}
1187	CH	C	R^{A5}	H	R^{A8}
1188	CH	C	R^{A5}	R^{A1}	R^{A8}
1189	CH	C	R^{A5}	R^{A2}	R^{A8}
1190	CH	C	R^{A5}	R^{A3}	R^{A8}
1191	CH	C	R^{A5}	R^{A4}	R^{A8}
1192	CH	C	R^{A5}	R^{A6}	R^{A8}
1193	CH	C	R^{A5}	R^{A7}	R^{A8}
1194	CH	C	R^{A5}	R^{A8}	R^{A8}
1195	CH	C	R^{A6}	H	R^{A8}
1196	CH	C	R^{A6}	R^{A1}	R^{A8}
1197	CH	C	R^{A6}	R^{A2}	R^{A8}
1198	CH	C	R^{A6}	R^{A3}	R^{A8}
1199	CH	C	R^{A6}	R^{A4}	R^{A8}
1200	CH	C	R^{A6}	R^{A5}	R^{A8}
1201	CH	C	R^{A6}	R^{A7}	R^{A8}
1202	CH	C	R^{A6}	R^{A8}	R^{A8}
1203	CH	C	R^{A7}	H	R^{A8}
1204	CH	C	R^{A7}	R^{A1}	R^{A8}
1205	CH	C	R^{A7}	R^{A2}	R^{A8}
1206	CH	C	R^{A7}	R^{A3}	R^{A8}
1207	CH	C	R^{A7}	R^{A4}	R^{A8}
1208	CH	C	R^{A7}	R^{A5}	R^{A8}
1209	CH	C	R^{A7}	R^{A6}	R^{A8}
1210	CH	C	R^{A7}	R^{A8}	R^{A8}
1211	CH	C	R^{A8}	H	R^{A8}
1212	CH	C	R^{A8}	R^{A1}	R^{A8}
1213	CH	C	R^{A8}	R^{A2}	R^{A8}
1214	CH	C	R^{A8}	R^{A3}	R^{A8}
1215	CH	C	R^{A8}	R^{A4}	R^{A8}
1216	CH	C	R^{A8}	R^{A5}	R^{A8}
1217	CH	C	R^{A8}	R^{A6}	R^{A8}
1218	CH	C	R^{A8}	R^{A8}	R^{A8}

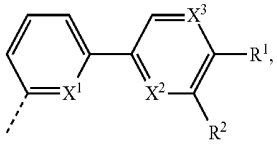
[0115] wherein:

[0116] ligands L_{A2851} to L_{A2986} are based on a structure of Formula VIII



where i=1632+m;

[0117] ligands L_{A2987} to L_{A3122} are based on a structure of Formula IX



where i=1768+m;

[0118] wherein m is an integer from 1219 to 1354 and for each m, X^1, X^2, X^3, R^1, and R^2 are defined in formulas VIII, and IX as follows:

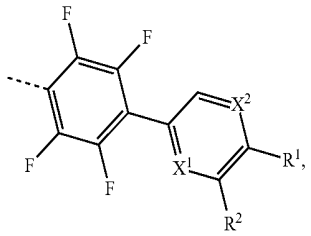
m	X^1	X^2	X^3	R^1	R^2
1219	CH	CH	CH	H	H
1220	CH	CH	CH	R^{A1}	H
1221	CH	CH	CH	R^{A2}	H
1222	CH	CH	CH	R^{A3}	H
1223	CH	CH	CH	R^{A4}	H
1224	CH	CH	CH	R^{A5}	H
1225	CH	CH	CH	R^{A6}	H
1226	CH	CH	CH	R^{A7}	H
1227	CH	CH	CH	R^{A8}	H
1228	CH	CH	CH	H	R^{A1}
1229	CH	CH	CH	H	R^{A2}
1230	CH	CH	CH	H	R^{A3}
1231	CH	CH	CH	H	R^{A4}
1232	CH	CH	CH	H	R^{A5}
1233	CH	CH	CH	H	R^{A6}
1234	CH	CH	CH	H	R^{A7}
1235	CH	CH	CH	H	R^{A8}
1236	N	CH	CH	H	H
1237	N	CH	CH	R^{A1}	H
1238	N	CH	CH	R^{A2}	H
1239	N	CH	CH	R^{A3}	H
1240	N	CH	CH	R^{A4}	H
1241	N	CH	CH	R^{A5}	H
1242	N	CH	CH	R^{A6}	H
1243	N	CH	CH	R^{A7}	H
1244	N	CH	CH	R^{A8}	H
1245	N	CH	CH	H	R^{A1}
1246	N	CH	CH	H	R^{A2}
1247	N	CH	CH	H	R^{A3}
1248	N	CH	CH	H	R^{A4}
1249	N	CH	CH	H	R^{A5}
1250	N	CH	CH	H	R^{A6}
1251	N	CH	CH	H	R^{A7}
1252	N	CH	CH	H	R^{A8}
1253	CH	N	CH	H	H
1254	CH	N	CH	R^{A1}	H
1255	CH	N	CH	R^{A2}	H
1256	CH	N	CH	R^{A3}	H
1257	CH	N	CH	R^{A4}	H
1258	CH	N	CH	R^{A5}	H
1259	CH	N	CH	R^{A6}	H
1260	CH	N	CH	R^{A7}	H
1261	CH	N	CH	R^{A8}	H
1262	CH	N	CH	H	R^{A1}
1263	CH	N	CH	H	R^{A2}
1264	CH	N	CH	H	R^{A3}
1265	CH	N	CH	H	R^{A4}
1266	CH	N	CH	H	R^{A5}
1267	CH	N	CH	H	R^{A6}
1268	CH	N	CH	H	R^{A7}
1269	CH	N	CH	H	R^{A8}
1270	CH	N	CH	H	H
1271	CH	N	CH	R^{A1}	H
1272	CH	N	CH	R^{A2}	H
1273	CH	N	CH	R^{A3}	H
1274	CH	N	CH	R^{A4}	H
1275	CH	N	CH	R^{A5}	H
1276	CH	N	CH	R^{A6}	H
1277	CH	N	CH	R^{A7}	H
1278	CH	N	CH	R^{A8}	H
1279	CH	N	CH	H	R^{A1}
1280	CH	N	CH	H	R^{A2}
1281	CH	N	CH	H	R^{A3}
1282	CH	N	CH	H	R^{A4}
1283	CH	N	CH	H	R^{A5}
1284	CH	N	CH	H	R^{A6}
1285	CH	N	CH	H	R^{A7}
1286	CH	N	CH	H	R^{A8}
1287	CH	CH	N	H	H
1288	CH	CH	N	R^{A1}	H
1289	CH	CH	N	R^{A2}	H
1290	CH	CH	N	R^{A3}	H
1291	CH	CH	N	R^{A4}	H
1292	CH	CH	N	R^{A5}	H
1293	CH	CH	N	R^{A6}	H
1294	CH	CH	N	R^{A7}	H

-continued

m	X^1	X^2	X^3	R^1	R^2
1295	CH	CH	N	R^{A8}	H
1296	CH	CH	N	H	R^{A1}
1297	CH	CH	N	H	R^{A2}
1298	CH	CH	N	H	R^{A3}
1299	CH	CH	N	H	R^{A4}
1300	CH	CH	N	H	R^{A5}
1301	CH	CH	N	H	R^{A6}
1302	CH	CH	N	H	R^{A7}
1303	CH	CH	N	H	R^{A8}
1304	N	CH	N	H	H
1305	N	CH	N	R^{A1}	H
1306	N	CH	N	R^{A2}	H
1307	N	CH	N	R^{A3}	H
1308	N	CH	N	R^{A4}	H
1309	N	CH	N	R^{A5}	H
1310	N	CH	N	R^{A6}	H
1311	N	CH	N	R^{A7}	H
1312	N	CH	N	R^{A8}	H
1313	N	CH	N	H	R^{A1}
1314	N	CH	N	H	R^{A2}
1315	N	CH	N	H	R^{A3}
1316	N	CH	N	H	R^{A4}
1317	N	CH	N	H	R^{A5}
1318	N	CH	N	H	R^{A6}
1319	N	CH	N	H	R^{A7}
1320	N	CH	N	H	R^{A8}
1321	CH	N	N	H	H
1322	CH	N	N	R^{A1}	H
1323	CH	N	N	R^{A2}	H
1324	CH	N	N	R^{A3}	H
1325	CH	N	N	R^{A4}	H
1326	CH	N	N	R^{A5}	H
1327	CH	N	N	R^{A6}	H
1328	CH	N	N	R^{A7}	H
1329	CH	N	N	R^{A8}	H
1330	CH	N	N	H	R^{A1}
1331	CH	N	N	H	R^{A2}
1332	CH	N	N	H	R^{A3}
1333	CH	N	N	H	R^{A4}
1334	CH	N	N	H	R^{A5}
1335	CH	N	N	H	R^{A6}
1336	CH	N	N	H	R^{A7}
1337	CH	N	N	H	R^{A8}
1338	CH	N	N	H	H
1339	CH	N	N	R^{A1}	H
1340	CH	N	N	R^{A2}	H
1341	CH	N	N	R^{A3}	H
1342	CH	N	N	R^{A4}	H
1343	CH	N	N	R^{A5}	H
1344	CH	N	N	R^{A6}	H
1345	CH	N	N	R^{A7}	H
1346	CH	N	N	R^{A8}	H
1347	CH	N	N	H	R^{A1}
1348	CH	N	N	H	R^{A2}
1349	CH	N	N	H	R^{A3}
1350	CH	N	N	H	R^{A4}
1351	CH	N	N	H	R^{A5}
1352	CH	N	N	H	R^{A6}
1353	CH	N	N	H	R^{A7}
1354	CH	N	N	H	R^{A8}

[0119] wherein:

[0120] ligands L_{A3123} to L_{A3382} are based on a structure of Formula X



where i=1768+m;

[0121] wherein m is an integer from 1355 to 1614 and for each m, X^1, X^2, R^1, and R^2 are defined in Formula X as follows:

m	X^1	X^2	R^1	R^2
1355	CH	CH	H	H
1356	CH	CH	R^{A1}	H
1357	CH	CH	R^{A1}	R^{A2}
1358	CH	CH	R^{A1}	R^{A3}
1359	CH	CH	R^{A1}	R^{A4}
1360	CH	CH	R^{A1}	R^{A5}
1361	CH	CH	R^{A1}	R^{A6}
1362	CH	CH	R^{A1}	R^{A7}
1363	CH	CH	R^{A1}	R^{A8}
1364	CH	CH	R^{A2}	H
1365	CH	CH	R^{A2}	R^{A1}
1366	CH	CH	R^{A2}	R^{A3}
1367	CH	CH	R^{A2}	R^{A4}
1368	CH	CH	R^{A2}	R^{A5}
1369	CH	CH	R^{A2}	R^{A6}
1370	CH	CH	R^{A2}	R^{A7}
1371	CH	CH	R^{A2}	R^{A8}
1372	CH	CH	R^{A3}	H
1373	CH	CH	R^{A3}	R^{A1}
1374	CH	CH	R^{A3}	R^{A2}
1375	CH	CH	R^{A3}	R^{A4}
1376	CH	CH	R^{A3}	R^{A5}
1377	CH	CH	R^{A3}	R^{A6}
1378	CH	CH	R^{A3}	R^{A7}
1379	CH	CH	R^{A3}	R^{A8}
1380	CH	CH	R^{A4}	H
1381	CH	CH	R^{A4}	R^{A1}
1382	CH	CH	R^{A4}	R^{A2}
1383	CH	CH	R^{A4}	R^{A3}
1384	CH	CH	R^{A4}	R^{A5}
1385	CH	CH	R^{A4}	R^{A6}
1386	CH	CH	R^{A4}	R^{A7}
1387	CH	CH	R^{A4}	R^{A8}
1388	CH	CH	R^{A5}	H
1389	CH	CH	R^{A5}	R^{A1}
1390	CH	CH	R^{A5}	R^{A2}
1391	CH	CH	R^{A5}	R^{A3}
1392	CH	CH	R^{A5}	R^{A4}
1393	CH	CH	R^{A5}	R^{A6}
1394	CH	CH	R^{A5}	R^{A7}
1395	CH	CH	R^{A5}	R^{A8}
1396	CH	CH	R^{A6}	H
1397	CH	CH	R^{A6}	R^{A1}
1398	CH	CH	R^{A6}	R^{A2}
1399	CH	CH	R^{A6}	R^{A3}
1400	CH	CH	R^{A6}	R^{A4}
1401	CH	CH	R^{A6}	R^{A5}
1402	CH	CH	R^{A6}	R^{A7}
1403	CH	CH	R^{A6}	R^{A8}
1404	CH	CH	R^{A7}	H
1405	CH	CH	R^{A7}	R^{A1}

-continued

m	X^1	X^2	R^1	R^2
1406	CH	CH	R^{A7}	R^{A2}
1407	CH	CH	R^{A7}	R^{A3}
1408	CH	CH	R^{A7}	R^{A4}
1409	CH	CH	R^{A7}	R^{A5}
1410	CH	CH	R^{A7}	R^{A6}
1411	CH	CH	R^{A7}	R^{A8}
1412	CH	CH	R^{A8}	H
1413	CH	CH	R^{A8}	R^{A1}
1414	CH	CH	R^{A8}	R^{A2}
1415	CH	CH	R^{A8}	R^{A3}
1416	CH	CH	R^{A8}	R^{A4}
1417	CH	CH	R^{A8}	R^{A5}
1418	CH	CH	R^{A8}	R^{A6}
1419	CH	CH	R^{A8}	R^{A8}
1420	N	CH	H	H
1421	N	CH	R^{A1}	H
1422	N	CH	R^{A1}	R^{A2}
1423	N	CH	R^{A1}	R^{A3}
1424	N	CH	R^{A1}	R^{A4}
1425	N	CH	R^{A1}	R^{A5}
1426	N	CH	R^{A1}	R^{A6}
1427	N	CH	R^{A1}	R^{A7}
1428	N	CH	R^{A1}	R^{A8}
1429	N	CH	R^{A2}	H
1430	N	CH	R^{A2}	R^{A1}
1431	N	CH	R^{A2}	R^{A3}
1432	N	CH	R^{A2}	R^{A4}
1433	N	CH	R^{A2}	R^{A5}
1434	N	CH	R^{A2}	R^{A6}
1435	N	CH	R^{A2}	R^{A7}
1436	N	CH	R^{A2}	R^{A8}
1437	N	CH	R^{A3}	H
1438	N	CH	R^{A3}	R^{A1}
1439	N	CH	R^{A3}	R^{A2}
1440	N	CH	R^{A3}	R^{A4}
1441	N	CH	R^{A3}	R^{A5}
1442	N	CH	R^{A3}	R^{A6}
1443	N	CH	R^{A3}	R^{A7}
1444	N	CH	R^{A3}	R^{A8}
1445	N	CH	R^{A4}	H
1446	N	CH	R^{A4}	R^{A1}
1447	N	CH	R^{A4}	R^{A2}
1448	N	CH	R^{A4}	R^{A3}
1449	N	CH	R^{A4}	R^{A5}
1450	N	CH	R^{A4}	R^{A6}
1451	N	CH	R^{A4}	R^{A7}
1452	N	CH	R^{A4}	R^{A8}
1453	N	CH	R^{A5}	H
1454	N	CH	R^{A5}	R^{A1}
1455	N	CH	R^{A5}	R^{A2}
1456	N	CH	R^{A5}	R^{A3}
1457	N	CH	R^{A5}	R^{A4}
1458	N	CH	R^{A5}	R^{A6}
1459	N	CH	R^{A5}	R^{A7}
1460	N	CH	R^{A5}	R^{A8}
1461	N	CH	R^{A6}	H
1462	N	CH	R^{A6}	R^{A1}
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1465	N	CH	R^{A6}	R^{A4}
1466	N	CH	R^{A6}	R^{A5}
1467	N	CH	R^{A6}	R^{A7}
1468	N	CH	R^{A6}	R^{A8}
1469	N	CH	R^{A7}	H
1470	N	CH	R^{A7}	R^{A1}
1471	N	CH	R^{A7}	R^{A2}
1472	N	CH	R^{A7}	R^{A3}
1473	N	CH	R^{A7}	R^{A4}
1474	N	CH	R^{A7}	R^{A5}
1475	N	CH	R^{A7}	R^{A6}
1476	N	CH	R^{A7}	R^{A8}
1477	N	CH	R^{A8}	H
1478	N	CH	R^{A8}	R^{A1}
1479	N	CH	R^{A8}	R^{A2}

-continued

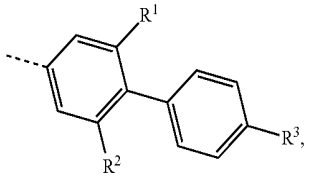
m	X^1	X^2	R^1	R^2
1480	N	CH	R^{A8}	R^{A3}
1481	N	CH	R^{A8}	R^{A4}
1482	N	CH	R^{A8}	R^{A5}
1483	N	CH	R^{A8}	R^{A6}
1484	N	CH	R^{A8}	R^{A8}
1485	CH	N	H	H
1486	CH	N	R^{A1}	H
1487	CH	N	R^{A1}	R^{A2}
1488	CH	N	R^{A1}	R^{A3}
1489	CH	N	R^{A1}	R^{A4}
1490	CH	N	R^{A1}	R^{A5}
1491	CH	N	R^{A1}	R^{A6}
1492	CH	N	R^{A1}	R^{A7}
1493	CH	N	R^{A1}	R^{A8}
1494	CH	N	R^{A2}	H
1495	CH	N	R^{A2}	R^{A1}
1496	CH	N	R^{A2}	R^{A3}
1497	CH	N	R^{A2}	R^{A4}
1498	CH	N	R^{A2}	R^{A5}
1499	CH	N	R^{A2}	R^{A6}
1500	CH	N	R^{A2}	R^{A7}
1501	CH	N	R^{A2}	R^{A8}
1502	CH	N	R^{A3}	H
1503	CH	N	R^{A3}	R^{A1}
1504	CH	N	R^{A3}	R^{A2}
1505	CH	N	R^{A3}	R^{A4}
1506	CH	N	R^{A3}	R^{A5}
1507	CH	N	R^{A3}	R^{A6}
1508	CH	N	R^{A3}	R^{A7}
1509	CH	N	R^{A3}	R^{A8}
1510	CH	N	R^{A4}	H
1511	CH	N	R^{A4}	R^{A1}
1512	CH	N	R^{A4}	R^{A2}
1513	CH	N	R^{A4}	R^{A3}
1514	CH	N	R^{A4}	R^{A5}
1515	CH	N	R^{A4}	R^{A6}
1516	CH	N	R^{A4}	R^{A7}
1517	CH	N	R^{A4}	R^{A8}
1518	CH	N	R^{A5}	H
1519	CH	N	R^{A5}	R^{A1}
1520	CH	N	R^{A5}	R^{A2}
1521	CH	N	R^{A5}	R^{A3}
1522	CH	N	R^{A5}	R^{A4}
1523	CH	N	R^{A5}	R^{A6}
1524	CH	N	R^{A5}	R^{A7}
1525	CH	N	R^{A5}	R^{A8}
1526	CH	N	R^{A6}	H
1527	CH	N	R^{A6}	R^{A1}
1528	CH	N	R^{A6}	R^{A2}
1529	CH	N	R^{A6}	R^{A3}
1530	CH	N	R^{A6}	R^{A4}
1531	CH	N	R^{A6}	R^{A5}
1532	CH	N	R^{A6}	R^{A7}
1533	CH	N	R^{A6}	R^{A8}
1534	CH	N	R^{A7}	H
1535	CH	N	R^{A7}	R^{A1}
1536	CH	N	R^{A7}	R^{A2}
1537	CH	N	R^{A7}	R^{A3}
1538	CH	N	R^{A7}	R^{A4}
1539	CH	N	R^{A7}	R^{A5}
1540	CH	N	R^{A7}	R^{A6}
1541	CH	N	R^{A7}	R^{A8}
1542	CH	N	R^{A8}	H
1543	CH	N	R^{A8}	R^{A1}
1544	CH	N	R^{A8}	R^{A2}
1545	CH	N	R^{A8}	R^{A3}
1546	CH	N	R^{A8}	R^{A4}
1547	CH	N	R^{A8}	R^{A5}
1548	CH	N	R^{A8}	R^{A6}
1549	CH	N	R^{A8}	R^{A8}
1550	N	N	H	H
1551	N	N	R^{A1}	H
1552	N	N	R^{A1}	R^{A2}
1553	N	N	R^{A1}	R^{A3}

-continued

m	X^1	X^2	R^1	R^2
1554	N	N	R^{A1}	R^{A4}
1555	N	N	R^{A1}	R^{A5}
1556	N	N	R^{A1}	R^{A6}
1557	N	N	R^{A1}	R^{A7}
1558	N	N	R^{A1}	R^{A8}
1559	N	N	R^{A2}	H
1560	N	N	R^{A2}	R^{A1}
1561	N	N	R^{A2}	R^{A3}
1562	N	N	R^{A2}	R^{A4}
1563	N	N	R^{A2}	R^{A5}
1564	N	N	R^{A2}	R^{A6}
1565	N	N	R^{A2}	R^{A7}
1566	N	N	R^{A2}	R^{A8}
1567	N	N	R^{A3}	H
1568	N	N	R^{A3}	R^{A1}
1569	N	N	R^{A3}	R^{A2}
1570	N	N	R^{A3}	R^{A4}
1571	N	N	R^{A3}	R^{A5}
1572	N	N	R^{A3}	R^{A6}
1573	N	N	R^{A3}	R^{A7}
1574	N	N	R^{A3}	R^{A8}
1575	N	N	R^{A4}	H
1576	N	N	R^{A4}	R^{A1}
1577	N	N	R^{A4}	R^{A2}
1578	N	N	R^{A4}	R^{A3}
1579	N	N	R^{A4}	R^{A5}
1580	N	N	R^{A4}	R^{A6}
1581	N	N	R^{A4}	R^{A7}
1582	N	N	R^{A4}	R^{A8}
1583	N	N	R^{A5}	H
1584	N	N	R^{A5}	R^{A1}
1585	N	N	R^{A5}	R^{A2}
1586	N	N	R^{A5}	R^{A3}
1587	N	N	R^{A5}	R^{A4}
1588	N	N	R^{A5}	R^{A6}
1589	N	N	R^{A5}	R^{A7}
1590	N	N	R^{A5}	R^{A8}
1591	N	N	R^{A6}	H
1592	N	N	R^{A6}	R^{A1}
1593	N	N	R^{A6}	R^{A2}
1594	N	N	R^{A6}	R^{A3}
1595	N	N	R^{A6}	R^{A4}
1596	N	N	R^{A6}	R^{A5}
1597	N	N	R^{A6}	R^{A7}
1598	N	N	R^{A6}	R^{A8}
1599	N	N	R^{A7}	H
1600	N	N	R^{A7}	R^{A1}
1601	N	N	R^{A7}	R^{A2}
1602	N	N	R^{A7}	R^{A3}
1603	N	N	R^{A7}	R^{A4}
1604	N	N	R^{A7}	R^{A5}
1605	N	N	R^{A7}	R^{A6}
1606	N	N	R^{A7}	R^{A8}
1607	N	N	R^{A8}	H
1608	N	N	R^{A8}	R^{A1}
1609	N	N	R^{A8}	R^{A2}
1610	N	N	R^{A8}	R^{A3}
1611	N	N	R^{A8}	R^{A4}
1612	N	N	R^{A8}	R^{A5}
1613	N	N	R^{A8}	R^{A6}
1614	N	N	R^{A8}	R^{A8}

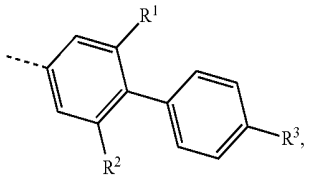
[0122] wherein:

[0123] ligands L_{A3382} to L_{A3446} are based on a structure of Formula XI



where i=1768+m;

[0124] ligands L_{A3447} to L_{A3510} are based on a structure of Formula XII



where i=1832+m;

[0125] wherein m is an integer from 1615 to 1678 and for each m, R^1, R^2, and R^3 are defined in formulas XI and XII as follows:

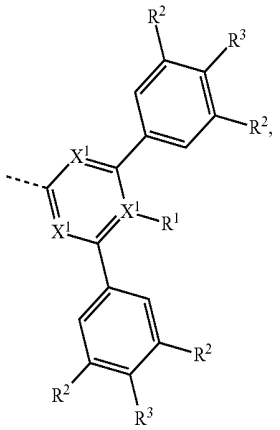
m	R^1	R^2	R^3
1615	R^{A1}	R^{A1}	H
1616	R^{A2}	R^{A2}	H
1617	R^{A3}	R^{A3}	H
1618	R^{A4}	R^{A4}	H
1619	R^{A5}	R^{A5}	H
1620	R^{A6}	R^{A6}	H
1621	R^{A7}	R^{A7}	H
1622	R^{A8}	R^{A8}	H
1623	R^{A1}	R^{A1}	R^{A1}
1624	R^{A2}	R^{A2}	R^{A1}
1625	R^{A3}	R^{A3}	R^{A1}
1626	R^{A4}	R^{A4}	R^{A1}
1627	R^{A5}	R^{A5}	R^{A1}
1628	R^{A6}	R^{A6}	R^{A1}
1629	R^{A7}	R^{A7}	R^{A1}
1630	R^{A8}	R^{A8}	R^{A1}
1631	R^{A1}	R^{A1}	R^{A2}
1632	R^{A2}	R^{A2}	R^{A2}
1633	R^{A3}	R^{A3}	R^{A2}
1634	R^{A4}	R^{A4}	R^{A2}
1635	R^{A5}	R^{A5}	R^{A2}
1636	R^{A6}	R^{A6}	R^{A2}
1637	R^{A7}	R^{A7}	R^{A2}
1638	R^{A8}	R^{A8}	R^{A2}
1639	R^{A1}	R^{A1}	R^{A2}
1640	R^{A2}	R^{A2}	R^{A2}
1641	R^{A3}	R^{A3}	R^{A2}
1642	R^{A4}	R^{A4}	R^{A2}
1643	R^{A5}	R^{A5}	R^{A2}
1644	R^{A6}	R^{A6}	R^{A2}
1645	R^{A7}	R^{A7}	R^{A2}
1646	R^{A8}	R^{A8}	R^{A2}
1647	R^{A1}	R^{A1}	R^{A5}
1648	R^{A2}	R^{A2}	R^{A5}
1649	R^{A3}	R^{A3}	R^{A5}
1650	R^{A4}	R^{A4}	R^{A5}
1651	R^{A5}	R^{A5}	R^{A5}
1652	R^{A6}	R^{A6}	R^{A5}

-continued

m	R^1	R^2	R^3
1653	R^{A7}	R^{A7}	R^{A5}
1654	R^{A8}	R^{A8}	R^{A5}
1655	R^{A1}	R^{A1}	R^{A6}
1656	R^{A2}	R^{A2}	R^{A6}
1657	R^{A3}	R^{A3}	R^{A6}
1658	R^{A4}	R^{A4}	R^{A6}
1659	R^{A5}	R^{A5}	R^{A6}
1660	R^{A6}	R^{A6}	R^{A6}
1661	R^{A7}	R^{A7}	R^{A6}
1662	R^{A8}	R^{A8}	R^{A6}
1663	R^{A1}	R^{A1}	R^{A7}
1664	R^{A2}	R^{A2}	R^{A7}
1665	R^{A3}	R^{A3}	R^{A7}
1666	R^{A4}	R^{A4}	R^{A7}
1667	R^{A5}	R^{A5}	R^{A7}
1668	R^{A6}	R^{A6}	R^{A7}
1669	R^{A7}	R^{A7}	R^{A7}
1670	R^{A8}	R^{A8}	R^{A7}
1671	R^{A1}	R^{A1}	R^{A8}
1672	R^{A2}	R^{A2}	R^{A8}
1673	R^{A3}	R^{A3}	R^{A8}
1674	R^{A4}	R^{A4}	R^{A8}
1675	R^{A5}	R^{A5}	R^{A8}
1676	R^{A6}	R^{A6}	R^{A8}
1677	R^{A7}	R^{A7}	R^{A8}
1678	R^{A8}	R^{A8}	R^{A8}

[0126] wherein:

[0127] ligands L_{A3511} to L_{A3663} are based on a structure of Formula XIII



where i=1832+m;

[0128] wherein m is an integer from 1679 to 1831 and for each m, R^1, R^2, R^3, and X^1 are defined in formula XIII as follows:

m	R^1	R^2	R^3	X^1
1679	H	H	H	CH
1680	H	R^{A1}	H	CH
1681	H	R^{A2}	H	CH
1682	H	R^{A3}	H	CH
1683	H	R^{A4}	H	CH
1684	H	R^{A5}	H	CH
1685	H	R^{A6}	H	CH
1686	H	R^{A7}	H	CH
1687	H	R^{A8}	H	CH
1688	H	H	R^{A1}	CH

-continued

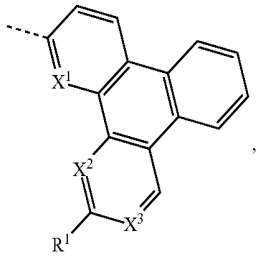
m	R^1	R^2	R^3	X^1
1689	H	H	R^{A2}	CH
1690	H	H	R^{A3}	CH
1691	H	H	R^{A4}	CH
1692	H	H	R^{A5}	CH
1693	H	H	R^{A6}	CH
1694	H	H	R^{A7}	CH
1695	H	H	R^{A8}	CH
1696	R^{A1}	H	H	CH
1697	R^{A1}	R^{A1}	H	CH
1698	R^{A1}	R^{A2}	H	CH
1699	R^{A1}	R^{A3}	H	CH
1700	R^{A1}	R^{A4}	H	CH
1701	R^{A1}	R^{A5}	H	CH
1702	R^{A1}	R^{A6}	H	CH
1703	R^{A1}	R^{A7}	H	CH
1704	R^{A1}	R^{A8}	H	CH
1705	R^{A1}	H	R^{A1}	CH
1706	R^{A1}	H	R^{A2}	CH
1707	R^{A1}	H	R^{A3}	CH
1708	R^{A1}	H	R^{A4}	CH
1709	R^{A1}	H	R^{A5}	CH
1710	R^{A1}	H	R^{A6}	CH
1711	R^{A1}	H	R^{A7}	CH
1712	R^{A1}	H	R^{A8}	CH
1713	R^{A2}	H	H	CH
1714	R^{A2}	R^{A1}	H	CH
1715	R^{A2}	R^{A2}	H	CH
1716	R^{A2}	R^{A3}	H	CH
1717	R^{A2}	R^{A4}	H	CH
1718	R^{A2}	R^{A5}	H	CH
1719	R^{A2}	R^{A6}	H	CH
1720	R^{A2}	R^{A7}	H	CH
1721	R^{A2}	R^{A8}	H	CH
1722	R^{A2}	H	R^{A1}	CH
1723	R^{A2}	H	R^{A2}	CH
1724	R^{A2}	H	R^{A3}	CH
1725	R^{A2}	H	R^{A4}	CH
1726	R^{A2}	H	R^{A5}	CH
1727	R^{A2}	H	R^{A6}	CH
1728	R^{A2}	H	R^{A7}	CH
1729	R^{A2}	H	R^{A8}	CH
1730	R^{A3}	H	H	CH
1731	R^{A3}	R^{A1}	H	CH
1732	R^{A3}	R^{A2}	H	CH
1733	R^{A3}	R^{A3}	H	CH
1734	R^{A3}	R^{A4}	H	CH
1735	R^{A3}	R^{A5}	H	CH
1736	R^{A3}	R^{A6}	H	CH
1737	R^{A3}	R^{A7}	H	CH
1738	R^{A3}	R^{A8}	H	CH
1739	R^{A3}	H	R^{A1}	CH
1740	R^{A3}	H	R^{A2}	CH
1741	R^{A3}	H	R^{A3}	CH
1742	R^{A3}	H	R^{A4}	CH
1743	R^{A3}	H	R^{A5}	CH
1744	R^{A3}	H	R^{A6}	CH
1745	R^{A3}	H	R^{A7}	CH
1746	R^{A3}	H	R^{A8}	CH
1747	R^{A4}	H	H	CH
1748	R^{A4}	R^{A1}	H	CH
1749	R^{A4}	R^{A2}	H	CH
1750	R^{A4}	R^{A3}	H	CH
1751	R^{A4}	R^{A4}	H	CH
1752	R^{A4}	R^{A5}	H	CH
1753	R^{A4}	R^{A6}	H	CH
1754	R^{A4}	R^{A7}	H	CH
1755	R^{A4}	R^{A8}	H	CH
1756	R^{A4}	H	R^{A1}	CH
1757	R^{A4}	H	R^{A2}	CH
1758	R^{A4}	H	R^{A3}	CH
1759	R^{A4}	H	R^{A4}	CH
1760	R^{A4}	H	R^{A5}	CH
1761	R^{A4}	H	R^{A6}	CH
1762	R^{A4}	H	R^{A7}	CH

-continued

m	R^1	R^2	R^3	X^1
1763	R^{A4}	H	R^{A8}	CH
1764	R^{A5}	H	H	CH
1765	R^{A5}	R^{A1}	H	CH
1766	R^{A5}	R^{A2}	H	CH
1767	R^{A5}	R^{A3}	H	CH
1768	R^{A5}	R^{A4}	H	CH
1769	R^{A5}	R^{A5}	H	CH
1770	R^{A5}	R^{A6}	H	CH
1771	R^{A5}	R^{A7}	H	CH
1772	R^{A5}	R^{A8}	H	CH
1773	R^{A5}	H	R^{A1}	CH
1774	R^{A5}	H	R^{A2}	CH
1775	R^{A5}	H	R^{A3}	CH
1776	R^{A5}	H	R^{A4}	CH
1777	R^{A5}	H	R^{A5}	CH
1778	R^{A5}	H	R^{A6}	CH
1779	R^{A5}	H	R^{A7}	CH
1780	R^{A5}	H	R^{A8}	CH
1781	R^{A7}	H	H	CH
1782	R^{A7}	R^{A1}	H	CH
1783	R^{A7}	R^{A2}	H	CH
1784	R^{A7}	R^{A3}	H	CH
1785	R^{A7}	R^{A4}	H	CH
1786	R^{A7}	R^{A5}	H	CH
1787	R^{A7}	R^{A6}	H	CH
1788	R^{A7}	R^{A7}	H	CH
1789	R^{A7}	R^{A8}	H	CH
1790	R^{A7}	H	R^{A1}	CH
1791	R^{A7}	H	R^{A2}	CH
1792	R^{A7}	H	R^{A3}	CH
1793	R^{A7}	H	R^{A4}	CH
1794	R^{A7}	H	R^{A5}	CH
1795	R^{A7}	H	R^{A6}	CH
1796	R^{A7}	H	R^{A7}	CH
1797	R^{A7}	H	R^{A8}	CH
1798	R^{A8}	H	H	CH
1799	R^{A8}	R^{A1}	H	CH
1800	R^{A8}	R^{A2}	H	CH
1801	R^{A8}	R^{A3}	H	CH
1802	R^{A8}	R^{A4}	H	CH
1803	R^{A8}	R^{A5}	H	CH
1804	R^{A8}	R^{A6}	H	CH
1805	R^{A8}	R^{A7}	H	CH
1806	R^{A8}	R^{A8}	H	CH
1807	R^{A8}	H	R^{A1}	CH
1808	R^{A8}	H	R^{A2}	CH
1809	R^{A8}	H	R^{A3}	CH
1810	R^{A8}	H	R^{A4}	CH
1811	R^{A8}	H	R^{A5}	CH
1812	R^{A8}	H	R^{A6}	CH
1813	R^{A8}	H	R^{A7}	CH
1814	R^{A8}	H	R^{A8}	CH
1815	—	H	H	N
1816	—	R^{A1}	H	N
1817	—	R^{A2}	H	N
1818	—	R^{A3}	H	N
1819	—	R^{A4}	H	N
1820	—	R^{A5}	H	N
1821	—	R^{A6}	H	N
1822	—	R^{A7}	H	N
1823	—	R^{A8}	H	N
1824	—	H	R^{A1}	N
1825	—	H	R^{A2}	N
1826	—	H	R^{A3}	N
1827	—	H	R^{A4}	N
1828	—	H	R^{A5}	N
1829	—	H	R^{A6}	N
1830	—	H	R^{A7}	N
1831	—	H	R^{A8}	N

[0129] wherein:

[0130] ligands L_{A3664} to L_{A3735} are based on a structure of Formula XIV



where i=1832+m;

[0131] wherein m is an integer from 1832 to 1903 and for each m, X^1, X^2, X^3, and R^1 are defined in formula XIV as follows:

m	X^1	X^2	X^3	R^1
1832	CH	CH	CH	H
1833	CH	CH	CH	R^{A1}
1834	CH	CH	CH	R^{A2}
1835	CH	CH	CH	R^{A3}
1836	CH	CH	CH	R^{A4}
1837	CH	CH	CH	R^{A5}
1838	CH	CH	CH	R^{A6}
1839	CH	CH	CH	R^{A7}
1840	CH	CH	CH	R^{A8}
1841	N	CH	CH	H
1842	N	CH	CH	R^{A1}
1843	N	CH	CH	R^{A2}
1844	N	CH	CH	R^{A3}
1845	N	CH	CH	R^{A4}
1846	N	CH	CH	R^{A5}
1847	N	CH	CH	R^{A6}
1848	N	CH	CH	R^{A7}
1849	N	CH	CH	R^{A8}
1850	CH	N	CH	H
1851	CH	N	CH	R^{A1}
1852	CH	N	CH	R^{A2}
1853	CH	N	CH	R^{A3}
1854	CH	N	CH	R^{A4}
1855	CH	N	CH	R^{A5}
1856	CH	N	CH	R^{A6}
1857	CH	N	CH	R^{A7}
1858	CH	N	CH	R^{A8}
1859	N	N	CH	H
1860	N	N	CH	R^{A1}
1861	N	N	CH	R^{A2}
1862	N	N	CH	R^{A3}
1863	N	N	CH	R^{A4}
1864	N	N	CH	R^{A5}
1865	N	N	CH	R^{A6}
1866	N	N	CH	R^{A7}
1867	N	N	CH	R^{A8}
1868	CH	CH	N	H
1869	CH	CH	N	R^{A1}
1870	CH	CH	N	R^{A2}
1871	CH	CH	N	R^{A3}
1872	CH	CH	N	R^{A4}
1873	CH	CH	N	R^{A5}
1874	CH	CH	N	R^{A6}
1875	CH	CH	N	R^{A7}
1876	CH	CH	N	R^{A8}
1877	N	CH	N	H
1878	N	CH	N	R^{A1}
1879	N	CH	N	R^{A2}
1880	N	CH	N	R^{A3}
1881	N	CH	N	R^{A4}

-continued

m	X^1	X^2	X^3	R^1
1882	N	CH	N	R^{A5}
1883	N	CH	N	R^{A6}
1884	N	CH	N	R^{A7}
1885	N	CH	N	R^{A8}
1886	CH	N	N	H
1887	CH	N	N	R^{A1}
1888	CH	N	N	R^{A2}
1889	CH	N	N	R^{A3}
1890	CH	N	N	R^{A4}
1891	CH	N	N	R^{A5}
1892	CH	N	N	R^{A6}
1893	CH	N	N	R^{A7}
1894	CH	N	N	R^{A8}
1895	N	N	N	H
1896	N	N	N	R^{A1}
1897	N	N	N	R^{A2}
1898	N	N	N	R^{A3}
1899	N	N	N	R^{A4}
1900	N	N	N	R^{A5}
1901	N	N	N	R^{A6}
1902	N	N	N	R^{A7}
1903	N	N	N	R^{A8}

[0132] wherein R^{A1} to R^{A8} have the following structures

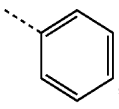
R^{A1} 

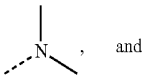
R^{A2} 

R^{A3} 

R^{A4} 

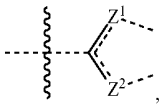
R^{A5} 

R^{A6} 

R^{A7} 

R^{A8} 

[0133] In some embodiments, L is selected from the group consisting of L_x having the formula of $(R_L)_n$-L_{Ai}-L_{Bj}, wherein x is an integer defined by x=3735(j−1)+i; wherein i is an integer from 1 to 3735, and j is an integer from 1 to 380; and wherein L_{Bj} has the following structures:



[0134] wherein the wave line represents the bond to L_A, and L_B, Z^1, and Z^2 are defined as follows:

L_{Bj}	Z^1	Z^2
L_{B1}	O	O
L_{B2}	S	S
L_{B3}	O	S
L_{B4}	O	N—R^{B1}
L_{B5}	O	N—R^{B2}
L_{B6}	O	N—R^{B3}
L_{B7}	O	N—R^{B4}
L_{B8}	O	N—R^{B5}
L_{B9}	O	N—R^{B6}
L_{B10}	O	N—R^{B7}
L_{B11}	O	N—R^{B8}
L_{B12}	O	N—R^{B9}
L_{B13}	O	N—R^{B10}
L_{B14}	O	N—R^{B11}
L_{B15}	O	N—R^{B12}
L_{B16}	O	N—R^{B13}
L_{B17}	O	N—R^{B14}
L_{B18}	O	N—R^{B15}
L_{B19}	O	N—R^{B16}
L_{B20}	O	N—R^{B17}
L_{B21}	O	N—R^{B18}
L_{B22}	O	N—R^{B19}
L_{B23}	O	N—R^{B20}
L_{B24}	O	N—R^{B21}
L_{B25}	O	N—R^{B22}
L_{B26}	O	N—R^{B23}
L_{B27}	O	N—R^{B24}
L_{B28}	O	N—R^{B25}
L_{B29}	O	N—R^{B26}
L_{B30}	N—R^{B1}	N—R^{B1}
L_{B31}	N—R^{B2}	N—R^{B2}
L_{B32}	N—R^{B3}	N—R^{B3}
L_{B33}	N—R^{B4}	N—R^{B4}
L_{B34}	N—R^{B5}	N—R^{B5}
L_{B35}	N—R^{B6}	N—R^{B6}
L_{B36}	N—R^{B7}	N—R^{B7}
L_{B37}	N—R^{B8}	N—R^{B8}
L_{B38}	N—R^{B9}	N—R^{B9}
L_{B39}	N—R^{B10}	N—R^{B10}
L_{B40}	N—R^{B11}	N—R^{B11}
L_{B41}	N—R^{B12}	N—R^{B12}
L_{B42}	N—R^{B11}	N—R^{B13}
L_{B43}	N—R^{B14}	N—R^{B14}
L_{B44}	N—R^{B15}	N—R^{B15}
L_{B45}	N—R^{B16}	N—R^{B16}
L_{B46}	N—R^{B17}	N—R^{B17}
L_{B47}	N—R^{B18}	N—R^{B18}
L_{B48}	N—R^{B19}	N—R^{B19}
L_{B49}	N—R^{B20}	N—R^{B20}
L_{B50}	N—R^{B21}	N—R^{B21}
L_{B51}	N—R^{B22}	N—R^{B22}
L_{B52}	N—R^{B23}	N—R^{B23}
L_{B53}	N—R^{B24}	N—R^{B24}
L_{B54}	N—R^{B25}	N—R^{B25}
L_{B55}	N—R^{B26}	N—R^{B26}
L_{B56}	N—R^{B1}	N—R^{B2}
L_{B57}	N—R^{B1}	N—R^{B3}
L_{B58}	N—R^{B1}	N—R^{B4}
L_{B59}	N—R^{B1}	N—R^{B5}
L_{B60}	N—R^{B1}	N—R^{B6}
L_{B61}	N—R^{B1}	N—R^{B7}
L_{B62}	N—R^{B1}	N—R^{B8}
L_{B63}	N—R^{B1}	N—R^{B9}
L_{B64}	N—R^{B1}	N—R^{B10}
L_{B65}	N—R^{B1}	N—R^{B11}
L_{B66}	N—R^{B1}	N—R^{B12}
L_{B67}	N—R^{B1}	N—R^{B13}
L_{B68}	N—R^{B1}	N—R^{B14}
L_{B69}	N—R^{B1}	N—R^{B15}
L_{B70}	N—R^{B1}	N—R^{B16}
L_{B71}	N—R^{B1}	N—R^{B17}
L_{B72}	N—R^{B1}	N—R^{B18}

-continued

L_{Bj}	Z^1	Z^2
L_{B73}	N—R^{B1}	N—R^{B19}
L_{B74}	N—R^{B1}	N—R^{B20}
L_{B75}	N—R^{B1}	N—R^{B21}
L_{B76}	N—R^{B1}	N—R^{B22}
L_{B77}	N—R^{B1}	N—R^{B23}
L_{B78}	N—R^{B1}	N—R^{B24}
L_{B79}	N—R^{B1}	N—R^{B25}
L_{B80}	N—R^{B1}	N—R^{B26}
L_{B81}	N—R^{B2}	N—R^{B3}
L_{B82}	N—R^{B2}	N—R^{B4}
L_{B83}	N—R^{B2}	N—R^{B5}
L_{B84}	N—R^{B2}	N—R^{B6}
L_{B85}	N—R^{B2}	N—R^{B7}
L_{B86}	N—R^{B2}	N—R^{B8}
L_{B87}	N—R^{B2}	N—R^{B9}
L_{B88}	N—R^{B2}	N—R^{B10}
L_{B89}	N—R^{B2}	N—R^{B11}
L_{B90}	N—R^{B2}	N—R^{B12}
L_{B91}	N—R^{B2}	N—R^{B13}
L_{B92}	N—R^{B2}	N—R^{B14}
L_{B93}	N—R^{B2}	N—R^{B15}
L_{B94}	N—R^{B2}	N—R^{B16}
L_{B95}	N—R^{B2}	N—R^{B17}
L_{B96}	N—R^{B2}	N—R^{B18}
L_{B97}	N—R^{B2}	N—R^{B19}
L_{B98}	N—R^{B2}	N—R^{B20}
L_{B99}	N—R^{B2}	N—R^{B21}
L_{B100}	N—R^{B2}	N—R^{B22}
L_{B101}	N—R^{B2}	N—R^{B23}
L_{B102}	N—R^{B2}	N—R^{B24}
L_{B103}	N—R^{B2}	N—R^{B25}
L_{B104}	N—R^{B2}	N—R^{B26}
L_{B105}	N—R^{B3}	N—R^{B4}
L_{B106}	N—R^{B3}	N—R^{B5}
L_{B107}	N—R^{B3}	N—R^{B6}
L_{B108}	N—R^{B3}	N—R^{B7}
L_{B109}	N—R^{B3}	N—R^{B8}
L_{B110}	N—R^{B3}	N—R^{B9}
L_{B111}	N—R^{B3}	N—R^{B10}
L_{B112}	N—R^{B3}	N—R^{B11}
L_{B113}	N—R^{B3}	N—R^{B12}
L_{B114}	N—R^{B3}	N—R^{B13}
L_{B115}	N—R^{B3}	N—R^{B14}
L_{B116}	N—R^{B3}	N—R^{B15}
L_{B117}	N—R^{B3}	N—R^{B16}
L_{B118}	N—R^{B3}	N—R^{B17}
L_{B119}	N—R^{B3}	N—R^{B18}
L_{B120}	N—R^{B3}	N—R^{B19}
L_{B121}	N—R^{B3}	N—R^{B20}
L_{B122}	N—R^{B3}	N—R^{B21}
L_{B123}	N—R^{B3}	N—R^{B22}
L_{B124}	N—R^{B3}	N—R^{B23}
L_{B125}	N—R^{B3}	N—R^{B24}
L_{B126}	N—R^{B3}	N—R^{B25}
L_{B127}	N—R^{B3}	N—R^{B26}
L_{B128}	N—R^{B4}	N—R^{B5}
L_{B129}	N—R^{B4}	N—R^{B6}
L_{B130}	N—R^{B4}	N—R^{B7}
L_{B131}	N—R^{B4}	N—R^{B8}
L_{B132}	N—R^{B4}	N—R^{B9}
L_{B133}	N—R^{B4}	N—R^{B10}
L_{B134}	N—R^{B4}	N—R^{B11}
L_{B135}	N—R^{B4}	N—R^{B12}
L_{B136}	N—R^{B4}	N—R^{B11}
L_{B137}	N—R^{B4}	N—R^{B14}
L_{B138}	N—R^{B4}	N—R^{B15}
L_{B139}	N—R^{B4}	N—R^{B16}
L_{B140}	N—R^{B4}	N—R^{B17}
L_{B141}	N—R^{B4}	N—R^{B18}
L_{B142}	N—R^{B4}	N—R^{B19}
L_{B143}	N—R^{B4}	N—R^{B20}
L_{B144}	N—R^{B4}	N—R^{B21}
L_{B145}	N—R^{B4}	N—R^{B22}
L_{B146}	N—R^{B4}	N—R^{B23}

-continued

L_{Bj}	Z^1	Z^2
L_{B147}	N—R^{B4}	N—R^{B24}
L_{B148}	N—R^{B4}	N—R^{B25}
L_{B149}	N—R^{B4}	N—R^{B26}
L_{B150}	N—R^{B5}	N—R^{B6}
L_{B151}	N—R^{B5}	N—R^{B7}
L_{B152}	N—R^{B5}	N—R^{B8}
L_{B153}	N—R^{B5}	N—R^{B9}
L_{B154}	N—R^{B5}	N—R^{B10}
L_{B155}	N—R^{B5}	N—R^{B11}
L_{B156}	N—R^{B5}	N—R^{B12}
L_{B157}	N—R^{B5}	N—R^{B13}
L_{B158}	N—R^{B5}	N—R^{B14}
L_{B159}	N—R^{B5}	N—R^{B15}
L_{B160}	N—R^{B5}	N—R^{B16}
L_{B161}	N—R^{B5}	N—R^{B17}
L_{B162}	N—R^{B5}	N—R^{B18}
L_{B163}	N—R^{B5}	N—R^{B19}
L_{B164}	N—R^{B5}	N—R^{B20}
L_{B165}	N—R^{B5}	N—R^{B21}
L_{B166}	N—R^{B5}	N—R^{B22}
L_{B167}	N—R^{B5}	N—R^{B23}
L_{B168}	N—R^{B5}	N—R^{B24}
L_{B169}	N—R^{B5}	N—R^{b25}
L_{B170}	N—R^{B5}	N—R^{B26}
L_{B171}	N—R^{B6}	N—R^{B7}
L_{B172}	N—R^{B6}	N—R^{B8}
L_{B173}	N—R^{B6}	N—R^{B9}
L_{B174}	N—R^{B6}	N—R^{B10}
L_{B175}	N—R^{B6}	N—R^{B11}
L_{B176}	N—R^{B6}	N—R^{B12}
L_{B177}	N—R^{B6}	N—R^{B13}
L_{B178}	N—R^{B6}	N—R^{B14}
L_{B179}	N—R^{B6}	N—R^{B15}
L_{B180}	N—R^{B6}	N—R^{B16}
L_{B181}	N—R^{B6}	N—R^{B17}
L_{B182}	N—R^{B6}	N—R^{B18}
L_{B183}	N—R^{B6}	N—R^{B19}
L_{B184}	N—R^{B6}	N—R^{B20}
L_{B185}	N—R^{B6}	N—R^{B21}
L_{B186}	N—R^{B6}	N—R^{B22}
L_{B187}	N—R^{B6}	N—R^{B23}
L_{B188}	N—R^{B6}	N—R^{B24}
L_{B189}	N—R^{B6}	N—R^{B25}
L_{B190}	N—R^{B6}	N—R^{B26}
L_{B191}	N—R^{B7}	N—R^{B8}
L_{B192}	N—R^{B7}	N—R^{B9}
L_{B193}	N—R^{B7}	N—R^{B10}
L_{B194}	N—R^{B7}	N—R^{B11}
L_{B195}	N—R^{B7}	N—R^{B12}
L_{B196}	N—R^{B7}	N—R^{B13}
L_{B197}	N—R^{B7}	N—R^{B14}
L_{B198}	N—R^{B7}	N—R^{B15}
L_{B199}	N—R^{B7}	N—R^{B16}
L_{B200}	N—R^{B7}	N—R^{B17}
L_{B201}	N—R^{B7}	N—R^{B18}
L_{B202}	N—R^{B7}	N—R^{B19}
L_{B203}	N—R^{B7}	N—R^{B20}
L_{B204}	N—R^{B7}	N—R^{B21}
L_{B205}	N—R^{B7}	N—R^{B22}
L_{B206}	N—R^{B7}	N—R^{B23}
L_{B207}	N—R^{B7}	N—R^{B24}
L_{B208}	N—R^{B7}	N—R^{B25}
L_{B209}	N—R^{B7}	N—R^{B26}
L_{B210}	N—R^{B8}	N—R^{B9}
L_{B211}	N—R^{B8}	N—R^{B10}
L_{B212}	N—R^{B8}	N—R^{B11}
L_{B213}	N—R^{B8}	N—R^{B12}
L_{B214}	N—R^{B8}	N—R^{B13}
L_{B215}	N—R^{B8}	N—R^{B14}
L_{B216}	N—R^{B8}	N—R^{B15}
L_{B217}	N—R^{B8}	N—R^{B16}
L_{B218}	N—R^{B8}	N—R^{B17}
L_{B219}	N—R^{B8}	N—R^{B18}
L_{B220}	N—R^{B8}	N—R^{B19}

-continued

L_{Bj}	Z^1	Z^2
L_{B221}	N—R^{B8}	N—R^{B20}
L_{B222}	N—R^{B8}	N—R^{B21}
L_{B223}	N—R^{B8}	N—R^{B22}
L_{B224}	N—R^{B8}	N—R^{B23}
L_{B225}	N—R^{B8}	N—R^{B24}
L_{B226}	N—R^{B8}	N—R^{B25}
L_{B227}	N—R^{B8}	N—R^{B26}
L_{B228}	N—R^{B9}	N—R^{B10}
L_{B229}	N—R^{B9}	N—R^{B11}
L_{B230}	N—R^{B9}	N—R^{B12}
L_{B231}	N—R^{B9}	N—R^{B13}
L_{B232}	N—R^{B9}	N—R^{B14}
L_{B233}	N—R^{B9}	N—R^{B15}
L_{B234}	N—R^{B9}	N—R^{B16}
L_{B235}	N—R^{B9}	N—R^{B17}
L_{B236}	N—R^{B9}	N—R^{B18}
L_{B237}	N—R^{B9}	N—R^{B19}
L_{B238}	N—R^{B9}	N—R^{B20}
L_{B239}	N—R^{B9}	N—R^{B21}
L_{B240}	N—R^{B9}	N—R^{B22}
L_{B241}	N—R^{B9}	N—R^{B23}
L_{B242}	N—R^{B9}	N—R^{B24}
L_{B243}	N—R^{B9}	N—R^{B25}
L_{B244}	N—R^{B9}	N—R^{B26}
L_{B245}	N—R^{B10}	N—R^{B11}
L_{B246}	N—R^{B10}	N—R^{B12}
L_{B247}	N—R^{B10}	N—R^{B13}
L_{B248}	N—R^{B10}	N—R^{B14}
L_{B249}	N—R^{B10}	N—R^{B15}
L_{B250}	N—R^{B10}	N—R^{B16}
L_{B251}	N—R^{B10}	N—R^{B17}
L_{B252}	N—R^{B10}	N—R^{B18}
L_{B253}	N—R^{B10}	N—R^{B19}
L_{B254}	N—R^{B10}	N—R^{B20}
L_{B255}	N—R^{B10}	N—R^{B21}
L_{B256}	N—R^{B10}	N—R^{B22}
L_{B257}	N—R^{B10}	N—R^{B23}
L_{B258}	N—R^{B10}	N—R^{B24}
L_{B259}	N—R^{B10}	N—R^{B25}
L_{B260}	N—R^{B10}	N—R^{B26}
L_{B261}	N—R^{B11}	N—R^{B12}
L_{B262}	N—R^{B11}	N—R^{B13}
L_{B263}	N—R^{B11}	N—R^{B14}
L_{B264}	N—R^{B11}	N—R^{B15}
L_{B265}	N—R^{B11}	N—R^{B16}
L_{B266}	N—R^{B11}	N—R^{B17}
L_{B267}	N—R^{B11}	N—R^{B18}
L_{B268}	N—R^{B11}	N—R^{B19}
L_{B269}	N—R^{B11}	N—R^{B20}
L_{B270}	N—R^{B11}	N—R^{B21}
L_{B271}	N—R^{B11}	N—R^{B22}
L_{B272}	N—R^{B11}	N—R^{B23}
L_{B273}	N—R^{B11}	N—R^{B24}
L_{B274}	N—R^{B11}	N—R^{B25}
L_{B275}	N—R^{B11}	N—R^{B26}
L_{B276}	N—R^{B12}	N—R^{B13}
L_{B277}	N—R^{B12}	N—R^{B14}
L_{B278}	N—R^{B12}	N—R^{B15}
L_{B279}	N—R^{B12}	N—R^{B16}
L_{B280}	N—R^{B12}	N—R^{B17}
L_{B281}	N—R^{B12}	N—R^{B18}
L_{B282}	N—R^{B12}	N—R^{B19}
L_{B283}	N—R^{B12}	N—R^{B20}
L_{B284}	N—R^{B12}	N—R^{B21}
L_{B285}	N—R^{B12}	N—R^{B22}
L_{B286}	N—R^{B12}	N—R^{B23}
L_{B287}	N—R^{B12}	N—R^{B24}
L_{B288}	N—R^{B12}	N—R^{B25}
L_{B289}	N—R^{B12}	N—R^{B26}
L_{B290}	N—R^{B13}	N—R^{B14}
L_{B291}	N—R^{B13}	N—R^{B15}
L_{B292}	N—R^{B13}	N—R^{B16}
L_{B293}	N—R^{B13}	N—R^{B17}
L_{B294}	N—R^{B13}	N—R^{B18}

-continued

L_{Bj}	Z^1	Z^2
L_{B295}	N—R^{B13}	N—R^{B19}
L_{B296}	N—R^{B13}	N—R^{B20}
L_{B297}	N—R^{B13}	N—R^{B21}
L_{B298}	N—R^{B13}	N—R^{B22}
L_{B299}	N—R^{B13}	N—R^{B23}
L_{B300}	N—R^{B13}	N—R^{B24}
L_{B301}	N—R^{B13}	N—R^{B25}
L_{B302}	N—R^{B13}	N—R^{B26}
L_{B303}	N—R^{B14}	N—R^{B15}
L_{B304}	N—R^{B14}	N—R^{B16}
L_{B305}	N—R^{B14}	N—R^{B17}
L_{B306}	N—R^{B14}	N—R^{B18}
L_{B307}	N—R^{B14}	N—R^{B19}
L_{B308}	N—R^{B14}	N—R^{B20}
L_{B309}	N—R^{B14}	N—R^{B21}
L_{B310}	N—R^{B14}	N—R^{B22}
L_{B311}	N—R^{B14}	N—R^{B23}
L_{B312}	N—R^{B14}	N—R^{B24}
L_{B313}	N—R^{B14}	N—R^{B25}
L_{B314}	N—R^{B14}	N—R^{B26}
L_{B315}	N—R^{B15}	N—R^{B16}
L_{B316}	N—R^{B15}	N—R^{B17}
L_{B317}	N—R^{B15}	N—R^{B18}
L_{B318}	N—R^{B15}	N—R^{B19}
L_{B319}	N—R^{B15}	N—R^{B20}
L_{B320}	N—R^{B15}	N—R^{B21}
L_{B321}	N—R^{B15}	N—R^{B22}
L_{B322}	N—R^{B15}	N—R^{B23}
L_{B323}	N—R^{B15}	N—R^{B24}
L_{B324}	N—R^{B15}	N—R^{B25}
L_{B325}	N—R^{B15}	N—R^{B26}
L_{B326}	N—R^{B16}	N—R^{B17}
L_{B327}	N—R^{B16}	N—R^{B18}
L_{B328}	N—R^{B16}	N—R^{B19}
L_{B329}	N—R^{B16}	N—R^{B20}
L_{B330}	N—R^{B16}	N—R^{B21}
L_{B331}	N—R^{B16}	N—R^{B22}
L_{B332}	N—R^{B16}	N—R^{B23}
L_{B333}	N—R^{B16}	N—R^{B24}
L_{B334}	N—R^{B16}	N—R^{B25}
L_{B335}	N—R^{B16}	N—R^{B26}
L_{B336}	N—R^{B17}	N—R^{B18}
L_{B337}	N—R^{B17}	N—R^{B19}
L_{B338}	N—R^{B17}	N—R^{B20}
L_{B339}	N—R^{B17}	N—R^{B21}
L_{B340}	N—R^{B17}	N—R^{B22}
L_{B341}	N—R^{B17}	N—R^{B23}
L_{B342}	N—R^{B17}	N—R^{B24}
L_{B343}	N—R^{B17}	N—R^{B25}
L_{B344}	N—R^{B17}	N—R^{B26}
L_{B345}	N—R^{B18}	N—R^{B19}
L_{B346}	N—R^{B18}	N—R^{B20}
L_{B347}	N—R^{B18}	N—R^{B21}
L_{B348}	N—R^{B18}	N—R^{B22}
L_{B349}	N—R^{B18}	N—R^{B23}
L_{B350}	N—R^{B18}	N—R^{B24}
L_{B351}	N—R^{B18}	N—R^{B25}
L_{B352}	N—R^{B18}	N—R^{B26}
L_{B353}	N—R^{B19}	N—R^{B20}
L_{B354}	N—R^{B19}	N—R^{B21}
L_{B355}	N—R^{B19}	N—R^{B22}
L_{B356}	N—R^{B19}	N—R^{B23}
L_{B357}	N—R^{B19}	N—R^{B24}
L_{B358}	N—R^{B19}	N—R^{B25}
L_{B359}	N—R^{B19}	N—R^{B26}
L_{B360}	N—R^{B20}	N—R^{B21}
L_{B361}	N—R^{B20}	N—R^{B22}
L_{B362}	N—R^{B20}	N—R^{B23}
L_{B363}	N—R^{B20}	N—R^{B24}
L_{B364}	N—R^{B20}	N—R^{B25}
L_{B365}	N—R^{B20}	N—R^{B26}
L_{B366}	N—R^{B21}	N—R^{B22}
L_{B367}	N—R^{B21}	N—R^{B23}
L_{B368}	N—R^{B21}	N—R^{B24}

-continued

L_{Bj}	Z^1	Z^2
L_{B369}	N—R^{B21}	N—R^{B25}
L_{B370}	N—R^{B21}	N—R^{B26}
L_{B371}	N—R^{B22}	N—R^{B23}
L_{B372}	N—R^{B22}	N—R^{B24}
L_{B373}	N—R^{B22}	N—R^{B25}
L_{B374}	N—R^{B22}	N—R^{B26}
L_{B375}	N—R^{B23}	N—R^{B24}
L_{B376}	N—R^{B23}	N—R^{B25}
L_{B377}	N—R^{B23}	N—R^{B26}
L_{B378}	N—R^{B24}	N—R^{B25}
L_{B379}	N—R^{B24}	N—R^{B26}
L_{B380}	N—R^{B25}	N—R^{B26}

wherein R^{B1} to R^{B26} have the following structures

R^B1 ----H,

R^B2 D,

R^B3 CH_3,

R^B4 CD_3,

R^B5

R^B6

R^B7

R^B8

R^B9

R^B10

R^B11

R^B12

-continued

R^B13

R^B14

R^B15

R^B16

R^B17

R^B18

R^B19

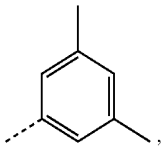
R^B20 CN,

R^B21

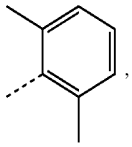
R^B22

-continued

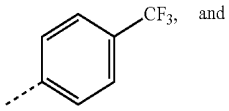
R^B23



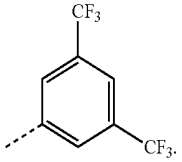
R^B24



R^B25

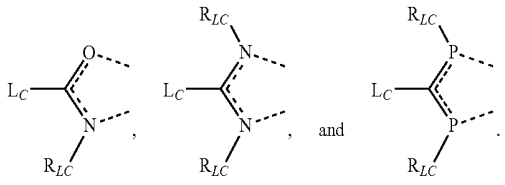


R^B26



[0135] In some embodiments, the compound is selected from the group consisting of Compound A-x having the formula $Bi(L_x)_3$; or Compound B-x having the formula $Bi_2(L_x)_6$; wherein x is an integer from 1 to 1,419,300.

[0136] According to an aspect of the present disclosure, a compound having a stoichiometry formula of BiL_3 is disclosed. In such embodiments, Bi is Bi (III), L is mono-anionic bidentate ligand, wherein each L can be same or different; and wherein L is selected from the group consisting of:

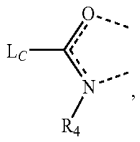


In these formulas, each R in the same formula can be same or different; the O, N, or P coordinate to Bi atom by the single dashed line; and each L_C and R_{LC} is independently hydrogen or a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, and combinations thereof. Where L_C or R_{LC} is substituted aryl or substituted heteroaryl, the substituted aryl or substituted heteroaryl can be substituted by a substituent selected from the group consisting of deuterium, halide, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, cyano, arylalkyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, and combinations thereof.

[0137] In some embodiments, L_C is hydrogen or a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, phenyl, substituted phenyl, pyridine, substituted pyridine, pyrimidine, substituted pyrimidine, and combination thereof.

[0138] In some embodiments, L is selected from the group consisting of L_{Cl}; wherein l is an integer from 1 to 1053; wherein each L_{Cl} is defined as below:

[0139] wherein L_{C1} through L_{C351} have a structure of Formula IV,



L_C and R^4, are defined as:

L_{Cl}	L_C	R^4
L_{C1}	R^{B1}	R^{B1}
L_{C2}	R^{B2}	R^{B2}
L_{C3}	R^{B3}	R^{B3}
L_{C4}	R^{B4}	R^{B4}
L_{C5}	R^{B5}	R^{B5}
L_{C6}	R^{B6}	R^{B6}
L_{C7}	R^{B7}	R^{B7}
L_{C8}	R^{B8}	R^{B8}
L_{C9}	R^{B9}	R^{B9}
L_{C10}	R^{B10}	R^{B10}
L_{C11}	R^{B11}	R^{B11}
L_{C12}	R^{B12}	R^{B12}
L_{C13}	R^{B13}	R^{B13}
L_{C14}	R^{B14}	R^{B14}
L_{C15}	R^{B15}	R^{B15}
L_{C16}	R^{B16}	R^{B16}
L_{C17}	R^{B17}	R^{B17}
L_{C18}	R^{B18}	R^{B18}
L_{C19}	R^{B19}	R^{B19}
L_{C20}	R^{B20}	R^{B20}
L_{C21}	R^{B21}	R^{B21}
L_{C22}	R^{B22}	R^{B22}
L_{C23}	R^{B23}	R^{B23}
L_{C24}	R^{B24}	R^{B24}
L_{C25}	R^{B25}	R^{B25}
L_{C26}	R^{B26}	R^{B26}
L_{C27}	R^{B1}	R^{B2}
L_{C28}	R^{B1}	R^{B3}
L_{C29}	R^{B1}	R^{B4}
L_{C30}	R^{B1}	R^{B5}
L_{C31}	R^{B1}	R^{B6}
L_{C32}	R^{B1}	R^{B7}
L_{C33}	R^{B1}	R^{B8}
L_{C34}	R^{B1}	R^{B9}
L_{C35}	R^{B1}	R^{B10}
L_{C36}	R^{B1}	R^{B11}
L_{C37}	R^{B1}	R^{B12}
L_{C38}	R^{B1}	R^{B13}
L_{C39}	R^{B1}	R^{B14}
L_{C40}	R^{B1}	R^{B15}
L_{C41}	R^{B1}	R^{B16}
L_{C42}	R^{B1}	R^{B17}
L_{C43}	R^{B1}	R^{B18}
L_{C44}	R^{B1}	R^{B19}
L_{C45}	R^{B1}	R^{B20}
L_{C46}	R^{B1}	R^{B21}
L_{C47}	R^{B1}	R^{B22}
L_{C48}	R^{B1}	R^{B23}
L_{C49}	R^{B1}	R^{B24}
L_{C50}	R^{B1}	R^{B25}
L_{C51}	R^{B1}	R^{B26}
L_{C52}	R^{B2}	R^{B3}
L_{C53}	R^{B2}	R^{B4}
L_{C54}	R^{B2}	R^{B5}
L_{C55}	R^{B2}	R^{B6}
L_{C56}	R^{B2}	R^{B7}
L_{C57}	R^{B2}	R^{B8}

-continued

L_{CI}	L_C	R^4
L_{C58}	R^{B2}	R^{B9}
L_{C59}	R^{B2}	R^{B10}
L_{C60}	R^{B2}	R^{B11}
L_{C61}	R^{B2}	R^{B12}
L_{C62}	R^{B2}	R^{B13}
L_{C63}	R^{B2}	R^{B14}
L_{C64}	R^{B2}	R^{B15}
L_{C65}	R^{B2}	R^{B16}
L_{C66}	R^{B2}	R^{B17}
L_{C67}	R^{B2}	R^{B18}
L_{C68}	R^{B2}	R^{B19}
L_{C69}	R^{B2}	R^{B20}
L_{C70}	R^{B2}	R^{B21}
L_{C71}	R^{B2}	R^{B22}
L_{C72}	R^{B2}	R^{B23}
L_{C73}	R^{B2}	R^{B24}
L_{C74}	R^{B2}	R^{B25}
L_{C75}	R^{B2}	R^{B26}
L_{C76}	R^{B3}	R^{B4}
L_{C77}	R^{B3}	R^{B6}
L_{C78}	R^{B3}	R^{B6}
L_{C79}	R^{B3}	R^{B7}
L_{C80}	R^{B3}	R^{B8}
L_{C81}	R^{B3}	R^{B9}
L_{C82}	R^{B3}	R^{B10}
L_{C83}	R^{B3}	R^{B11}
L_{C84}	R^{B3}	R^{B12}
L_{C85}	R^{B3}	R^{B13}
L_{C86}	R^{B3}	R^{B14}
L_{C87}	R^{B3}	R^{B15}
L_{C88}	R^{B3}	R^{B16}
L_{C89}	R^{B3}	R^{B17}
L_{C90}	R^{B3}	R^{B18}
L_{C91}	R^{B3}	R^{B19}
L_{C92}	R^{B3}	R^{B20}
L_{C93}	R^{B3}	R^{B21}
L_{C94}	R^{B3}	R^{B22}
L_{C95}	R^{B3}	R^{B23}
L_{C96}	R^{B3}	R^{B24}
L_{C97}	R^{B3}	R^{B25}
L_{C98}	R^{B3}	R^{B26}
L_{C99}	R^{B4}	R^{B5}
L_{C100}	R^{B4}	R^{B6}
L_{C101}	R^{B4}	R^{B7}
L_{C102}	R^{B4}	R^{B8}
L_{C103}	R^{B4}	R^{B9}
L_{C104}	R^{B4}	R^{B10}
L_{C105}	R^{B4}	R^{B11}
L_{C106}	R^{B4}	R^{B12}
L_{C107}	R^{B4}	R^{B13}
L_{C108}	R^{B4}	R^{B14}
L_{C109}	R^{B4}	R^{B15}
L_{C110}	R^{B4}	R^{B16}
L_{C111}	R^{B4}	R^{B17}
L_{C112}	R^{B4}	R^{B18}
L_{C113}	R^{B4}	R^{B19}
L_{C114}	R^{B4}	R^{B20}
L_{C115}	R^{B4}	R^{B21}
L_{C116}	R^{B4}	R^{B22}
L_{C117}	R^{B4}	R^{B23}
L_{C118}	R^{B4}	R^{B24}
L_{C119}	R^{B4}	R^{B25}
L_{C120}	R^{B4}	R^{B26}
L_{C121}	R^{B5}	R^{B6}
L_{C122}	R^{B5}	R^{B7}
L_{C123}	R^{B5}	R^{B8}
L_{C124}	R^{B5}	R^{B9}
L_{C125}	R^{B5}	R^{B10}
L_{C126}	R^{B5}	R^{B11}
L_{C127}	R^{B5}	R^{B12}
L_{C128}	R^{B5}	R^{B13}
L_{C129}	R^{B5}	R^{B14}
L_{C130}	R^{B5}	R^{B15}
L_{C131}	R^{B5}	R^{B16}

-continued

L_{CI}	L_C	R^4
L_{C132}	R^{B5}	R^{B17}
L_{C133}	R^{B5}	R^{B18}
L_{C134}	R^{B5}	R^{B19}
L_{C135}	R^{B5}	R^{B20}
L_{C136}	R^{B5}	R^{B21}
L_{C137}	R^{B5}	R^{B22}
L_{C138}	R^{B5}	R^{B23}
L_{C139}	R^{B5}	R^{B24}
L_{C140}	R^{B5}	R^{B25}
L_{C141}	R^{B5}	R^{B26}
L_{C142}	R^{B6}	R^{B7}
L_{C143}	R^{B6}	R^{B8}
L_{C144}	R^{B6}	R^{B9}
L_{C145}	R^{B6}	R^{B10}
L_{C146}	R^{B6}	R^{B11}
L_{C147}	R^{B6}	R^{B12}
L_{C148}	R^{B6}	R^{B13}
L_{C149}	R^{B6}	R^{B14}
L_{C150}	R^{B6}	R^{B15}
L_{C151}	R^{B6}	R^{B16}
L_{C152}	R^{B6}	R^{B17}
L_{C153}	R^{B6}	R^{B18}
L_{C154}	R^{B6}	R^{B19}
L_{C155}	R^{B6}	R^{B20}
L_{C156}	R^{B6}	R^{B21}
L_{C157}	R^{B6}	R^{B22}
L_{C158}	R^{B6}	R^{B23}
L_{C159}	R^{B6}	R^{B24}
L_{C160}	R^{B6}	R^{B25}
L_{C161}	R^{B6}	R^{B26}
L_{C162}	R^{B7}	R^{B8}
L_{C163}	R^{B7}	R^{B9}
L_{C164}	R^{B7}	R^{B10}
L_{C165}	R^{B7}	R^{B11}
L_{C166}	R^{B7}	R^{B12}
L_{C167}	R^{B7}	R^{B13}
L_{C168}	R^{B7}	R^{B14}
L_{C169}	R^{B7}	R^{B15}
L_{C170}	R^{B7}	R^{B16}
L_{C171}	R^{B7}	R^{B17}
L_{C172}	R^{B7}	R^{B18}
L_{C173}	R^{B7}	R^{B19}
L_{C174}	R^{B7}	R^{B20}
L_{C175}	R^{B7}	R^{B21}
L_{C176}	R^{B7}	R^{B22}
L_{C177}	R^{B7}	R^{B23}
L_{C178}	R^{B7}	R^{B24}
L_{C179}	R^{B7}	R^{B25}
L_{C180}	R^{B7}	R^{B26}
L_{C181}	R^{B8}	R^{B9}
L_{C182}	R^{B8}	R^{B10}
L_{C183}	R^{B8}	R^{B11}
L_{C184}	R^{B8}	R^{B12}
L_{C185}	R^{B8}	R^{B13}
L_{C186}	R^{B8}	R^{B14}
L_{C187}	R^{B8}	R^{B15}
L_{C188}	R^{B8}	R^{B16}
L_{C189}	R^{B8}	R^{B17}
L_{C190}	R^{B8}	R^{B18}
L_{C191}	R^{B8}	R^{B19}
L_{C192}	R^{B8}	R^{B20}
L_{C193}	R^{B8}	R^{B21}
L_{C194}	R^{B8}	R^{B22}
L_{C195}	R^{B8}	R^{B23}
L_{C196}	R^{B8}	R^{B24}
L_{C197}	R^{B8}	R^{B25}
L_{C198}	R^{B8}	R^{B26}
L_{C199}	R^{B9}	R^{B10}
L_{C200}	R^{B9}	R^{B11}
L_{C201}	R^{B9}	R^{B12}
L_{C202}	R^{B9}	R^{B13}
L_{C203}	R^{B9}	R^{B14}
L_{C204}	R^{B9}	R^{B15}
L_{C205}	R^{B9}	R^{B16}

-continued

L_{CI}	L_C	R^4
L_{C206}	R^{B9}	R^{B17}
L_{C207}	R^{B9}	R^{B18}
L_{C208}	R^{B9}	R^{B19}
L_{C209}	R^{B9}	R^{B20}
L_{C210}	R^{B9}	R^{B21}
L_{C211}	R^{B9}	R^{B22}
L_{C212}	R^{B9}	R^{B23}
L_{C213}	R^{B9}	R^{B24}
L_{C214}	R^{B9}	R^{B25}
L_{C215}	R^{B9}	R^{B26}
L_{C216}	R^{B10}	R^{B11}
L_{C217}	R^{B10}	R^{B12}
L_{C218}	R^{B10}	R^{B13}
L_{C219}	R^{B10}	R^{B14}
L_{C220}	R^{B10}	R^{B15}
L_{C221}	R^{B10}	R^{B16}
L_{C222}	R^{B10}	R^{B17}
L_{C223}	R^{B10}	R^{B18}
L_{C224}	R^{B10}	R^{B19}
L_{C225}	R^{B10}	R^{B20}
L_{C226}	R^{B10}	R^{B21}
L_{C227}	R^{B10}	R^{B22}
L_{C228}	R^{B10}	R^{B23}
L_{C229}	R^{B10}	R^{B24}
L_{C230}	R^{B10}	R^{B25}
L_{C231}	R^{B10}	R^{B26}
L_{C232}	R^{B11}	R^{B12}
L_{C233}	R^{B11}	R^{B13}
L_{C234}	R^{B11}	R^{B14}
L_{C235}	R^{B11}	R^{B15}
L_{C236}	R^{B11}	R^{B16}
L_{C237}	R^{B11}	R^{B17}
L_{C238}	R^{B11}	R^{B18}
L_{C239}	R^{B11}	R^{B19}
L_{C240}	R^{B11}	R^{B20}
L_{C241}	R^{B11}	R^{B21}
L_{C242}	R^{B11}	R^{B22}
L_{C243}	R^{B11}	R^{B23}
L_{C244}	R^{B11}	R^{B24}
L_{C245}	R^{B11}	R^{B25}
L_{C246}	R^{B11}	R^{B26}
L_{C247}	R^{B12}	R^{B13}
L_{C248}	R^{B12}	R^{B14}
L_{C249}	R^{B12}	R^{B15}
L_{C250}	R^{B12}	R^{B16}
L_{C251}	R^{B12}	R^{B17}
L_{C252}	R^{B12}	R^{B18}
L_{C253}	R^{B12}	R^{B19}
L_{C254}	R^{B12}	R^{B20}
L_{C255}	R^{B12}	R^{B21}
L_{C256}	R^{B12}	R^{B22}
L_{C257}	R^{B12}	R^{B23}
L_{C258}	R^{B12}	R^{B24}
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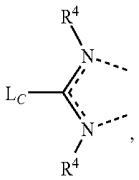
L_{C260}	R^{B12}	R^{B26}
L_{C261}	R^{B13}	R^{B14}
L_{C262}	R^{B13}	R^{B15}
L_{C263}	R^{B13}	R^{B16}
L_{C264}	R^{B13}	R^{B17}
L_{C265}	R^{B13}	R^{B18}
L_{C266}	R^{B13}	R^{B19}
L_{C267}	R^{B13}	R^{B20}
L_{C268}	R^{B13}	R^{B21}
L_{C269}	R^{B13}	R^{B22}
L_{C270}	R^{B13}	R^{B23}
L_{C271}	R^{B13}	R^{B24}
L_{C272}	R^{B13}	R^{B25}
L_{C273}	R^{B13}	R^{B26}
L_{C274}	R^{B14}	R^{B15}
L_{C275}	R^{B14}	R^{B16}
L_{C276}	R^{B14}	R^{B17}
L_{C277}	R^{B14}	R^{B18}
L_{C278}	R^{B14}	R^{B19}
L_{C279}	R^{B14}	R^{B20}

-continued

L_{CI}	L_C	R^4
L_{C280}	R^{B14}	R^{B21}
L_{C281}	R^{B14}	R^{B22}
L_{C282}	R^{B14}	R^{B23}
L_{C283}	R^{B14}	R^{B24}
L_{C284}	R^{B14}	R^{B25}
L_{C285}	R^{B14}	R^{B26}
L_{C286}	R^{B15}	R^{B16}
L_{C287}	R^{B15}	R^{B17}
L_{C288}	R^{B15}	R^{B18}
L_{C289}	R^{B15}	R^{B19}
L_{C290}	R^{B15}	R^{B20}
L_{C291}	R^{B15}	R^{B21}
L_{C292}	R^{B15}	R^{B22}
L_{C293}	R^{B15}	R^{B23}
L_{C294}	R^{B15}	R^{B24}
L_{C295}	R^{B15}	R^{B25}
L_{C296}	R^{B15}	R^{B26}
L_{C297}	R^{B16}	R^{B17}
L_{C298}	R^{B16}	R^{B18}
L_{C299}	R^{B16}	R^{B19}
L_{C300}	R^{B16}	R^{B20}
L_{C301}	R^{B16}	R^{B21}
L_{C302}	R^{B16}	R^{B22}
L_{C303}	R^{B16}	R^{B23}
L_{C304}	R^{B16}	R^{B24}
L_{C305}	R^{B16}	R^{B25}
L_{C306}	R^{B16}	R^{B26}
L_{C307}	R^{B17}	R^{B18}
L_{C308}	R^{B17}	R^{B19}
L_{C309}	R^{B17}	R^{B20}
L_{C310}	R^{B17}	R^{B21}
L_{C311}	R^{B17}	R^{B22}
L_{C312}	R^{B17}	R^{B23}
L_{C313}	R^{B17}	R^{B24}
L_{C314}	R^{B17}	R^{B25}
L_{C315}	R^{B17}	R^{B26}
L_{C316}	R^{B18}	R^{B19}
L_{C317}	R^{B18}	R^{B20}
L_{C318}	R^{B18}	R^{B21}
L_{C319}	R^{B18}	R^{B22}
L_{C320}	R^{B18}	R^{B23}
L_{C321}	R^{B18}	R^{B24}
L_{C322}	R^{B18}	R^{B25}
L_{C323}	R^{B18}	R^{B26}
L_{C324}	R^{B19}	R^{B20}
L_{C325}	R^{B19}	R^{B21}
L_{C326}	R^{B19}	R^{B22}
L_{C327}	R^{B19}	R^{B23}
L_{C328}	R^{B19}	R^{B24}
L_{C329}	R^{B19}	R^{B25}
L_{C330}	R^{B19}	R^{B26}
L_{C331}	R^{B20}	R^{B21}
L_{C332}	R^{B20}	R^{B22}
L_{C333}	R^{B20}	R^{B23}
L_{C334}	R^{B20}	R^{B24}
L_{C335}	R^{B20}	R^{B25}
L_{C336}	R^{B20}	R^{B26}
L_{C337}	R^{B21}	R^{B22}
L_{C338}	R^{B21}	R^{B23}
L_{C339}	R^{B21}	R^{B24}
L_{C340}	R^{B21}	R^{B25}
L_{C341}	R^{B21}	R^{B26}
L_{C342}	R^{B22}	R^{B23}
L_{C343}	R^{B22}	R^{B24}
L_{C344}	R^{B22}	R^{B25}
L_{C345}	R^{B22}	R^{B26}
L_{C346}	R^{B23}	R^{B24}
L_{C347}	R^{B23}	R^{B25}
L_{C348}	R^{B23}	R^{B26}
L_{C349}	R^{B24}	R^{B25}
L_{C350}	R^{B24}	R^{B26}
L_{C351}	R^{B25}	R^{B26}

[0140] wherein L_{C352} through L_{C702} have a structure of Formula V,



in which LC and R^4, are defined as:

Ligand	L_C	R^4
L_{C352}	R^{B1}	R^{B1}
L_{C353}	R^{B2}	R^{B2}
L_{C354}	R^{B3}	R^{B3}
L_{C355}	R^{B4}	R^{B4}
L_{C356}	R^{B5}	R^{B5}
L_{C357}	R^{B6}	R^{B6}
L_{C358}	R^{B7}	R^{B7}
L_{C359}	R^{B8}	R^{B8}
L_{C360}	R^{B9}	R^{B9}
L_{C361}	R^{B10}	R^{B10}
L_{C362}	R^{B11}	R^{B11}
L_{C363}	R^{B12}	R^{B12}
L_{C364}	R^{B13}	R^{B13}
L_{C365}	R^{B14}	R^{B14}
L_{C366}	R^{B15}	R^{B15}
L_{C367}	R^{B16}	R^{B16}
L_{C368}	R^{B17}	R^{B17}
L_{C369}	R^{B18}	R^{B18}
L_{C370}	R^{B19}	R^{B19}
L_{C371}	R^{B20}	R^{B20}
L_{C372}	R^{B21}	R^{B21}
L_{C373}	R^{B22}	R^{B22}
L_{C374}	R^{B23}	R^{B23}
L_{C375}	R^{B24}	R^{B24}
L_{C376}	R^{B25}	R^{B25}
L_{C377}	R^{B26}	R^{B26}
L_{C378}	R^{B1}	R^{B2}
L_{C379}	R^{B1}	R^{B3}
L_{C380}	R^{B1}	R^{B4}
L_{C381}	R^{B1}	R^{B5}
L_{C382}	R^{B1}	R^{B6}
L_{C383}	R^{B1}	R^{B7}
L_{C384}	R^{B1}	R^{B8}
L_{C385}	R^{B1}	R^{B9}
L_{C386}	R^{B1}	R^{B10}
L_{C387}	R^{B1}	R^{B11}
L_{C388}	R^{B1}	R^{B12}
L_{C389}	R^{B1}	R^{B13}
L_{C390}	R^{B1}	R^{B14}
L_{C391}	R^{B1}	R^{B15}
L_{C392}	R^{B1}	R^{B16}
L_{C393}	R^{B1}	R^{B17}
L_{C394}	R^{B1}	R^{B18}
L_{C395}	R^{B1}	R^{B19}
L_{C396}	R^{B1}	R^{B20}
L_{C397}	R^{B1}	R^{B21}
L_{C398}	R^{B1}	R^{B22}
L_{C399}	R^{B1}	R^{B23}
L_{C400}	R^{B1}	R^{B24}
L_{C401}	R^{B1}	R^{B25}
L_{C402}	R^{B1}	R^{B26}
L_{C403}	R^{B2}	R^{B3}
L_{C404}	R^{B2}	R^{B4}
L_{C405}	R^{B2}	R^{B5}
L_{C406}	R^{B2}	R^{B6}
L_{C407}	R^{B2}	R^{B7}
L_{C408}	R^{B2}	R^{B8}
L_{C409}	R^{B2}	R^{B9}
L_{C410}	R^{B2}	R^{B10}

-continued

Ligand	L_C	R^4
L_{C411}	R^{B2}	R^{B11}
L_{C412}	R^{B2}	R^{B12}
L_{C413}	R^{B2}	R^{B13}
L_{C414}	R^{B2}	R^{B14}
L_{C415}	R^{B2}	R^{B15}
L_{C416}	R^{B2}	R^{B16}
L_{C417}	R^{B2}	R^{B17}
L_{C418}	R^{B2}	R^{B18}
L_{C419}	R^{B2}	R^{B19}
L_{C420}	R^{B2}	R^{B20}
L_{C421}	R^{B2}	R^{B21}
L_{C422}	R^{B2}	R^{B22}
L_{C423}	R^{B2}	R^{B23}
L_{C424}	R^{B2}	R^{B24}
L_{C425}	R^{B2}	R^{B25}
L_{C426}	R^{B2}	R^{B26}
L_{C427}	R^{B3}	R^{B4}
L_{C428}	R^{B3}	R^{B5}
L_{C429}	R^{B3}	R^{B6}
L_{C430}	R^{B3}	R^{B7}
L_{C431}	R^{B3}	R^{B8}
L_{C432}	R^{B3}	R^{B9}
L_{C433}	R^{B3}	R^{B10}
L_{C434}	R^{B3}	R^{B11}
L_{C435}	R^{B3}	R^{B12}
L_{C436}	R^{B3}	R^{B13}
L_{C437}	R^{B3}	R^{B14}
L_{C438}	R^{B3}	R^{B15}
L_{C439}	R^{B3}	R^{B16}
L_{C440}	R^{B3}	R^{B17}
L_{C441}	R^{B3}	R^{B18}
L_{C442}	R^{B3}	R^{B19}
L_{C443}	R^{B3}	R^{B20}
L_{C444}	R^{B3}	R^{B21}
L_{C445}	R^{B3}	R^{B22}
L_{C446}	R^{B3}	R^{B23}
L_{C447}	R^{B3}	R^{B24}
L_{C448}	R^{B3}	R^{B25}
L_{C449}	R^{B3}	R^{B26}
L_{C450}	R^{B4}	R^{B5}
L_{C451}	R^{B4}	R^{B6}
L_{C452}	R^{B4}	R^{B7}
L_{C453}	R^{B4}	R^{B8}
L_{C454}	R^{B4}	R^{B9}
L_{C455}	R^{B4}	R^{B10}
L_{C456}	R^{B4}	R^{B11}
L_{C457}	R^{B4}	R^{B12}
L_{C458}	R^{B4}	R^{B13}
L_{C459}	R^{B4}	R^{B14}
L_{C460}	R^{B4}	R^{B15}
L_{C461}	R^{B4}	R^{B16}
L_{C462}	R^{B4}	R^{B17}
L_{C463}	R^{B4}	R^{B18}
L_{C464}	R^{B4}	R^{B19}
L_{C465}	R^{B4}	R^{B20}
L_{C466}	R^{B4}	R^{B21}
L_{C467}	R^{B4}	R^{B22}
L_{C468}	R^{B4}	R^{B23}
L_{C469}	R^{B4}	R^{B24}
L_{C470}	R^{B4}	R^{B25}
L_{C471}	R^{B4}	R^{B26}
L_{C472}	R^{B5}	R^{B6}
L_{C473}	R^{B5}	R^{B7}
L_{C474}	R^{B5}	R^{B8}
L_{C475}	R^{B5}	R^{B9}
L_{C476}	R^{B5}	R^{B10}
L_{C477}	R^{B5}	R^{B11}
L_{C478}	R^{B5}	R^{B12}
L_{C479}	R^{B5}	R^{B13}
L_{C480}	R^{B5}	R^{B14}
L_{C481}	R^{B5}	R^{B15}
L_{C482}	R^{B5}	R^{B16}
L_{C483}	R^{B5}	R^{B17}
L_{C484}	R^{B5}	R^{B18}

-continued

Ligand	L_C	R^4
L_{C485}	R^{B5}	R^{B19}
L_{C486}	R^{B5}	R^{B20}
L_{C487}	R^{B5}	R^{B21}
L_{C388}	R^{B5}	R^{B22}
L_{C489}	R^{B5}	R^{B23}
L_{C490}	R^{B5}	R^{B24}
L_{C491}	R^{B5}	R^{B25}
L_{C492}	R^{B5}	R^{B26}
L_{C493}	R^{B6}	R^{B7}
L_{C494}	R^{B6}	R^{B8}
L_{C495}	R^{B6}	R^{B9}
L_{C496}	R^{B6}	R^{B10}
L_{C497}	R^{B6}	R^{B11}
L_{C498}	R^{B6}	R^{B12}
L_{C499}	R^{B6}	R^{B13}
L_{C500}	R^{B6}	R^{B14}
L_{C501}	R^{B6}	R^{B15}
L_{C502}	R^{B6}	R^{B16}
L_{C503}	R^{B6}	R^{B17}
L_{C504}	R^{B6}	R^{B18}
L_{C505}	R^{B6}	R^{B19}
L_{C506}	R^{B6}	R^{B20}
L_{C507}	R^{B6}	R^{B21}
L_{C508}	R^{B6}	R^{B22}
L_{C509}	R^{B6}	R^{B23}
L_{C510}	R^{B6}	R^{B24}
L_{C511}	R^{B6}	R^{B25}
L_{C512}	R^{B6}	R^{B26}
L_{C513}	R^{B7}	R^{B8}
L_{C514}	R^{B7}	R^{B9}
L_{C515}	R^{B7}	R^{B10}
L_{C516}	R^{B7}	R^{B11}
L_{C517}	R^{B7}	R^{B12}
L_{C518}	R^{B7}	R^{B13}
L_{C519}	R^{B7}	R^{B14}
L_{C520}	R^{B7}	R^{B15}
L_{C521}	R^{B7}	R^{B16}
L_{C522}	R^{B7}	R^{B17}
L_{C523}	R^{B7}	R^{B18}
L_{C524}	R^{B7}	R^{B19}
L_{C525}	R^{B7}	R^{B20}
L_{C526}	R^{B7}	R^{B21}
L_{C527}	R^{B7}	R^{B22}
L_{C528}	R^{B7}	R^{B23}
L_{C529}	R^{B7}	R^{B24}
L_{C530}	R^{B7}	R^{B25}
L_{C531}	R^{B7}	R^{B26}
L_{C532}	R^{B8}	R^{B9}
L_{C533}	R^{B8}	R^{B10}
L_{C534}	R^{B8}	R^{B11}
L_{C535}	R^{B8}	R^{B12}
L_{C536}	R^{B8}	R^{B13}
L_{C537}	R^{B8}	R^{B14}
L_{C538}	R^{B8}	R^{B15}
L_{C539}	R^{B8}	R^{B16}
L_{C540}	R^{B8}	R^{B17}
L_{C541}	R^{B8}	R^{B18}
L_{C542}	R^{B8}	R^{B19}
L_{C543}	R^{B8}	R^{B20}
L_{C544}	R^{B8}	R^{B21}
L_{C545}	R^{B8}	R^{B22}
L_{C546}	R^{B8}	R^{B23}
L_{C547}	R^{B8}	R^{B24}
L_{C548}	R^{B8}	R^{B25}
L_{C549}	R^{B8}	R^{B26}
L_{C550}	R^{B9}	R^{B10}
L_{C551}	R^{B9}	R^{B11}
L_{C552}	R^{B9}	R^{B12}
L_{C543}	R^{B9}	R^{B13}
L_{C544}	R^{B9}	R^{B14}
L_{C545}	R^{B9}	R^{B15}
L_{C556}	R^{B9}	R^{B16}
L_{C557}	R^{B9}	R^{B17}
L_{C558}	R^{B9}	R^{B18}

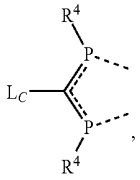
-continued

Ligand	L_C	R^4
L_{C559}	R^{B9}	R^{B19}
L_{C560}	R^{B9}	R^{B20}
L_{C561}	R^{B9}	R^{B21}
L_{C562}	R^{B9}	R^{B22}
L_{C563}	R^{B9}	R^{B23}
L_{C564}	R^{B9}	R^{B24}
L_{C565}	R^{B9}	R^{B25}
L_{C566}	R^{B9}	R^{B26}
L_{C567}	R^{B10}	R^{B11}
L_{C568}	R^{B10}	R^{B12}
L_{C569}	R^{B10}	R^{B13}
L_{C570}	R^{B10}	R^{B14}
L_{C571}	R^{B10}	R^{B15}
L_{C572}	R^{B10}	R^{B16}
L_{C573}	R^{B10}	R^{B17}
L_{C574}	R^{B10}	R^{B18}
L_{C575}	R^{B10}	R^{B19}
L_{C576}	R^{B10}	R^{B20}
L_{C577}	R^{B10}	R^{B21}
L_{C578}	R^{B10}	R^{B22}
L_{C579}	R^{B10}	R^{B23}
L_{C580}	R^{B10}	R^{B24}
L_{C581}	R^{B10}	R^{B25}
L_{C582}	R^{B10}	R^{B26}
L_{C583}	R^{B11}	R^{B12}
L_{C584}	R^{B11}	R^{B13}
L_{C585}	R^{B11}	R^{B14}
L_{C586}	R^{B11}	R^{B15}
L_{C587}	R^{B11}	R^{B16}
L_{C588}	R^{B11}	R^{B17}
L_{C589}	R^{B11}	R^{B18}
L_{C590}	R^{B11}	R^{B19}
L_{C591}	R^{B11}	R^{B20}
L_{C592}	R^{B11}	R^{B21}
L_{C593}	R^{B11}	R^{B22}
L_{C594}	R^{B11}	R^{B23}
L_{C595}	R^{B11}	R^{B24}
L_{C596}	R^{B11}	R^{B25}
L_{C597}	R^{B11}	R^{B26}
L_{C598}	R^{B12}	R^{B13}
L_{C599}	R^{B12}	R^{B14}
L_{C600}	R^{B12}	R^{B15}
L_{C601}	R^{B12}	R^{B16}
L_{C602}	R^{B12}	R^{B17}
L_{C603}	R^{B12}	R^{B18}
L_{C604}	R^{B12}	R^{B19}
L_{C605}	R^{B12}	R^{B20}
L_{C606}	R^{B12}	R^{B21}
L_{C607}	R^{B12}	R^{B22}
L_{C608}	R^{B12}	R^{B23}
L_{C609}	R^{B12}	R^{B24}
L_{C610}	R^{B12}	R^{B25}
L_{C611}	R^{B12}	R^{B26}
L_{C612}	R^{B13}	R^{B14}
L_{C613}	R^{B13}	R^{B15}
L_{C614}	R^{B13}	R^{B16}
L_{C615}	R^{B13}	R^{B17}
L_{C616}	R^{B13}	R^{B18}
L_{C617}	R^{B13}	R^{B19}
L_{C618}	R^{B13}	R^{B20}
L_{C619}	R^{B13}	R^{B21}
L_{C620}	R^{B13}	R^{B22}
L_{C621}	R^{B13}	R^{B23}
L_{C622}	R^{B13}	R^{B24}
L_{C623}	R^{B13}	R^{B25}
L_{C624}	R^{B13}	R^{B26}
L_{C625}	R^{B14}	R^{B15}
L_{C626}	R^{B14}	R^{B16}
L_{C627}	R^{B14}	R^{B17}
L_{C628}	R^{B14}	R^{B18}
L_{C629}	R^{B14}	R^{B19}
L_{C630}	R^{B14}	R^{B20}
L_{C631}	R^{B14}	R^{B21}
L_{C632}	R^{B14}	R^{B22}

-continued

Ligand	L_C	R^4
L_{C633}	R^{B14}	R^{B23}
L_{C634}	R^{B14}	R^{B24}
L_{C635}	R^{B14}	R^{B25}
L_{C636}	R^{B14}	R^{B26}
L_{C637}	R^{B15}	R^{B16}
L_{C638}	R^{B15}	R^{B17}
L_{C639}	R^{B15}	R^{B18}
L_{C640}	R^{B15}	R^{B19}
L_{C641}	R^{B15}	R^{B20}
L_{C642}	R^{B15}	R^{B21}
L_{C643}	R^{B15}	R^{B22}
L_{C644}	R^{B15}	R^{B23}
L_{C645}	R^{B15}	R^{B24}
L_{C646}	R^{B15}	R^{B25}
L_{C647}	R^{B15}	R^{B26}
L_{C648}	R^{B16}	R^{B17}
L_{C649}	R^{B16}	R^{B18}
L_{C650}	R^{B16}	R^{B19}
L_{C651}	R^{B16}	R^{B20}
L_{C652}	R^{B16}	R^{B21}
L_{C653}	R^{B16}	R^{B22}
L_{C654}	R^{B16}	R^{B23}
L_{C655}	R^{B16}	R^{B24}
L_{C656}	R^{B16}	R^{B25}
L_{C657}	R^{B16}	R^{B26}
L_{C658}	R^{B17}	R^{B18}
L_{C659}	R^{B17}	R^{B19}
L_{C660}	R^{B17}	R^{B20}
L_{C661}	R^{B17}	R^{B21}
L_{C662}	R^{B17}	R^{B22}
L_{C663}	R^{B17}	R^{B23}
L_{C664}	R^{B17}	R^{B24}
L_{C665}	R^{B17}	R^{B25}
L_{C666}	R^{B17}	R^{B26}
L_{C667}	R^{B18}	R^{B19}
L_{C668}	R^{B18}	R^{B20}
L_{C669}	R^{B18}	R^{B21}
L_{C670}	R^{B18}	R^{B22}
L_{C671}	R^{B18}	R^{B23}
L_{C672}	R^{B18}	R^{B24}
L_{C673}	R^{B18}	R^{B25}
L_{C674}	R^{B18}	R^{B26}
L_{C675}	R^{B19}	R^{B20}
L_{C676}	R^{B19}	R^{B21}
L_{C677}	R^{B19}	R^{B22}
L_{C678}	R^{B19}	R^{B23}
L_{C679}	R^{B19}	R^{B24}
L_{C680}	R^{B19}	R^{B25}
L_{C681}	R^{B19}	R^{B26}
L_{C682}	R^{B20}	R^{B21}
L_{C683}	R^{B20}	R^{B22}
L_{C684}	R^{B20}	R^{B23}
L_{C685}	R^{B20}	R^{B24}
L_{C686}	R^{B20}	R^{B25}
L_{C687}	R^{B20}	R^{B26}
L_{C688}	R^{B21}	R^{B22}
L_{C689}	R^{B21}	R^{B23}
L_{C690}	R^{B21}	R^{B24}
L_{C691}	R^{B21}	R^{B25}
L_{C692}	R^{B21}	R^{B26}
L_{C693}	R^{B22}	R^{B23}
L_{C694}	R^{B22}	R^{B24}
L_{C695}	R^{B22}	R^{B25}
L_{C696}	R^{B22}	R^{B26}
L_{C697}	R^{B23}	R^{B24}
L_{C698}	R^{B23}	R^{B25}
L_{C699}	R^{B23}	R^{B26}
L_{C700}	R^{B24}	R^{B25}
L_{C701}	R^{B24}	R^{B26}
L_{C702}	R^{B25}	R^{B26}

[0141] wherein L_{C703} through L_{C1053} have a structure of Formula VI,



in which L_C and R^4, are defined as:

Ligand	L_C	R^4
L_{C703}	R^{B1}	R^{B1}
L_{C704}	R^{B2}	R^{B2}
L_{C705}	R^{B3}	R^{B3}
L_{C706}	R^{B4}	R^{B4}
L_{C707}	R^{B5}	R^{B5}
L_{C708}	R^{B6}	R^{B6}
L_{C709}	R^{B7}	R^{B7}
L_{C710}	R^{B8}	R^{B8}
L_{C711}	R^{B9}	R^{B9}
L_{C712}	R^{B10}	R^{B10}
L_{C713}	R^{B11}	R^{B11}
L_{C714}	R^{B12}	R^{B12}
L_{C715}	R^{B13}	R^{B13}
L_{C716}	R^{B14}	R^{B14}
L_{C717}	R^{B15}	R^{B15}
L_{C718}	R^{B16}	R^{B16}
L_{C719}	R^{B17}	R^{B17}
L_{C720}	R^{B18}	R^{B18}
L_{C721}	R^{B19}	R^{B19}
L_{C722}	R^{B20}	R^{B20}
L_{C723}	R^{B21}	R^{B21}
L_{C724}	R^{B22}	R^{B22}
L_{C725}	R^{B23}	R^{B23}
L_{C726}	R^{B24}	R^{B24}
L_{C727}	R^{B25}	R^{B25}
L_{C728}	R^{B26}	R^{B26}
L_{C729}	R^{B1}	R^{B2}
L_{C730}	R^{B1}	R^{B3}
L_{C731}	R^{B1}	R^{B4}
L_{C732}	R^{B1}	R^{B5}
L_{C733}	R^{B1}	R^{B6}
L_{C734}	R^{B1}	R^{B7}
L_{C735}	R^{B1}	R^{B8}
L_{C736}	R^{B1}	R^{B9}
L_{C737}	R^{B1}	R^{B10}
L_{C738}	R^{B1}	R^{B11}
L_{C739}	R^{B1}	R^{B12}
L_{C740}	R^{B1}	R^{B13}
L_{C741}	R^{B1}	R^{B14}
L_{C742}	R^{B1}	R^{B15}
L_{C743}	R^{B1}	R^{B16}
L_{C744}	R^{B1}	R^{B17}
L_{C745}	R^{B1}	R^{B18}
L_{C746}	R^{B1}	R^{B19}
L_{C747}	R^{B1}	R^{B20}
L_{C748}	R^{B1}	R^{B21}
L_{C749}	R^{B1}	R^{B22}
L_{C750}	R^{B1}	R^{B23}
L_{C751}	R^{B1}	R^{B24}
L_{C752}	R^{B1}	R^{B25}
L_{C753}	R^{B1}	R^{B26}
L_{C754}	R^{B2}	R^{B3}
L_{C755}	R^{B2}	R^{B4}
L_{C756}	R^{B2}	R^{B5}
L_{C757}	R^{B2}	R^{B6}
L_{C758}	R^{B2}	R^{B7}
L_{C759}	R^{B2}	R^{B8}
L_{C760}	R^{B2}	R^{B9}
L_{C761}	R^{B2}	R^{B10}

-continued

Ligand	L_C	R^4
L_{C762}	R^{B2}	R^{B11}
L_{C763}	R^{B2}	R^{B12}
L_{C764}	R^{B2}	R^{B13}
L_{C765}	R^{B2}	R^{B14}
L_{C766}	R^{B2}	R^{B15}
L_{C767}	R^{B2}	R^{B16}
L_{C768}	R^{B2}	R^{B17}
L_{C769}	R^{B2}	R^{B18}
L_{C770}	R^{B2}	R^{B19}
L_{C771}	R^{B2}	R^{B20}
L_{C772}	R^{B2}	R^{B21}
L_{C773}	R^{B2}	R^{B22}
L_{C774}	R^{B2}	R^{B23}
L_{C775}	R^{B2}	R^{B24}
L_{C776}	R^{B2}	R^{B25}
L_{C777}	R^{B2}	R^{B26}
L_{C778}	R^{B3}	R^{B4}
L_{C779}	R^{B3}	R^{B5}
L_{C780}	R^{B3}	R^{B6}
L_{C781}	R^{B3}	R^{B7}
L_{C782}	R^{B3}	R^{B8}
L_{C783}	R^{B3}	R^{B9}
L_{C784}	R^{B3}	R^{B10}
L_{C785}	R^{B3}	R^{B11}
L_{C786}	R^{B3}	R^{B12}
L_{C787}	R^{B3}	R^{B13}
L_{C788}	R^{B3}	R^{B14}
L_{C789}	R^{B3}	R^{B15}
L_{C790}	R^{B3}	R^{B16}
L_{C791}	R^{B3}	R^{B17}
L_{C792}	R^{B3}	R^{B18}
L_{C793}	R^{B3}	R^{B19}
L_{C794}	R^{B3}	R^{B20}
L_{C795}	R^{B3}	R^{B21}
L_{C796}	R^{B3}	R^{B22}
L_{C797}	R^{B3}	R^{B23}
L_{C798}	R^{B3}	R^{B24}
L_{C799}	R^{B3}	R^{B25}
L_{C800}	R^{B3}	R^{B26}
L_{C801}	R^{B4}	R^{B5}
L_{C802}	R^{B4}	R^{B6}
L_{C803}	R^{B4}	R^{B7}
L_{C804}	R^{B4}	R^{B8}
L_{C805}	R^{B4}	R^{B9}
L_{C806}	R^{B4}	R^{B10}
L_{C807}	R^{B4}	R^{B11}
L_{C808}	R^{B4}	R^{B12}
L_{C809}	R^{B4}	R^{B13}
L_{C810}	R^{B4}	R^{B14}
L_{C811}	R^{B4}	R^{B15}
L_{C812}	R^{B4}	R^{B16}
L_{C813}	R^{B4}	R^{B17}
L_{C814}	R^{B4}	R^{B18}
L_{C815}	R^{B4}	R^{B19}
L_{C816}	R^{B4}	R^{B20}
L_{C817}	R^{B4}	R^{B21}
L_{C818}	R^{B4}	R^{B22}
L_{C819}	R^{B4}	R^{B23}
L_{C820}	R^{B4}	R^{B24}
L_{C821}	R^{B4}	R^{B25}
L_{C822}	R^{B4}	R^{B26}
L_{C823}	R^{B5}	R^{B6}
L_{C824}	R^{B5}	R^{B7}
L_{C825}	R^{B5}	R^{B8}
L_{C826}	R^{B5}	R^{B9}
L_{C827}	R^{B5}	R^{B10}
L_{C828}	R^{B5}	R^{B11}
L_{C829}	R^{B5}	R^{B12}
L_{C830}	R^{B5}	R^{B13}
L_{C831}	R^{B5}	R^{B14}
L_{C832}	R^{B5}	R^{B15}
L_{C833}	R^{B5}	R^{B16}
L_{C834}	R^{B5}	R^{B17}
L_{C835}	R^{B5}	R^{B18}

-continued

Ligand	L_C	R^4
L_{C836}	R^{B5}	R^{B19}
L_{C837}	R^{B5}	R^{B20}
L_{C838}	R^{B5}	R^{B21}
L_{C839}	R^{B5}	R^{B22}
L_{C840}	R^{B5}	R^{B23}
L_{C841}	R^{B5}	R^{B24}
L_{C842}	R^{B5}	R^{B25}
L_{C843}	R^{B5}	R^{B26}
L_{C844}	R^{B6}	R^{B7}
L_{C845}	R^{B6}	R^{B8}
L_{C846}	R^{B6}	R^{B9}
L_{C847}	R^{B6}	R^{B10}
L_{C848}	R^{B6}	R^{B11}
L_{C849}	R^{B6}	R^{B12}
L_{C850}	R^{B6}	R^{B13}
L_{C851}	R^{B6}	R^{B14}
L_{C852}	R^{B6}	R^{B15}
L_{C853}	R^{B6}	R^{B16}
L_{C854}	R^{B6}	R^{B17}
L_{C855}	R^{B6}	R^{B18}
L_{C856}	R^{B6}	R^{B19}
L_{C857}	R^{B6}	R^{B20}
L_{C858}	R^{B6}	R^{B21}
L_{C859}	R^{B6}	R^{B22}
L_{C860}	R^{B6}	R^{B23}
L_{C861}	R^{B6}	R^{B24}
L_{C862}	R^{B6}	R^{B25}
L_{C863}	R^{B6}	R^{B26}
L_{C864}	R^{B7}	R^{B8}
L_{C865}	R^{B7}	R^{B9}
L_{C866}	R^{B7}	R^{B10}
L_{C867}	R^{B7}	R^{B11}
L_{C868}	R^{B7}	R^{B12}
L_{C869}	R^{B7}	R^{B13}
L_{C870}	R^{B7}	R^{B14}
L_{C871}	R^{B7}	R^{B15}
L_{C872}	R^{B7}	R^{B16}
L_{C873}	R^{B7}	R^{B17}
L_{C874}	R^{B7}	R^{B18}
L_{C875}	R^{B7}	R^{B19}
L_{C876}	R^{B7}	R^{B20}
L_{C877}	R^{B7}	R^{B21}
L_{C878}	R^{B7}	R^{B22}
L_{C879}	R^{B7}	R^{B23}
L_{C880}	R^{B7}	R^{B24}
L_{C881}	R^{B7}	R^{B25}
L_{C882}	R^{B7}	R^{B26}
L_{C883}	R^{B8}	R^{B9}
L_{C884}	R^{B8}	R^{B10}
L_{C885}	R^{B8}	R^{B11}
L_{C886}	R^{B8}	R^{B12}
L_{C887}	R^{B8}	R^{B13}
L_{C888}	R^{B8}	R^{B14}
L_{C889}	R^{B8}	R^{B15}
L_{C890}	R^{B8}	R^{B16}
L_{C891}	R^{B8}	R^{B17}
L_{C892}	R^{B8}	R^{B18}
L_{C893}	R^{B8}	R^{B19}
L_{C894}	R^{B8}	R^{B20}
L_{C895}	R^{B8}	R^{B21}
L_{C896}	R^{B8}	R^{B22}
L_{C897}	R^{B8}	R^{B23}
L_{C898}	R^{B8}	R^{B24}
L_{C899}	R^{B8}	R^{B25}
L_{C900}	R^{B8}	R^{B26}
L_{C901}	R^{B9}	R^{B10}
L_{C902}	R^{B9}	R^{B11}
L_{C903}	R^{B9}	R^{B12}
L_{C904}	R^{B9}	R^{B13}
L_{C905}	R^{B9}	R^{B14}
L_{C906}	R^{B9}	R^{B15}
L_{C907}	R^{B9}	R^{B16}
L_{C908}	R^{B9}	R^{B17}
L_{C909}	R^{B9}	R^{B18}

-continued

Ligand	L_C	R^4
L_{C910}	R^{B9}	R^{B19}
L_{C911}	R^{B9}	R^{B20}
L_{C912}	R^{B9}	R^{B21}
L_{C913}	R^{B9}	R^{B22}
L_{C914}	R^{B9}	R^{B23}
L_{C915}	R^{B9}	R^{B24}
L_{C916}	R^{B9}	R^{B25}
L_{C917}	R^{B9}	R^{B26}
L_{C918}	R^{B10}	R^{B11}
L_{C919}	R^{B10}	R^{B12}
L_{C920}	R^{B10}	R^{B13}
L_{C921}	R^{B10}	R^{B14}
L_{C922}	R^{B10}	R^{B15}
L_{C923}	R^{B10}	R^{B16}
L_{C924}	R^{B10}	R^{B17}
L_{C925}	R^{B10}	R^{B18}
L_{C926}	R^{B10}	R^{B19}
L_{C927}	R^{B10}	R^{B20}
L_{C928}	R^{B10}	R^{B21}
L_{C929}	R^{B10}	R^{B22}
L_{C930}	R^{B10}	R^{B23}
L_{C931}	R^{B10}	R^{B24}
L_{C932}	R^{B10}	R^{B25}
L_{C933}	R^{B10}	R^{B26}
L_{C934}	R^{B11}	R^{B12}
L_{C935}	R^{B11}	R^{B13}
L_{C936}	R^{B11}	R^{B14}
L_{C937}	R^{B11}	R^{B15}
L_{C938}	R^{B11}	R^{B16}
L_{C939}	R^{B11}	R^{B17}
L_{C940}	R^{B11}	R^{B18}
L_{C941}	R^{B11}	R^{B19}
L_{C942}	R^{B11}	R^{B20}
L_{C943}	R^{B11}	R^{B21}
L_{C944}	R^{B11}	R^{B22}
L_{C945}	R^{B11}	R^{B23}
L_{C946}	R^{B11}	R^{B24}
L_{C947}	R^{B11}	R^{B25}
L_{C948}	R^{B11}	R^{B26}
L_{C949}	R^{B12}	R^{B13}
L_{C950}	R^{B12}	R^{B14}
L_{C951}	R^{B12}	R^{B15}
L_{C952}	R^{B12}	R^{B16}
L_{C953}	R^{B12}	R^{B17}
L_{C954}	R^{B12}	R^{B18}
L_{C955}	R^{B12}	R^{B19}
L_{C956}	R^{B12}	R^{B20}
L_{C957}	R^{B12}	R^{B21}
L_{C958}	R^{B12}	R^{B22}
L_{C959}	R^{B12}	R^{B23}
L_{C960}	R^{B12}	R^{B24}
L_{C961}	R^{B12}	R^{B25}
L_{C962}	R^{B12}	R^{B26}
L_{C963}	R^{B13}	R^{B14}
L_{C964}	R^{B13}	R^{B15}
L_{C965}	R^{B13}	R^{B16}
L_{C966}	R^{B13}	R^{B17}
L_{C967}	R^{B13}	R^{B18}
L_{C968}	R^{B13}	R^{B19}
L_{C969}	R^{B13}	R^{B20}
L_{C970}	R^{B13}	R^{B21}
L_{C971}	R^{B13}	R^{B22}
L_{C972}	R^{B13}	R^{B23}
L_{C973}	R^{B13}	R^{B24}
L_{C974}	R^{B13}	R^{B25}
L_{C975}	R^{B13}	R^{B26}
L_{C976}	R^{B14}	R^{B15}
L_{C977}	R^{B14}	R^{B16}
L_{C978}	R^{B14}	R^{B17}
L_{C979}	R^{B14}	R^{B18}
L_{C980}	R^{B14}	R^{B19}
L_{C981}	R^{B14}	R^{B20}
L_{C982}	R^{B14}	R^{B21}
L_{C983}	R^{B14}	R^{B22}

-continued

Ligand	L_C	R^4
L_{C984}	R^{B14}	R^{B23}
L_{C985}	R^{B14}	R^{B24}
L_{C986}	R^{B14}	R^{B25}
L_{C987}	R^{B14}	R^{B26}
L_{C988}	R^{B15}	R^{B16}
L_{C989}	R^{B15}	R^{B17}
L_{C990}	R^{B15}	R^{B18}
L_{C991}	R^{B15}	R^{B19}
L_{C992}	R^{B15}	R^{B20}
L_{C993}	R^{B15}	R^{B21}
L_{C994}	R^{B15}	R^{B22}
L_{C995}	R^{B15}	R^{B23}
L_{C996}	R^{B15}	R^{B24}
L_{C997}	R^{B15}	R^{B25}
L_{C998}	R^{B15}	R^{B26}
L_{C999}	R^{B16}	R^{B17}
L_{C1000}	R^{B16}	R^{B18}
L_{C1001}	R^{B16}	R^{B19}
L_{C1002}	R^{B16}	R^{B20}
L_{C1003}	R^{B16}	R^{B21}
L_{C1004}	R^{B16}	R^{B22}
L_{C1005}	R^{B16}	R^{B23}
L_{C1006}	R^{B16}	R^{B24}
L_{C1007}	R^{B16}	R^{B25}
L_{C1008}	R^{B16}	R^{B26}
L_{C1009}	R^{B17}	R^{B18}
L_{C1010}	R^{B17}	R^{B19}
L_{C1011}	R^{B17}	R^{B20}
L_{C1012}	R^{B17}	R^{B21}
L_{C1013}	R^{B17}	R^{B22}
L_{C1014}	R^{B17}	R^{B23}
L_{C1015}	R^{B17}	R^{B24}
L_{C1016}	R^{B17}	R^{B25}
L_{C1017}	R^{B17}	R^{B26}
L_{C1018}	R^{B18}	R^{B19}
L_{C1019}	R^{B18}	R^{B20}
L_{C1020}	R^{B18}	R^{B21}
L_{C1021}	R^{B18}	R^{B22}
L_{C1022}	R^{B18}	R^{B23}
L_{C1023}	R^{B18}	R^{B24}
L_{C1024}	R^{B18}	R^{B25}
L_{C1025}	R^{B18}	R^{B26}
L_{C1026}	R^{B19}	R^{B20}
L_{C1027}	R^{B19}	R^{B21}
L_{C1028}	R^{B19}	R^{B22}
L_{C1029}	R^{B19}	R^{B23}
L_{C1030}	R^{B19}	R^{B24}
L_{C1031}	R^{B19}	R^{B25}
L_{C1032}	R^{B19}	R^{B26}
L_{C1033}	R^{B20}	R^{B21}
L_{C1034}	R^{B20}	R^{B22}
L_{C1035}	R^{B20}	R^{B23}
L_{C1036}	R^{B20}	R^{B24}
L_{C1037}	R^{B20}	R^{B25}
L_{C1038}	R^{B20}	R^{B26}
L_{C1039}	R^{B21}	R^{B27}
L_{C1040}	R^{B21}	R^{B23}
L_{C1041}	R^{B21}	R^{B24}
L_{C1042}	R^{B21}	R^{B25}
L_{C1043}	R^{B21}	R^{B26}
L_{C1044}	R^{B22}	R^{B23}
L_{C1045}	R^{B22}	R^{B24}
L_{C1046}	R^{B22}	R^{B25}
L_{C1047}	R^{B22}	R^{B26}
L_{C1048}	R^{B23}	R^{B24}
L_{C1049}	R^{B23}	R^{B25}
L_{C1050}	R^{B23}	R^{B26}

-continued

Ligand	L_C	R^4
L_{C1051}	R^{B24}	R^{B25}
L_{C1052}	R^{B24}	R^{B26}
L_{C1053}	R^{B25}	R^{B26}

[0142] wherein R^{B1} and R^{B26} have the following structures

R^B1

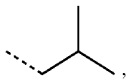
R^B2

R^B3

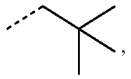
R^B4

R^B5

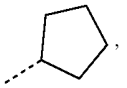
R^B6



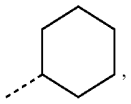
R^B7



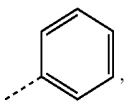
R^B8



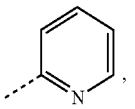
R^B9



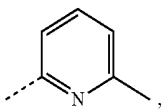
R^B10



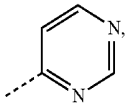
R^B11



R^B12



R^B13



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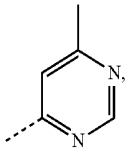
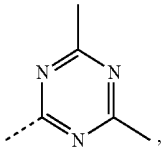
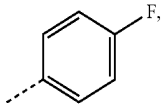
R^B14



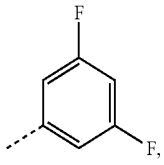
R^B15



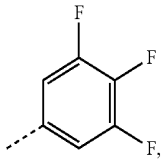
R^B16



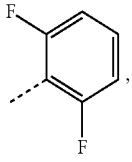
R^B17



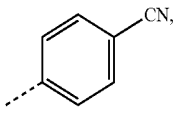
R^B18



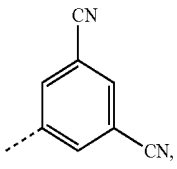
R^B19



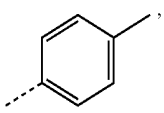
R^B20



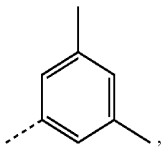
R^B21



R^B22



R^B23



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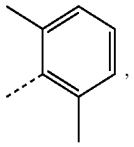
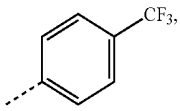
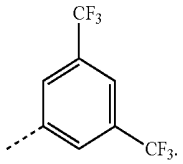
R^B24



R^B25



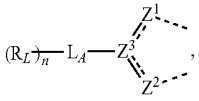
R^B26



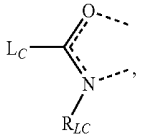
[0143] In some embodiments, the compound is selected from the group consisting of Compound C-l having the formula $Bi(L_{Cl})_3$; or Compound D-l having the formula $Bi_2(L_{Cl})_6$; wherein l is an integer from 1 to 1,053.

[0144] In some aspects described herein, an organic light emitting device (OLED) that includes an anode; a cathode; and an organic layer, disposed between the anode and the cathode is disclosed. In some embodiments, the organic layer is an emissive region. The organic layer can include a compound having a stoichiometry formula of BiL_3. Consistent with the disclosures herein, L can have a formula selected from the group consisting of

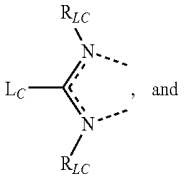
Formula (i)



Formula (ii)



Formula (iii)



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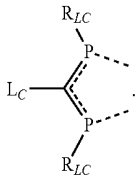
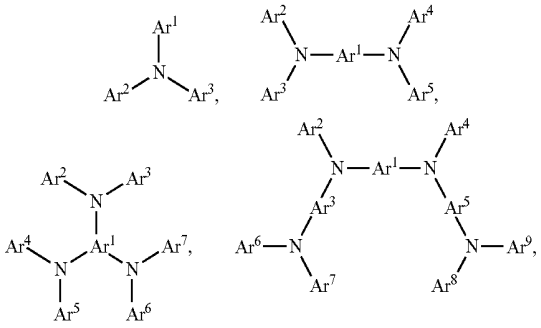
Formula (iv)

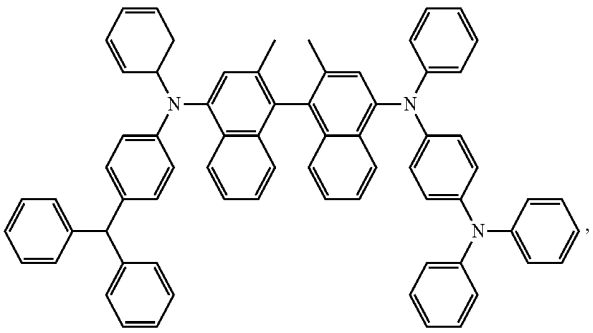


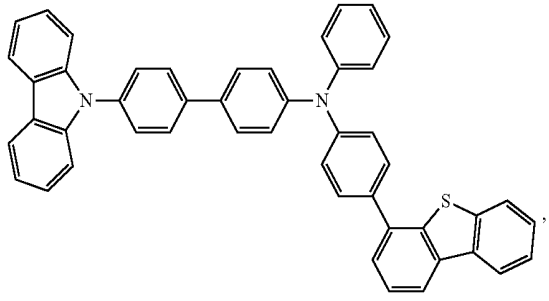
[0145] In some embodiments, the organic layer is a hole injecting layer and the compound is a p-type dopant in the hole injecting layer. In some embodiments, the hole injecting layer further comprises a compound selected from the group consisting of:



wherein each Ar^1 to Ar^9 is independently selected from the group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, and combination thereof.

[0146] In some embodiments, the hole injecting layer further comprises a compound selected from the group consisting of:





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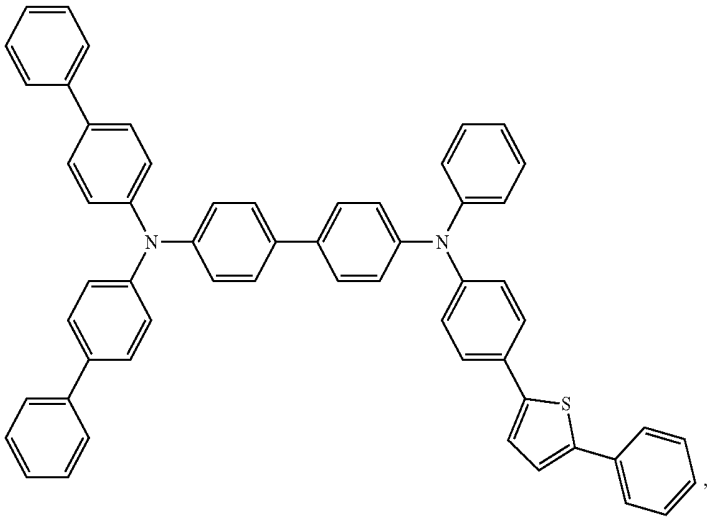

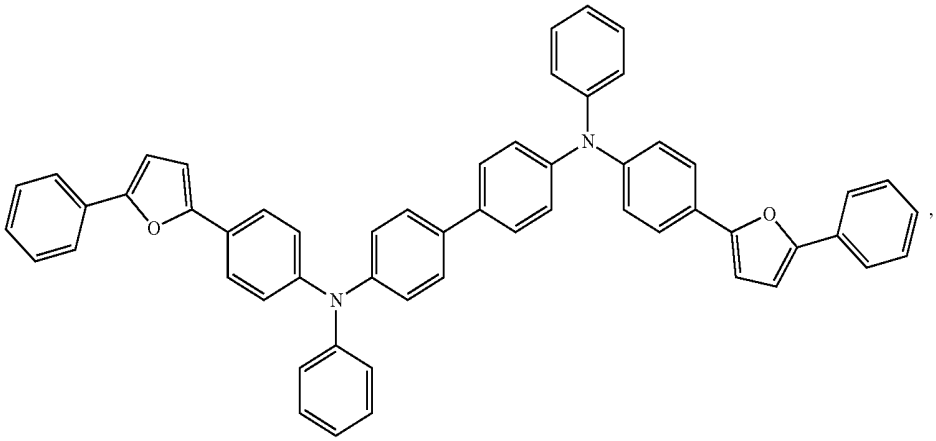

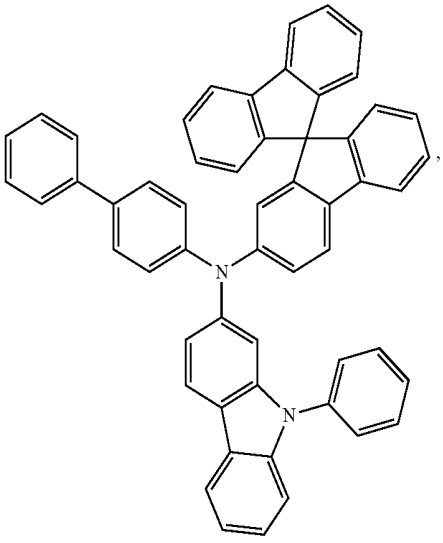

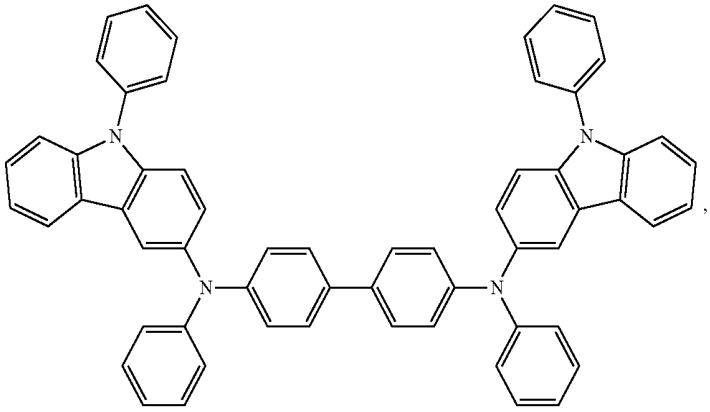

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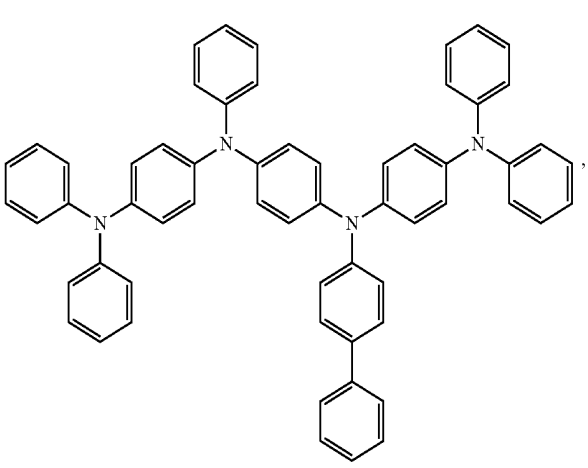

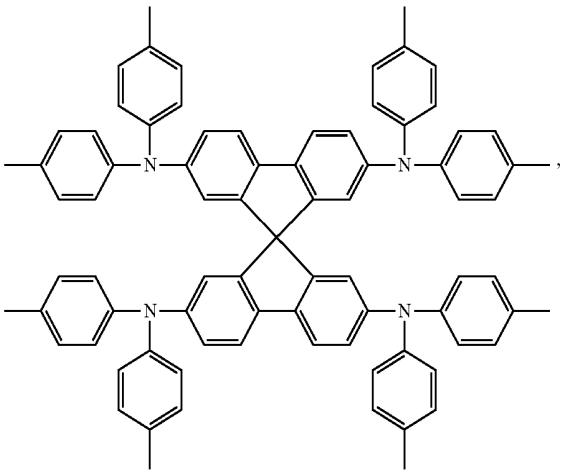

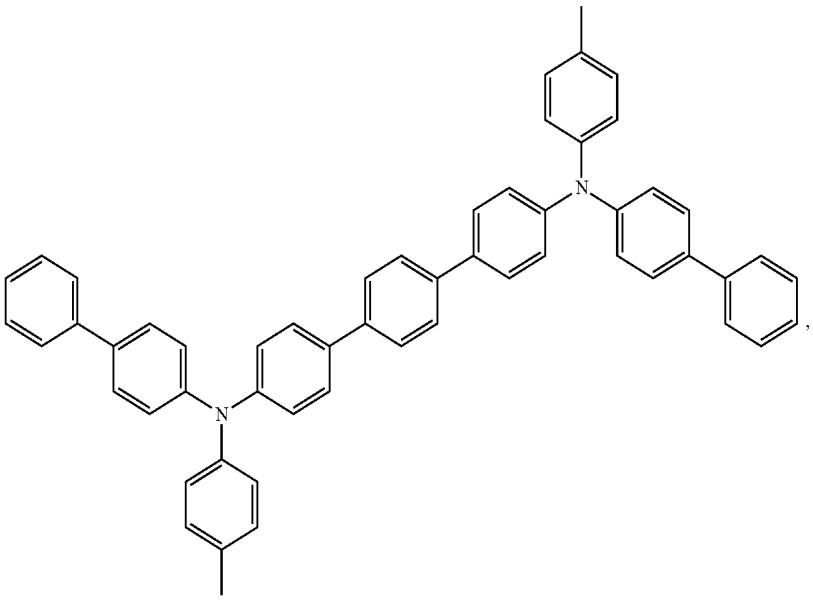

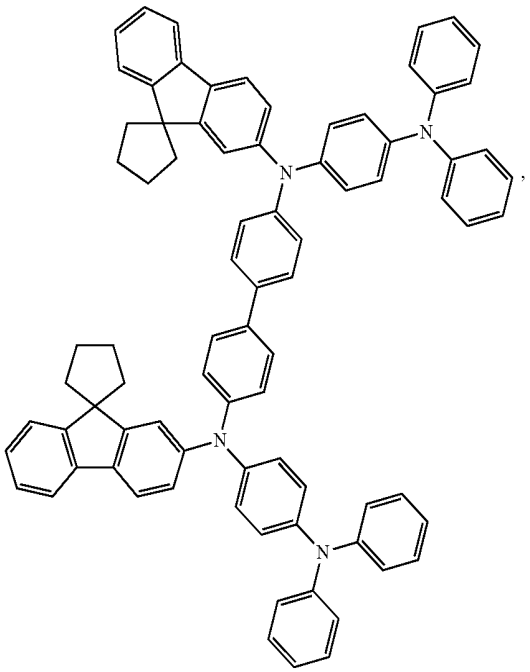

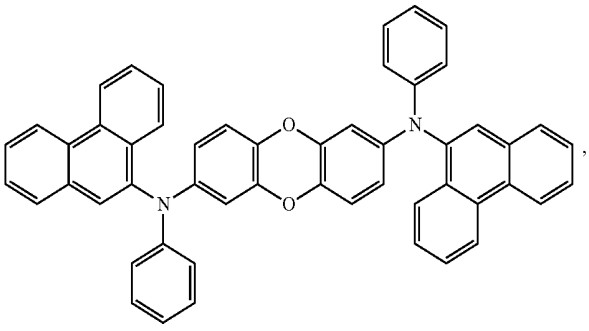

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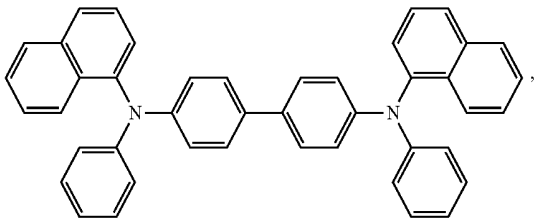

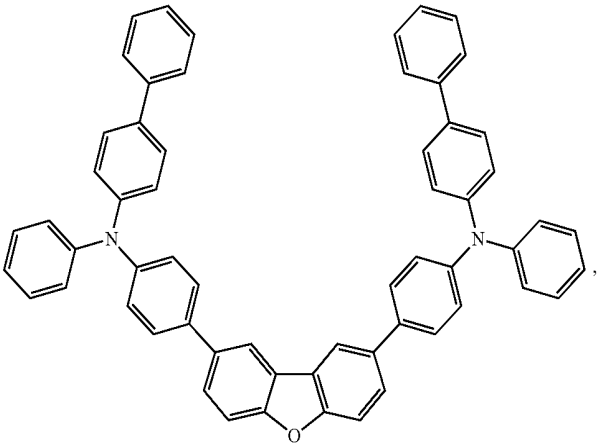

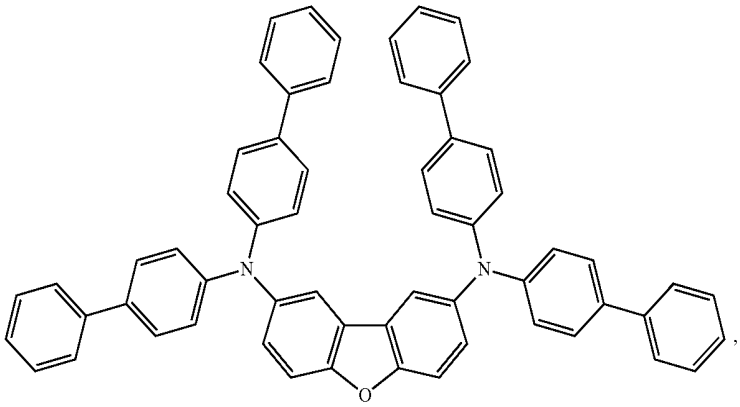

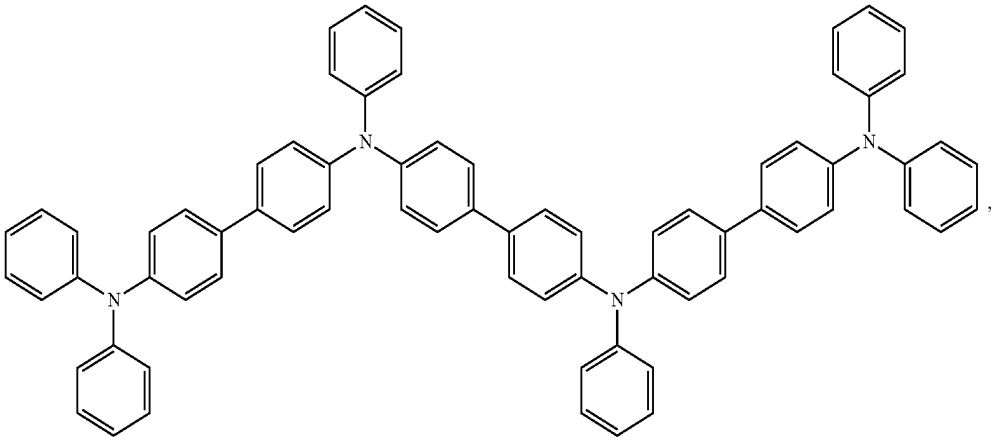

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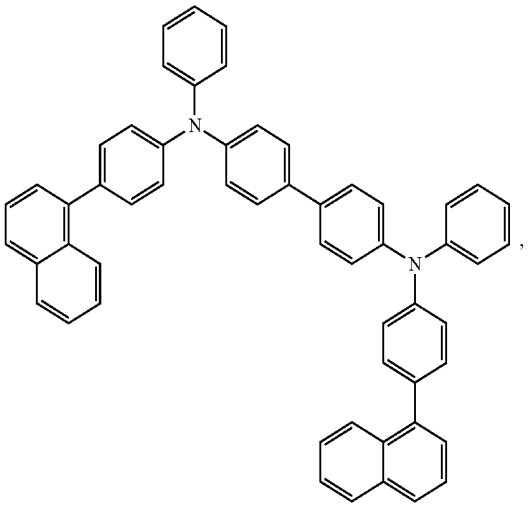

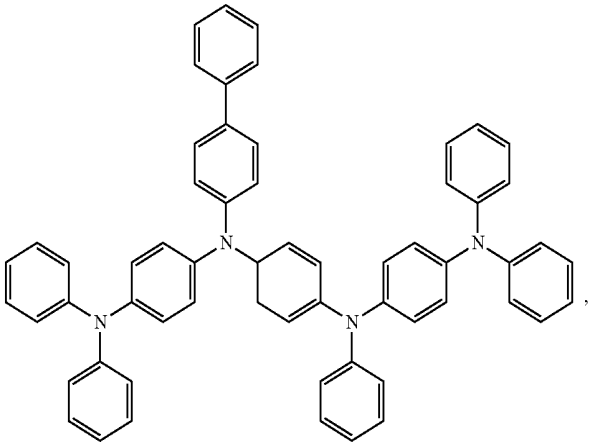

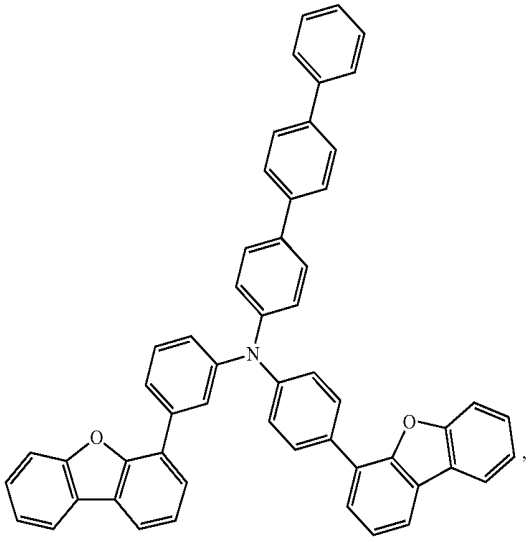

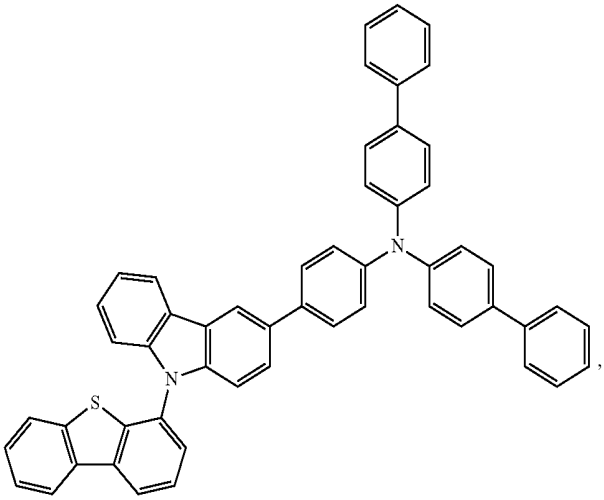

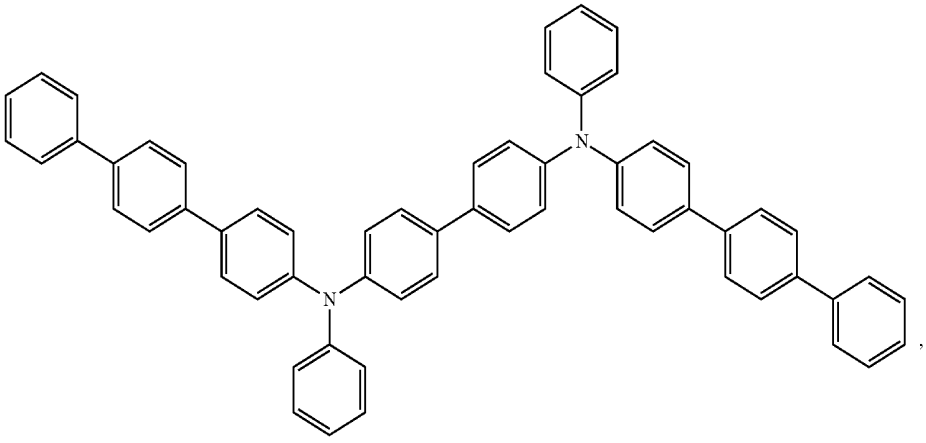

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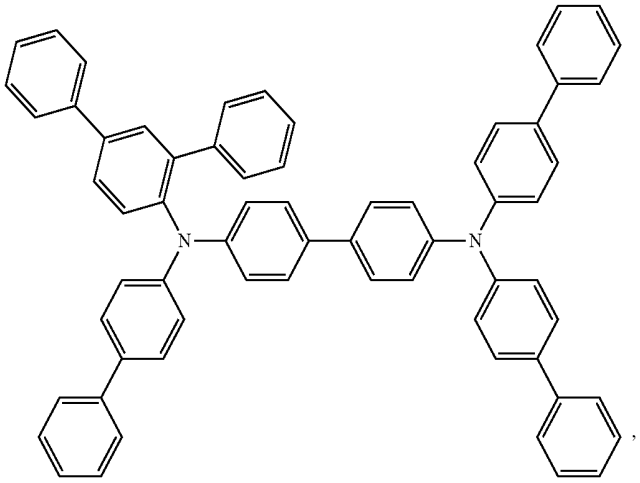

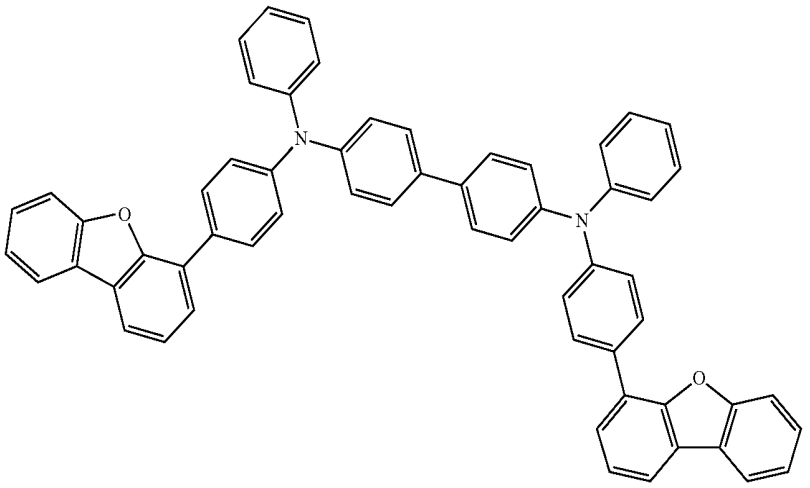

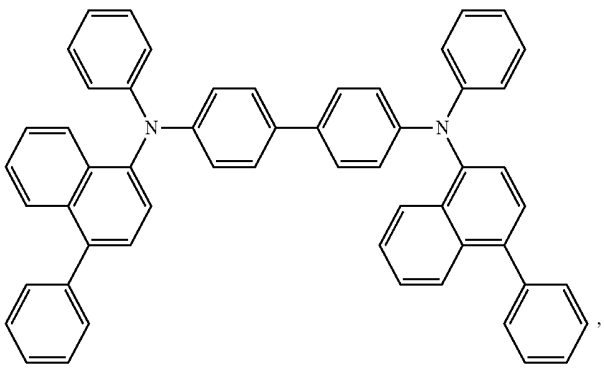

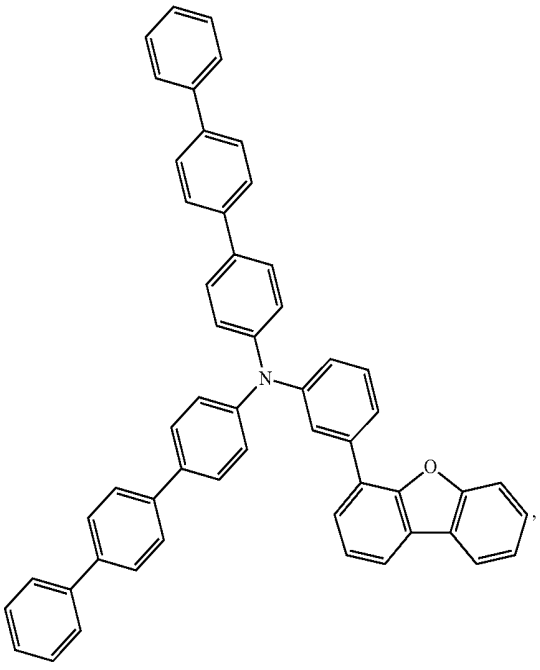

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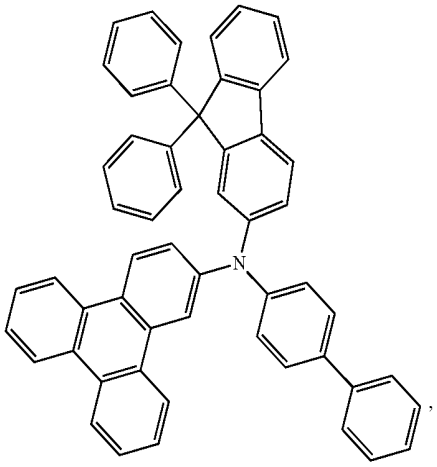

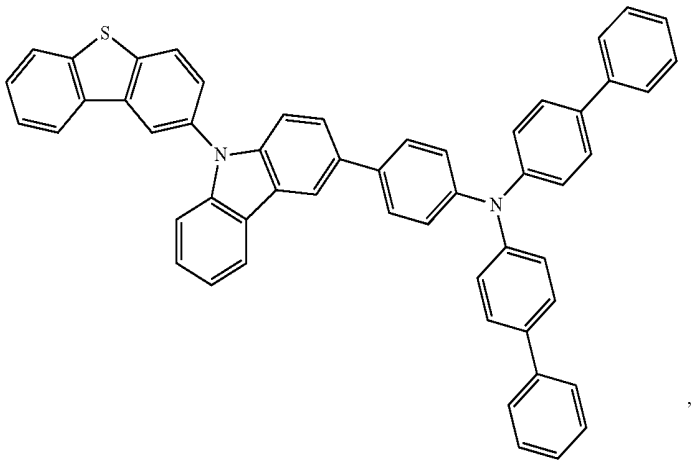

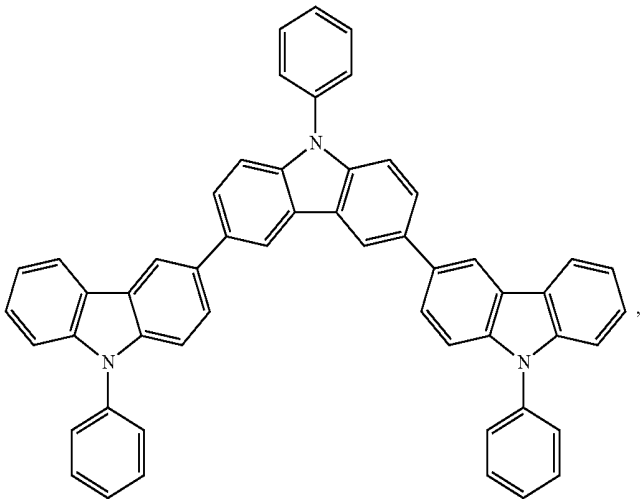

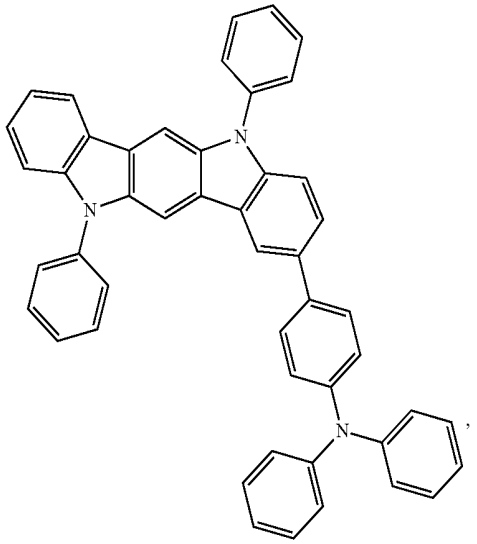

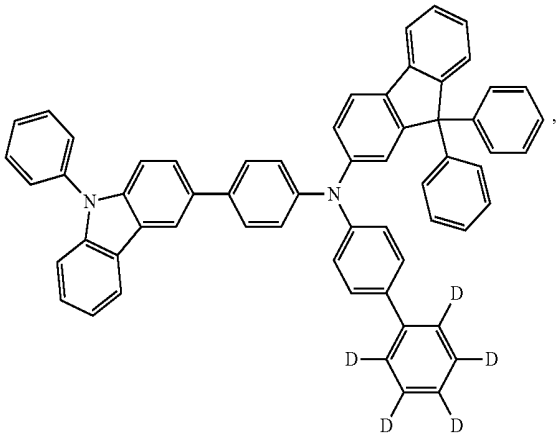

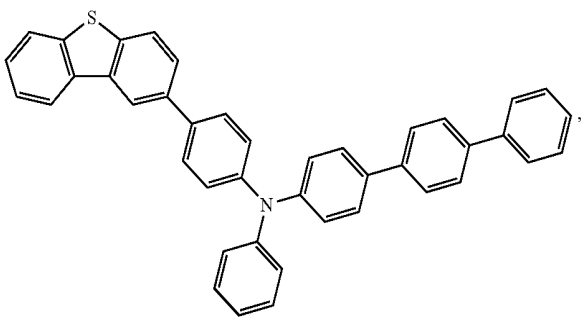

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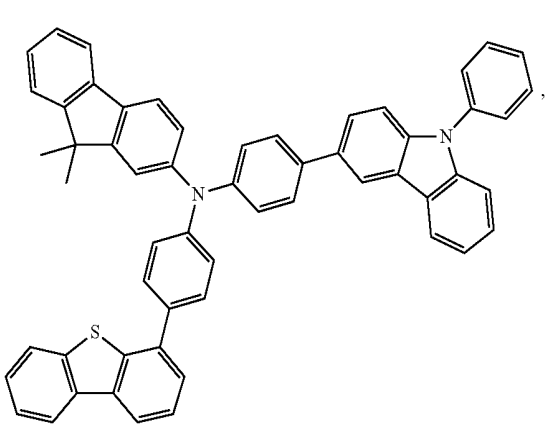

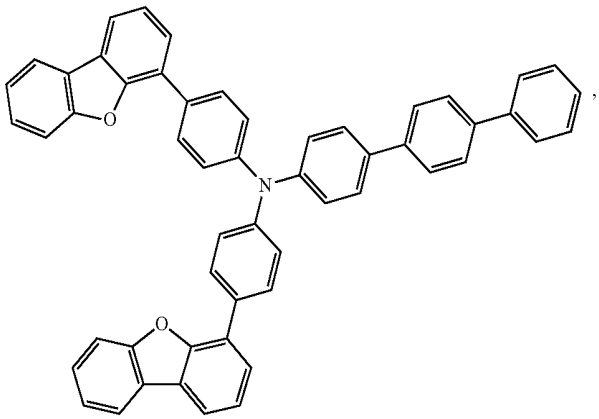

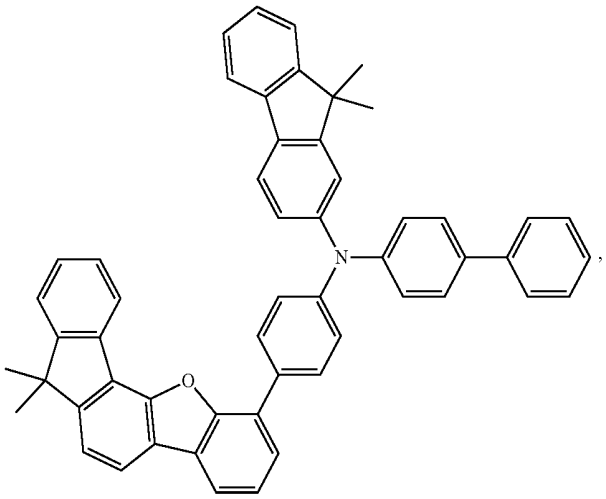

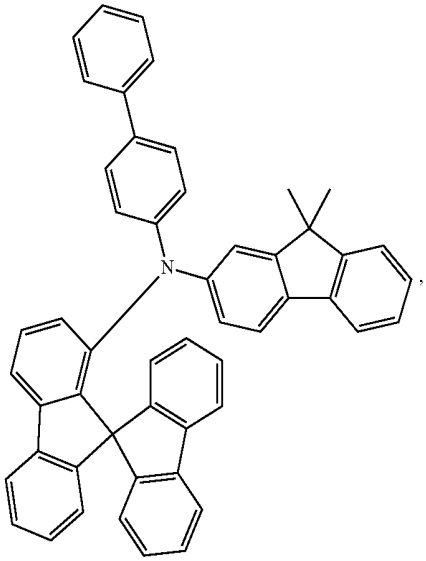

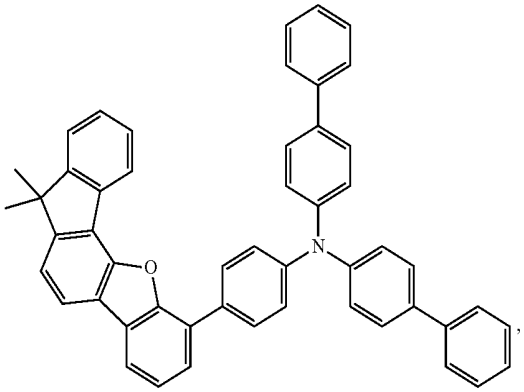

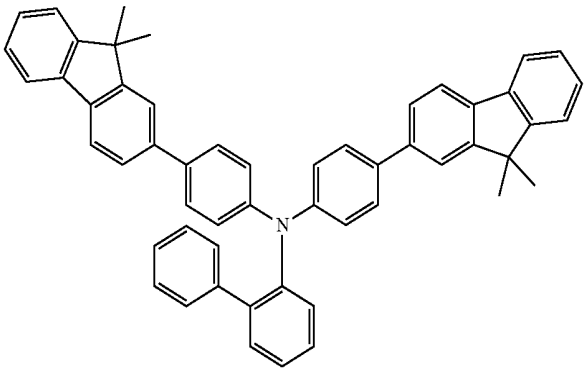

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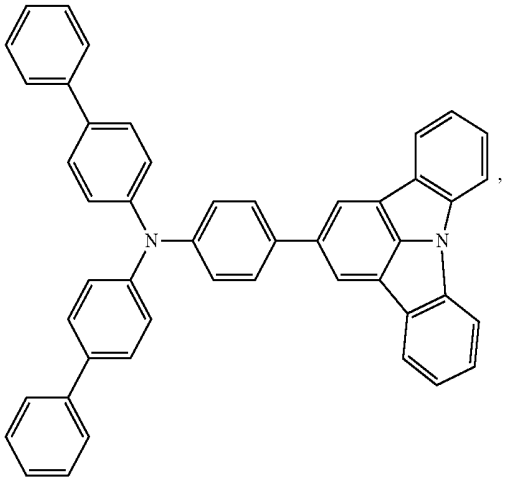

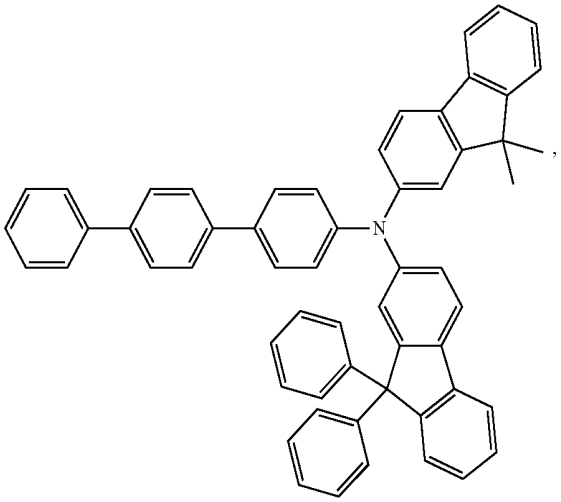

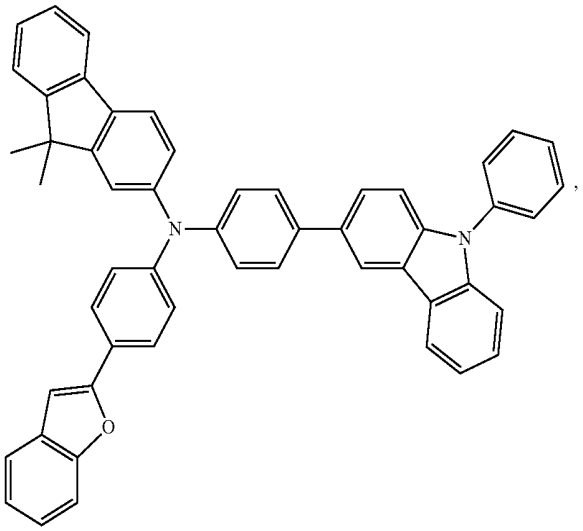

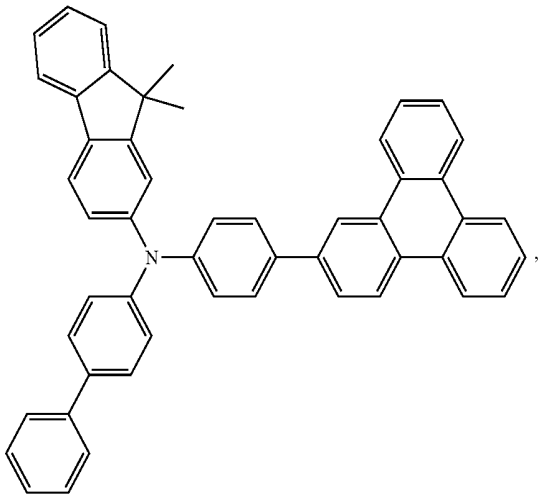

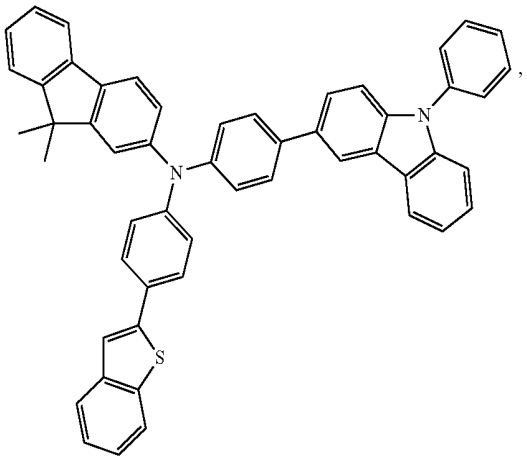

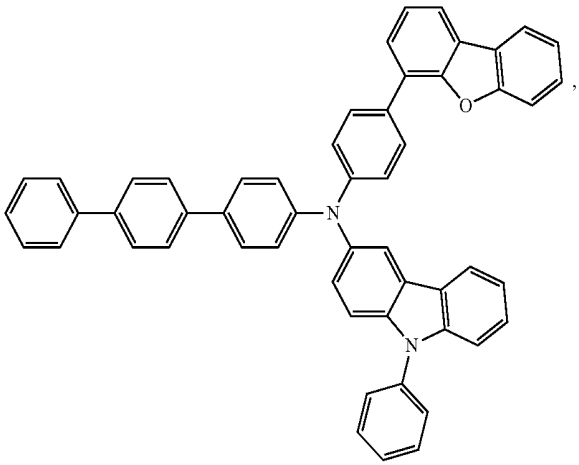

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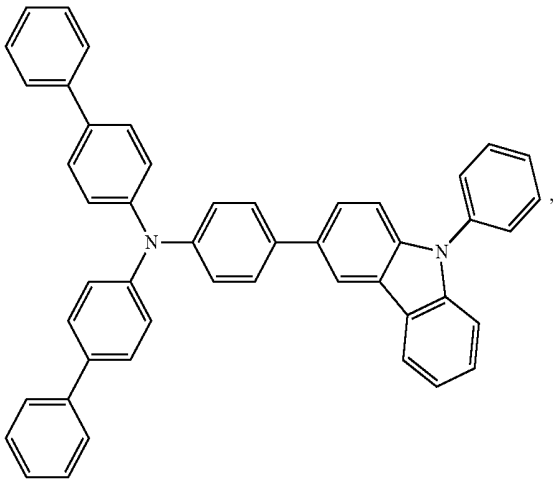

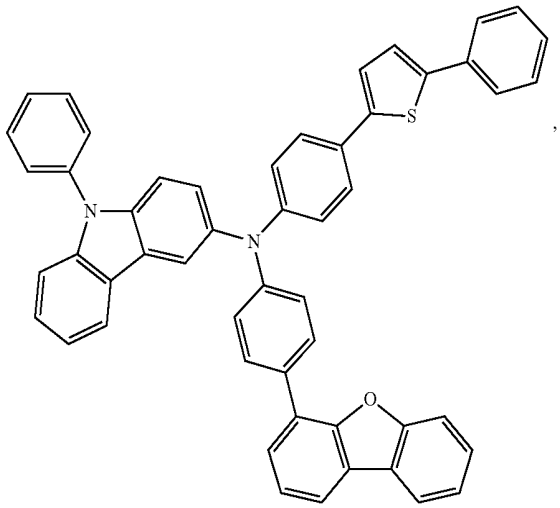

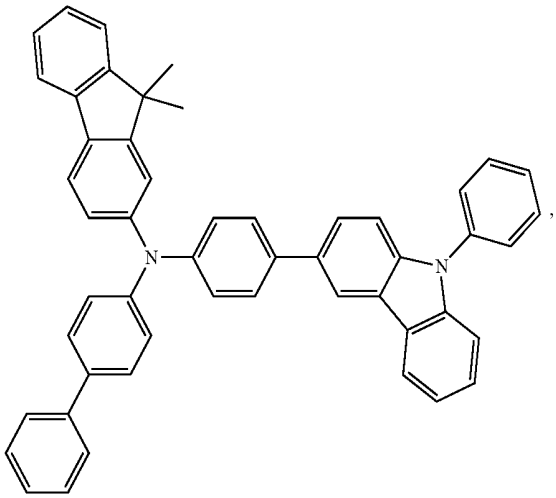

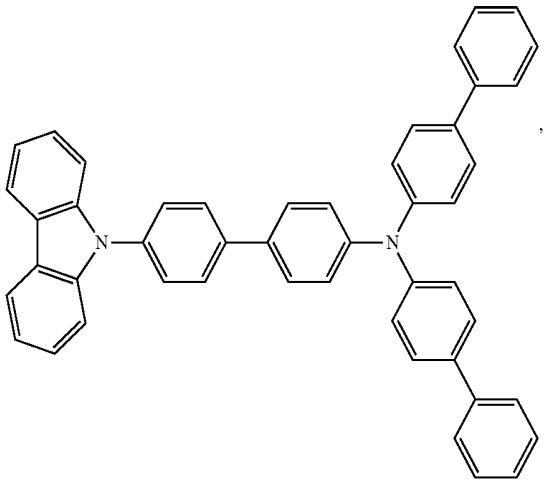

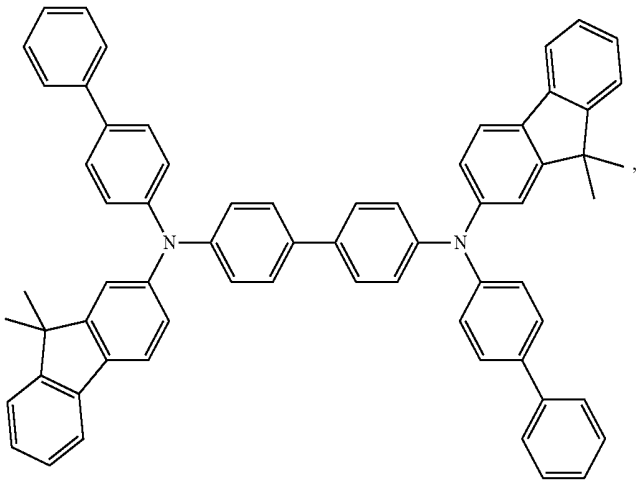

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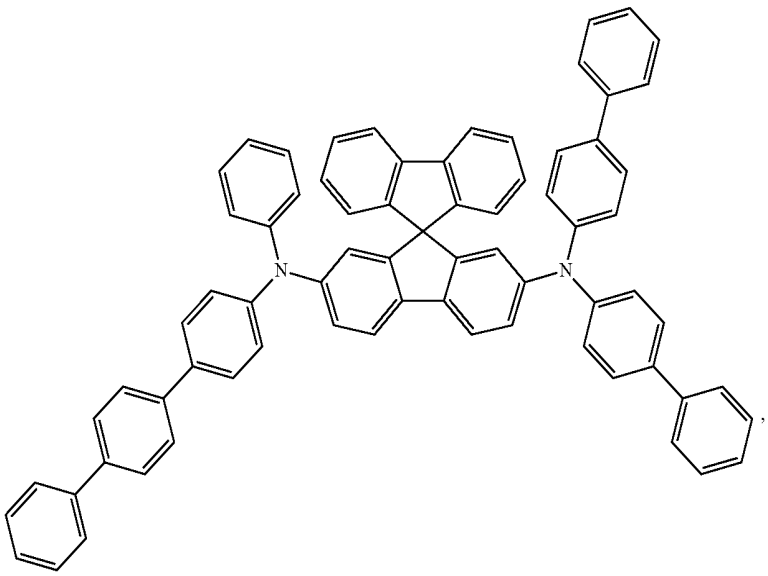

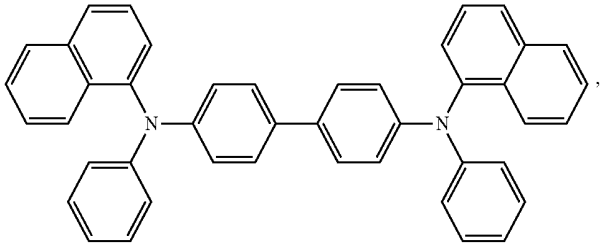

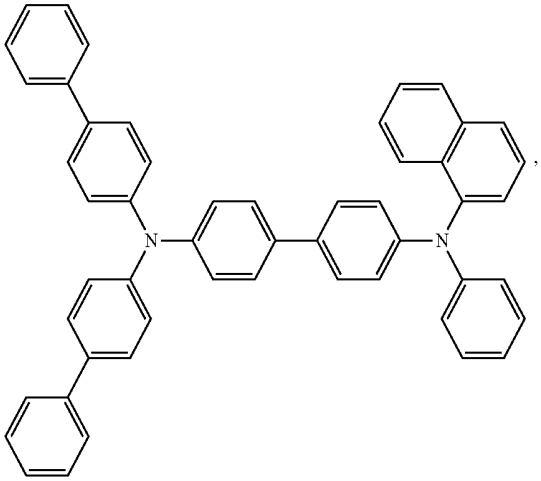

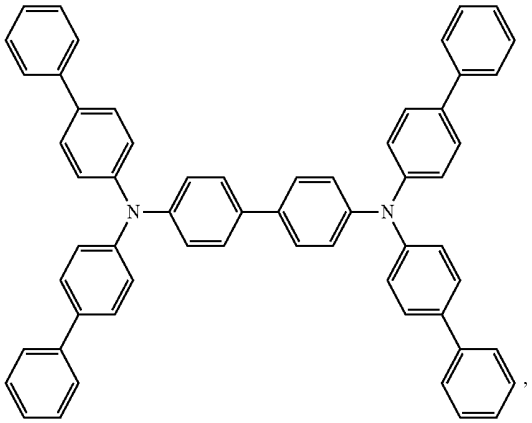

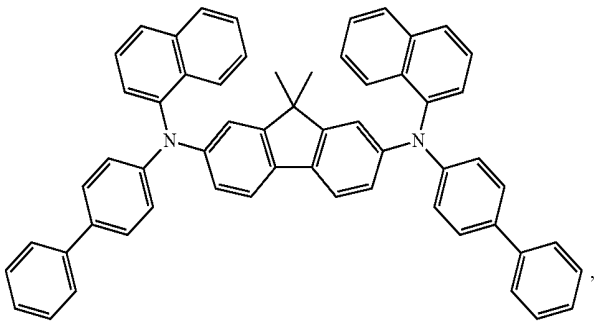

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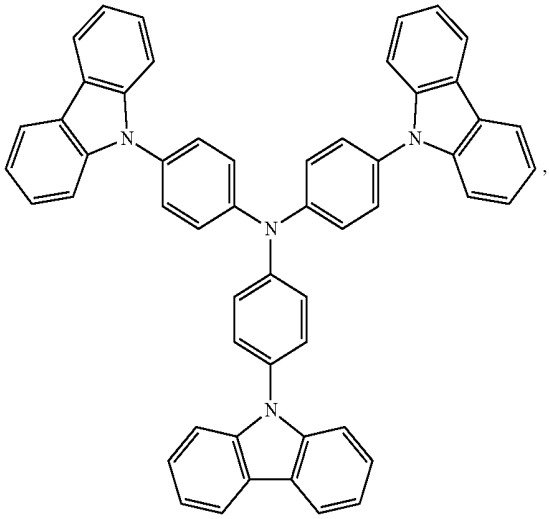

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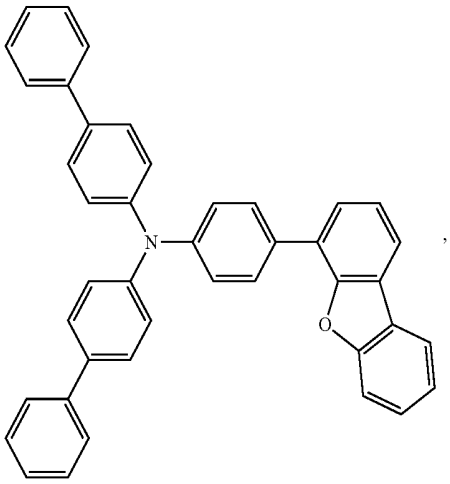

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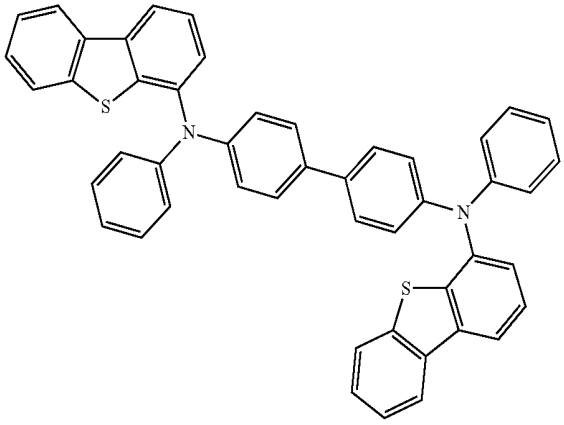

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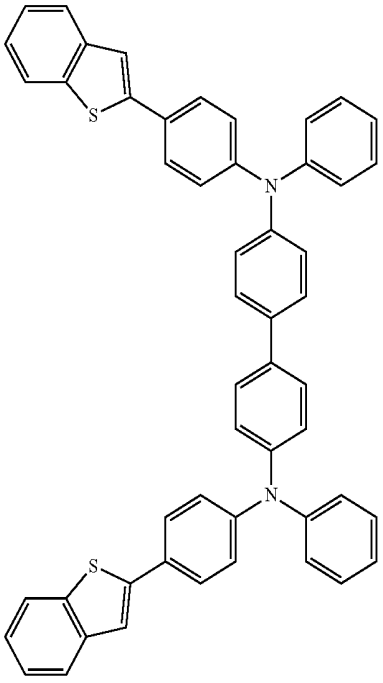
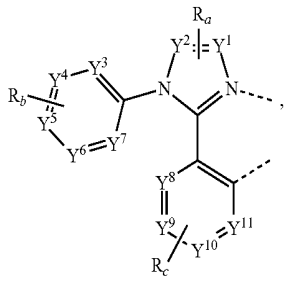
and



.

[0147] In some embodiments, the organic layer is a hole injecting layer and the compound is the only compound in the hole injecting layer.

[0148] In some embodiments, the OLED further comprises an emitting layer and the emitting layer includes a phosphorescent emissive dopant. In some embodiments, the emissive dopant is a transition metal complex having at least one ligand or part of the ligand if the ligand is more than bidentate selected from the group consisting of:



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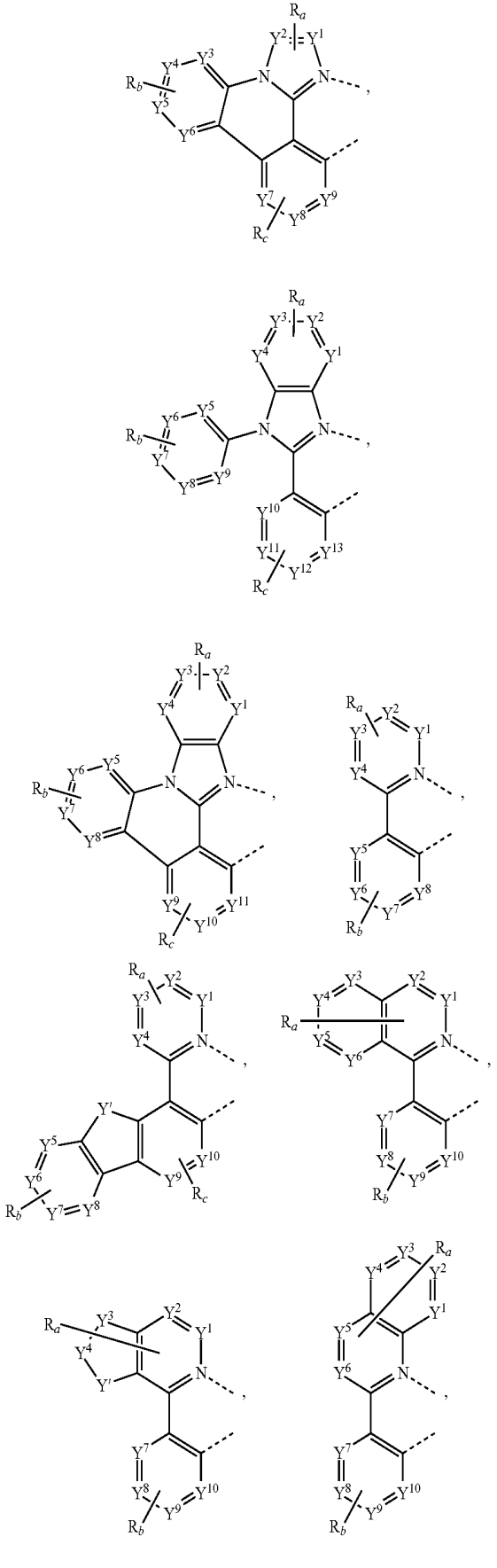

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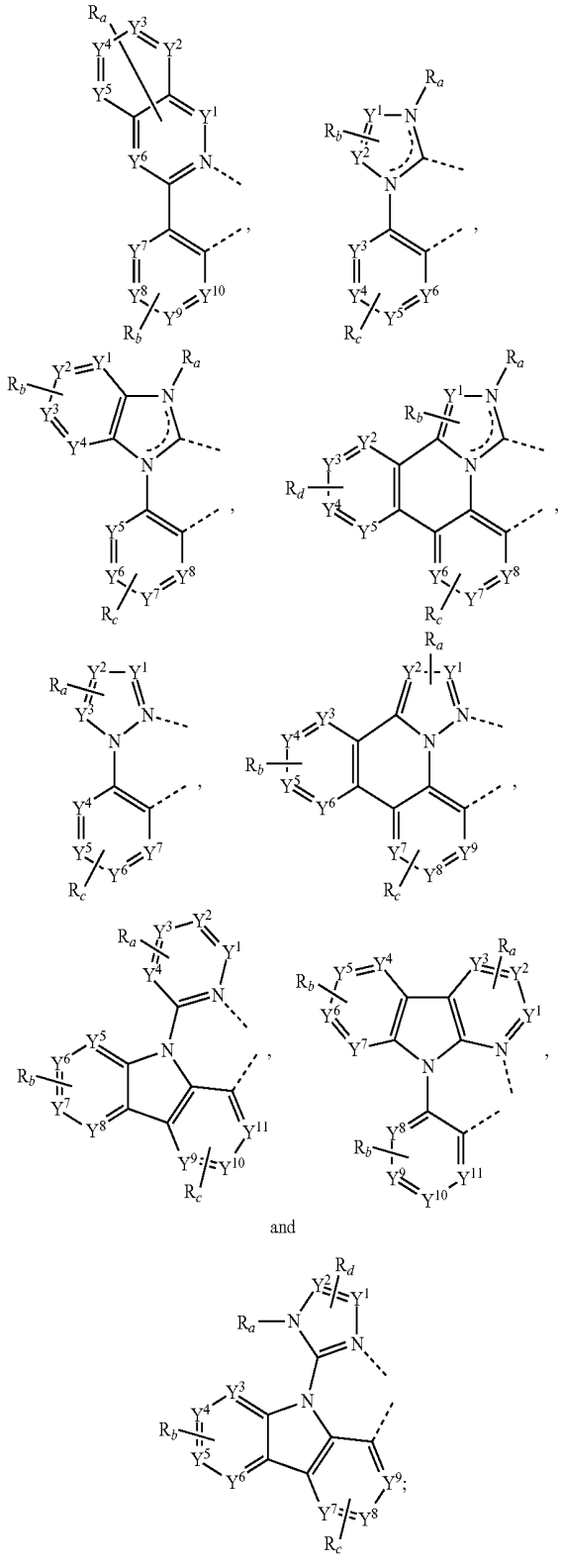


and

wherein each Y^1 to Y^{13} are independently selected from the group consisting of carbon and nitrogen;

[0149] wherein Y' is selected from the group consisting of BR_e, NR_e, PR_e, O, S, Se, C═O, S═O, SO_2, CR_eR_f, SiR_eR_f, and GeR_eR_f;

[0150] wherein each R_e, and R_f is independently selected from the group consisting of hydrogen, deuterium, halide, alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, and combinations thereof;

[0151] wherein R_e and R_f are optionally fused or joined to form a ring;

[0152] wherein each R_a, R_b, R_c, and R_d may independently represent from mono substitution to the maximum possible number of substitution, or no substitution;

[0153] wherein each R_a, R_b, R_c, and R_d is independently hydrogen or a substituent selected from the group consisting of deuterium, halide, alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, and combinations thereof; and

[0154] wherein any two adjacent substituents of R_a, R_b, R_c, and R_d are optionally fused or joined to form a ring or form a multidentate ligand.

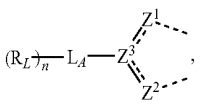
[0155] In some embodiments, the organic layer is a blocking layer and the compound is a blocking material in the organic layer; or the organic layer is a transporting layer and the compound is a transporting material in the organic layer.

[0156] In some embodiments, the OLED has one or more characteristics selected from the group consisting of being flexible, being rollable, being foldable, being stretchable, and being curved. In some embodiments, the OLED is transparent or semi-transparent. In some embodiments, the OLED further comprises a layer comprising carbon nanotubes.

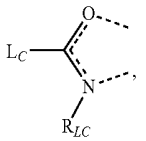
[0157] In some embodiments, the OLED further comprises a layer comprising a delayed fluorescent emitter. In some embodiments, the OLED comprises a RGB pixel arrangement or white plus color filter pixel arrangement. In some embodiments, the OLED is a mobile device, a hand held device, or a wearable device. In some embodiments, the OLED is a display panel having less than 10 inch diagonal or 50 square inch area. In some embodiments, the OLED is a display panel having at least 10 inch diagonal or 50 square inch area. In some embodiments, the OLED is a lighting panel.

[0158] According to another aspect, a formulation comprising the compound described herein is also disclosed. In particular, compounds having a stoichiometry formula of BiL_3 where L has a formula selected from the group consisting of

Formula (i)



Formula (ii)



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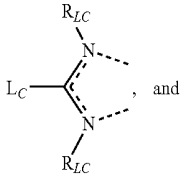
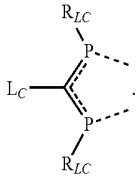
Formula (iii)



Formula (iv)



as described herein.

[0159] The OLED disclosed herein can be incorporated into one or more of a consumer product, an electronic component module, and a lighting panel.

[0160] In yet another aspect of the present disclosure, a formulation that comprises the novel compound disclosed herein is described. The formulation can include one or more components selected from the group consisting of a solvent, a host, a hole injection material, hole transport material, electron blocking material, hole blocking material, and an electron transport layer material, disclosed herein.

[0161] The present disclosure encompasses any chemical structure comprising the novel compound of the present disclosure, or a monovalent or polyvalent variant thereof. In other words, the inventive compound, or a monovalent or polyvalent variant thereof, can be a part of a larger chemical structure. Such chemical structure can be selected from the group consisting of a monomer, a polymer, a macromolecule, and a supramolecule (also known as supermolecule). As used herein, a "monovalent variant of a compound" refers to a moiety that is identical to the compound except that one hydrogen has been removed and replaced with a bond to the rest of the chemical structure. As used herein, a "polyvalent variant of a compound" refers to a moiety that is identical to the compound except that more than one hydrogen has been removed and replaced with a bond or bonds to the rest of the chemical structure. In the instance of a supramolecule, the inventive compound can also be incorporated into the supramolecule complex without covalent bonds.

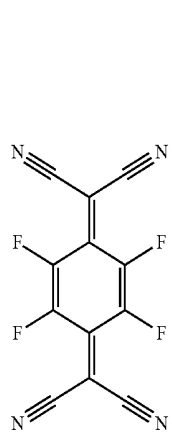
Combination with Other Materials

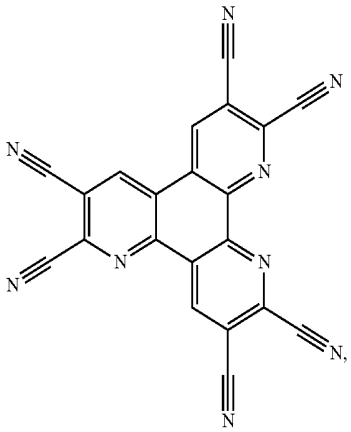
[0162] The materials described herein as useful for a particular layer in an organic light emitting device may be used in combination with a wide variety of other materials present in the device. For example, emissive dopants disclosed herein may be used in conjunction with a wide variety of hosts, transport layers, blocking layers, injection layers, electrodes and other layers that may be present. The materials described or referred to below are non-limiting examples of materials that may be useful in combination with the compounds disclosed herein, and one of skill in the art can readily consult the literature to identify other materials that may be useful in combination.

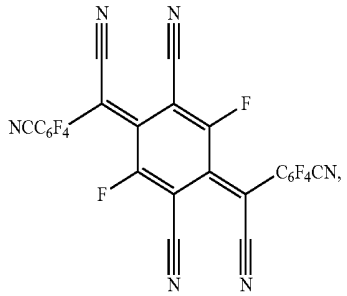
Conductivity Dopants:

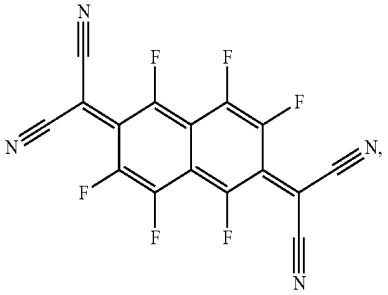
[0163] A charge transport layer can be doped with conductivity dopants to substantially alter its density of charge carriers, which will in turn alter its conductivity. The conductivity is increased by generating charge carriers in the matrix material, and depending on the type of dopant, a change in the Fermi level of the semiconductor may also be achieved. Hole-transporting layer can be doped by p-type conductivity dopants and n-type conductivity dopants are used in the electron-transporting layer.

[0164] Non-limiting examples of the conductivity dopants that may be used in an OLED in combination with materials disclosed herein are exemplified below together with references that disclose those materials: EP01617493, EP01968131, EP2020694, EP2684932, US20050139810, US20070160905, US20090167167, US2010288362, WO06081780, WO2009003455, WO2009008277, WO2009011327, WO2014009310, US2007252140, US2015060804, US20150123047, and US2012146012.









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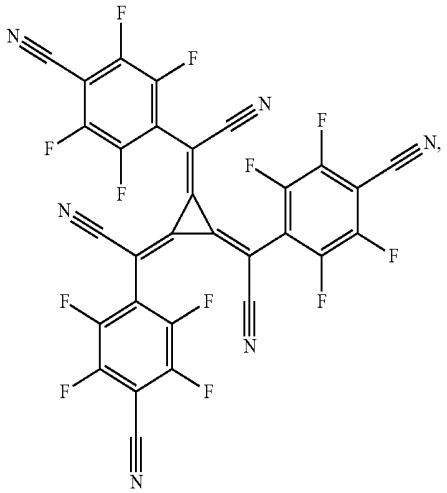

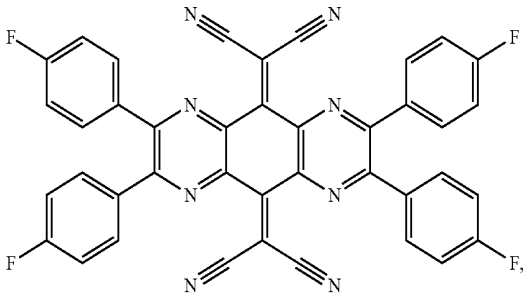

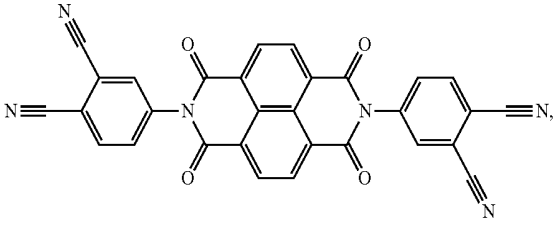

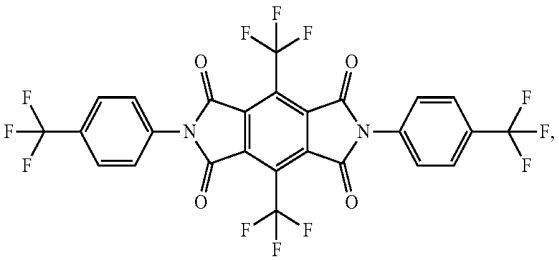

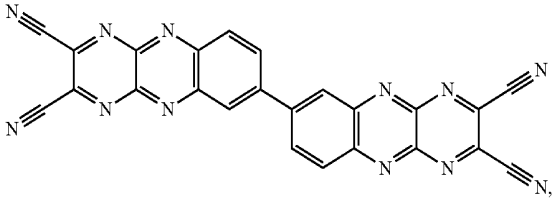

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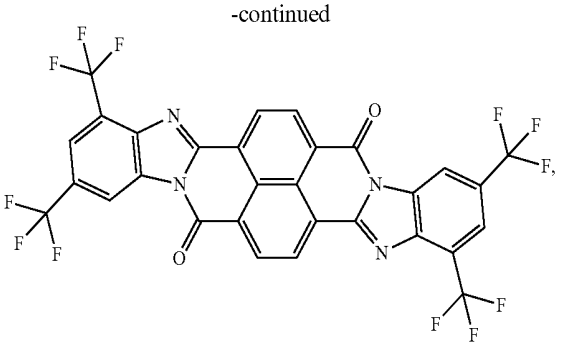
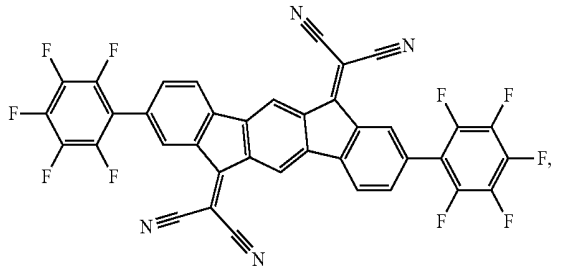
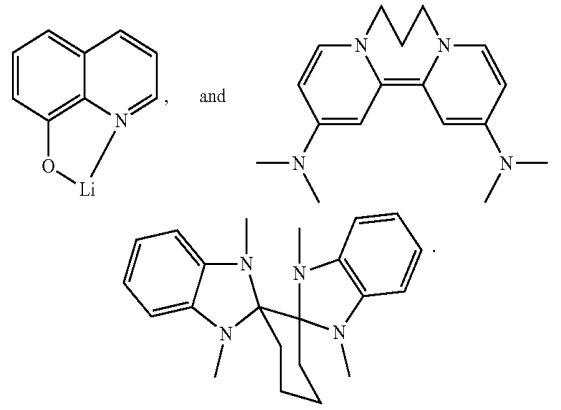


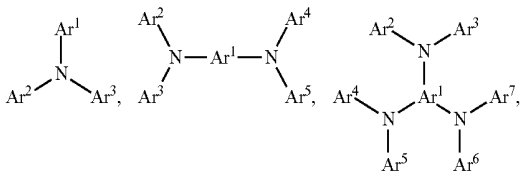


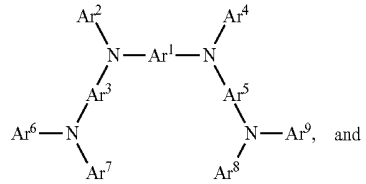


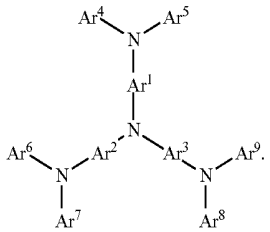
HIL/HTL:

[0165] A hole injecting/transporting material to be used in the present invention is not particularly limited, and any compound may be used as long as the compound is typically used as a hole injecting/transporting material. Examples of the material include, but are not limited to: a phthalocyanine or porphyrin derivative; an aromatic amine derivative; an indolocarbazole derivative; a polymer containing fluorohydrocarbon; a polymer with conductivity dopants; a conducting polymer, such as PEDOT/PSS; a self-assembly monomer derived from compounds such as phosphonic acid and silane derivatives; a metal oxide derivative, such as MoO_x; a p-type semiconducting organic compound, such as 1,4,5,8,9,12-Hexaazatriphenylenehexacarbonitrile; a metal complex, and a cross-linkable compounds.

[0166] Examples of aromatic amine derivatives used in HIL or HTL include, but are not limited to the following general structures:

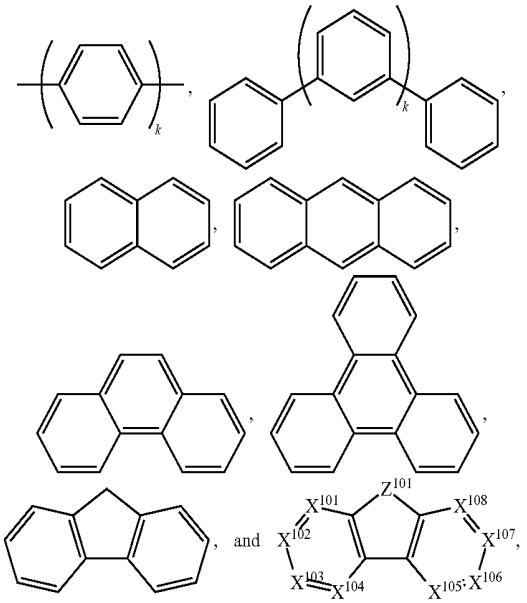






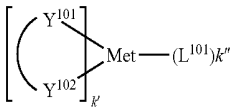
[0167] Each of Ar^1 to Ar^9 is selected from the group consisting of aromatic hydrocarbon cyclic compounds such as benzene, biphenyl, triphenyl, triphenylene, naphthalene, anthracene, phenalene, phenanthrene, fluorene, pyrene, chrysene, perylene, and azulene; the group consisting of aromatic heterocyclic compounds such as dibenzothiophene, dibenzofuran, dibenzoselenophene, furan, thiophene, benzofuran, benzothiophene, benzoselenophene, carbazole, indolocarbazole, pyridylindole, pyrrolodipyridine, pyrazole, imidazole, triazole, oxazole, thiazole, oxadiazole, oxatriazole, dioxazole, thiadiazole, pyridine, pyridazine, pyrimidine, pyrazine, triazine, oxazine, oxathiazine, oxadiazine, indole, benzimidazole, indazole, indoxazine, benzoxazole, benzisoxazole, benzothiazole, quinoline, isoquinoline, cinnoline, quinazoline, quinoxaline, naphthyridine, phthalazine, pteridine, xanthene, acridine, phenazine, phenothiazine, phenoxazine, benzofuropyridine, furodipyridine, benzothienopyridine, thienodipyridine, benzoselenophenopyridine, and selenophenodipyridine; and the group consisting of 2 to 10 cyclic structural units which are groups of the same type or different types selected from the aromatic hydrocarbon cyclic group and the aromatic heterocyclic group and are bonded to each other directly or via at least one of oxygen atom, nitrogen atom, sulfur atom, silicon atom, phosphorus atom, boron atom, chain structural unit and the aliphatic cyclic group. Each Ar may be unsubstituted or may be substituted by a substituent selected from the group consisting of deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acids, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, and combinations thereof.

[0168] In one aspect, Ar^1 to Ar^9 is independently selected from the group consisting of:



wherein k is an integer from 1 to 20; X^{101} to X^{108} is C (including CH) or N; Z^{101} is NAr^1, O, or S; Ar^1 has the same group defined above.

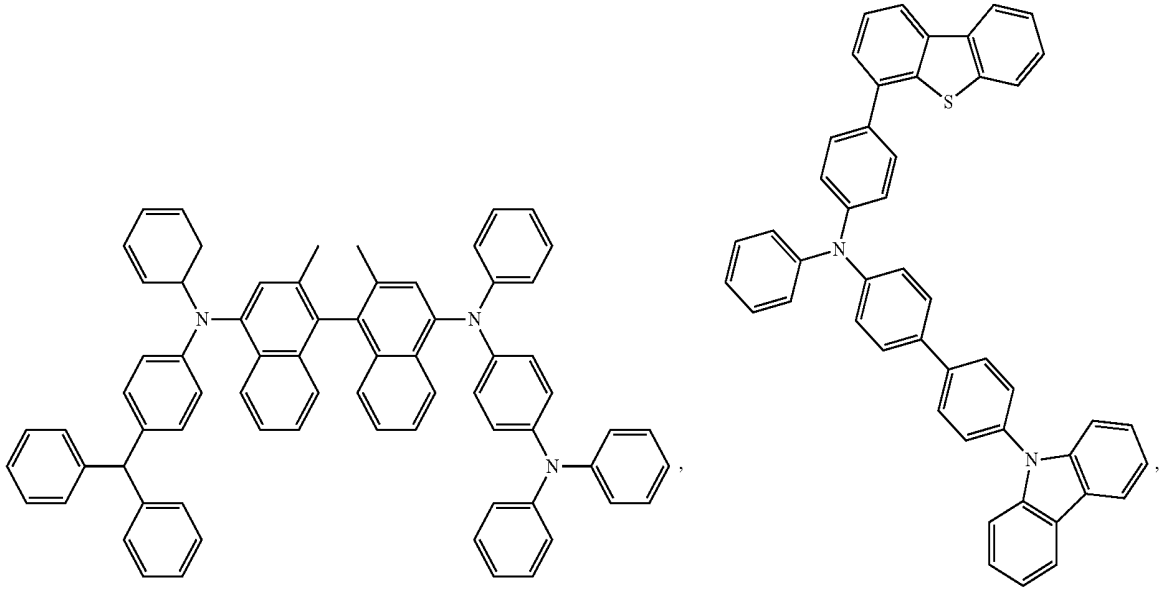
[0169] Examples of metal complexes used in HIL or HTL include, but are not limited to the following general formula:



wherein Met is a metal, which can have an atomic weight greater than 40; $(Y^{101}\text{-}Y^{102})$ is a bidentate ligand, Y^{101} and Y^{102} are independently selected from C, N, O, P, and S; L^{101} is an ancillary ligand; k' is an integer value from 1 to the maximum number of ligands that may be attached to the metal; and k'+k" is the maximum number of ligands that may be attached to the metal.

[0170] In one aspect, $(Y^{101}\text{-}Y^{102})$ is a 2-phenylpyridine derivative. In another aspect, $(Y^{101}\text{-}Y^{102})$ is a carbene ligand. In another aspect, Met is selected from Ir, Pt, Os, and Zn. In a further aspect, the metal complex has a smallest oxidation potential in solution vs. Fc^+/Fc couple less than about 0.6 V.

[0171] Non-limiting examples of the HIL and HTL materials that may be used in an OLED in combination with materials disclosed herein are exemplified below together with references that disclose those materials: CN102702075, DE102012005215, EP01624500, EP01698613, EP01806334, EP01930964, EP01972613, EP01997799, EP02011790, EP02055700, EP02055701, EP1725079, EP2085382, EP2660300, EP650955, JP07-073529, JP2005112765, JP2007091719, JP2008021687, JP2014-009196, KR20110088898, KR20130077473, TW201139402, U.S. Ser. No. 06/517,957, US20020158242, US20030162053, US20050123751, US20060182993, US20060240279, US20070145888, US20070181874, US20070278938, US20080014464, US20080091025, US20080106190, US20080124572, US20080145707, US20080220265, US20080233434, US20080303417, US2008107919, US20090115320, US20090167161, US2009066235, US2011007385, US20110163302, US2011240968, US2011278551, US2012205642, US2013241401, US20140117329, US2014183517, U.S. Pat. Nos. 5,061,569, 5,639,914, WO05075451, WO07125714, WO08023550, WO08023759, WO2009145016, WO2010061824, WO2011075644, WO2012177006, WO2013018530, WO2013039073, WO2013087142, WO2013118812, WO2013120577, WO2013157367, WO2013175747, WO2014002873, WO2014015935, WO2014015937, WO2014030872, WO2014030921, WO2014034791, WO2014104514, WO2014157018,



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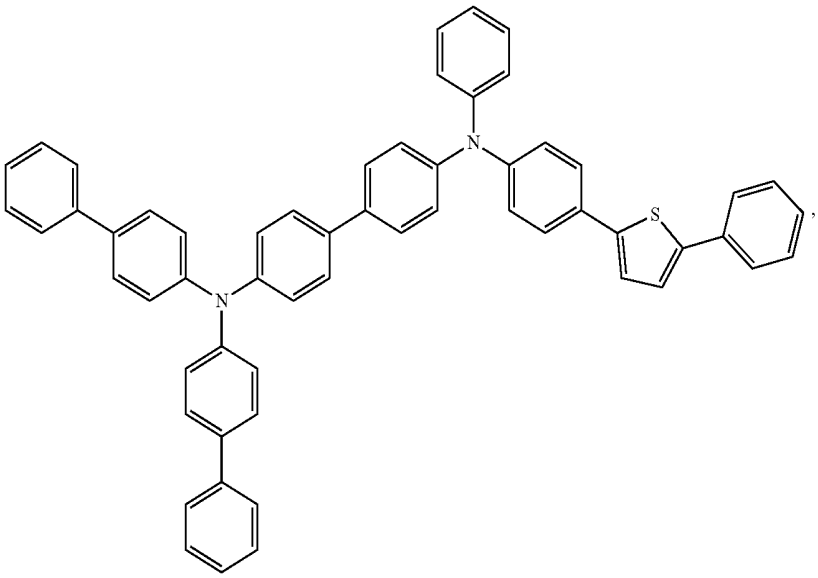

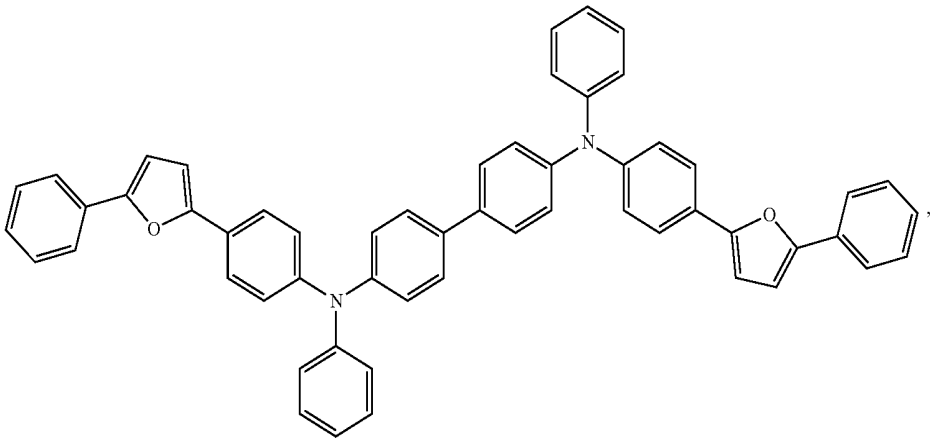

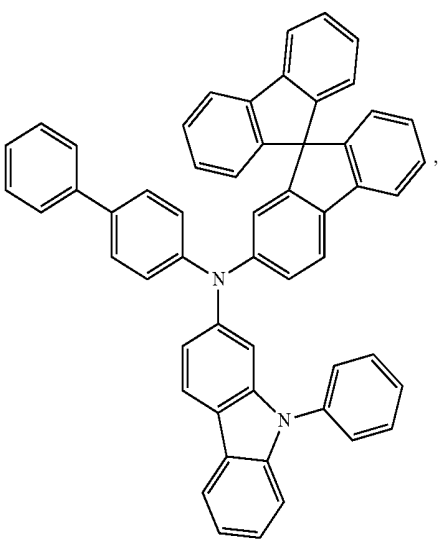

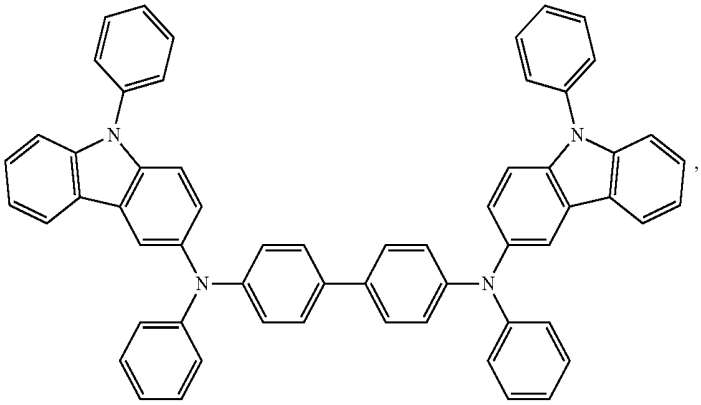

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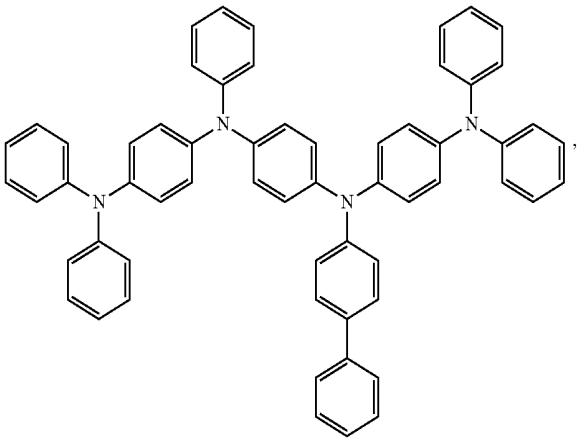

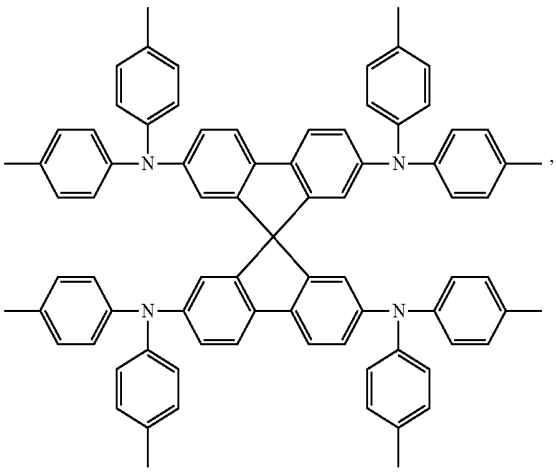

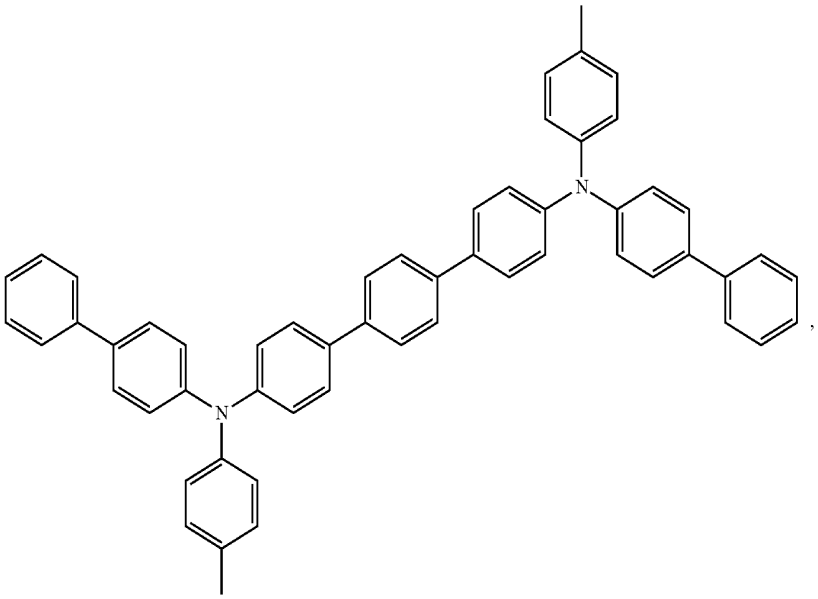

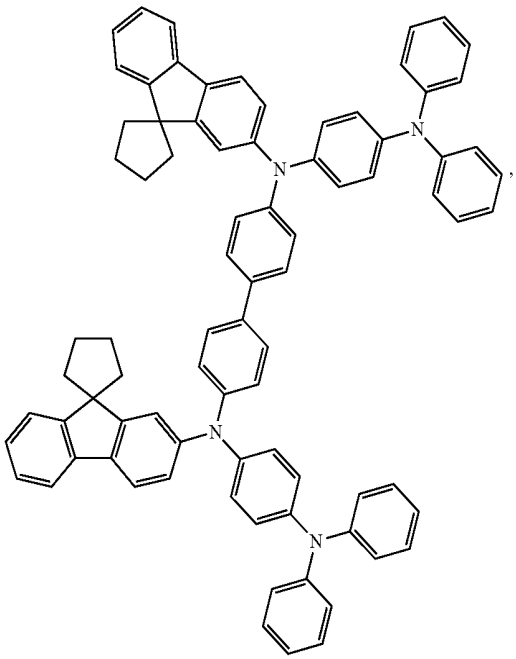

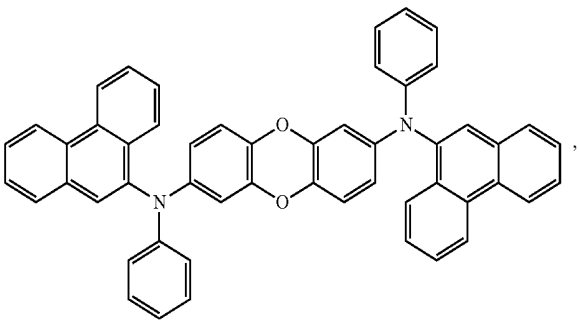

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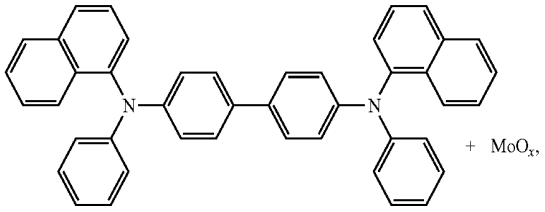

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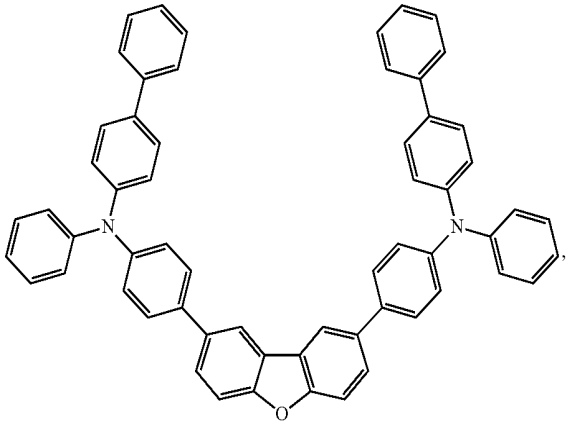

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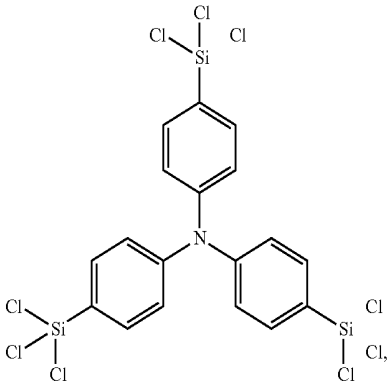

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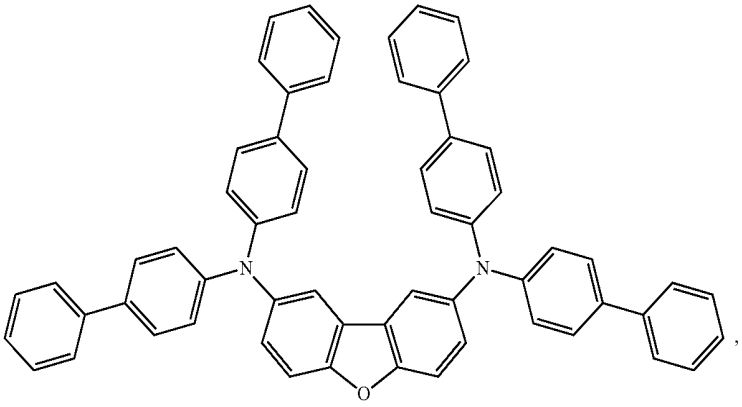

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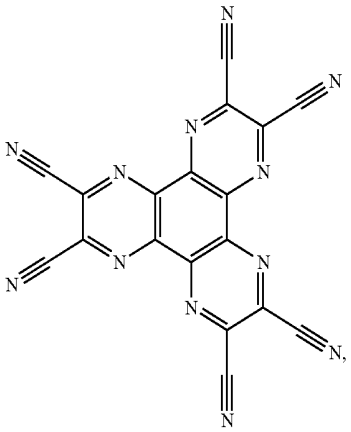

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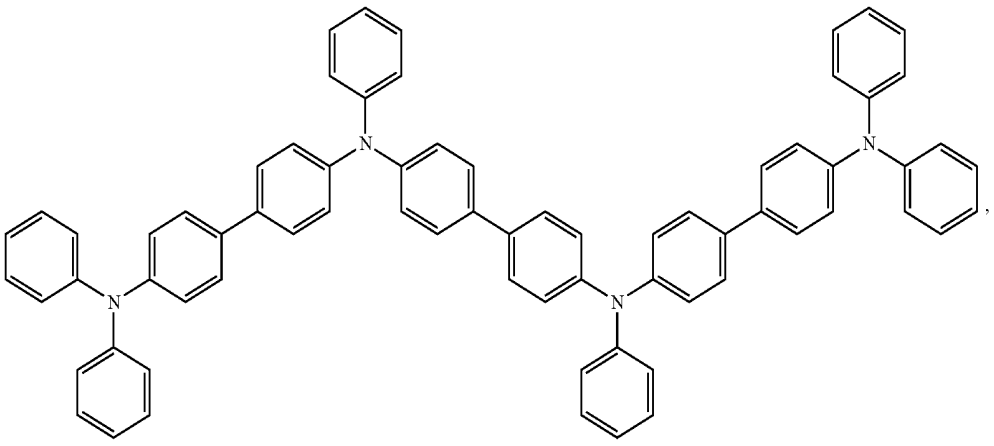

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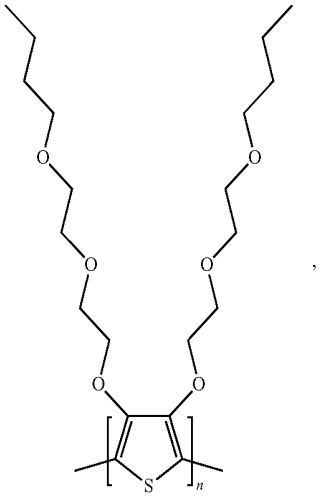

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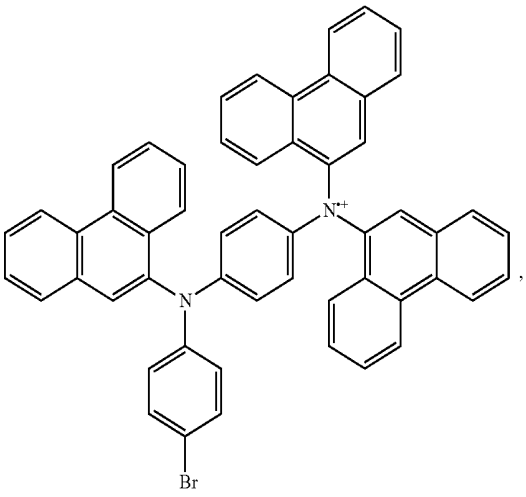

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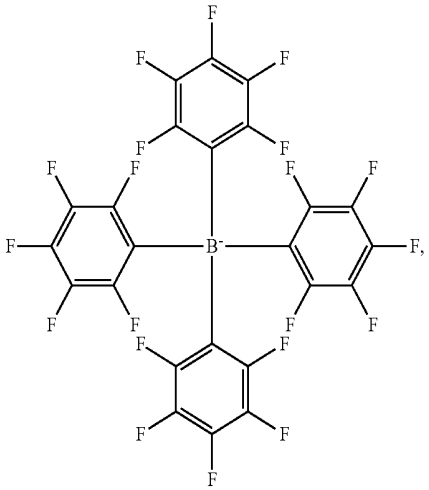

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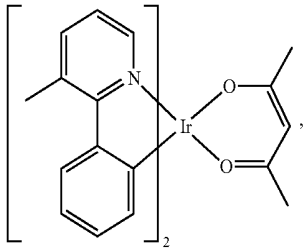

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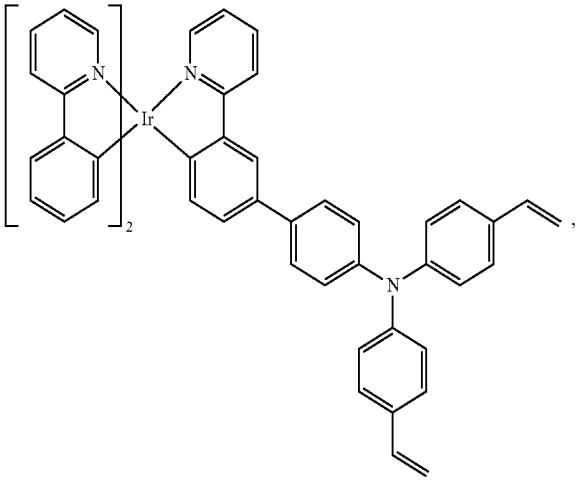

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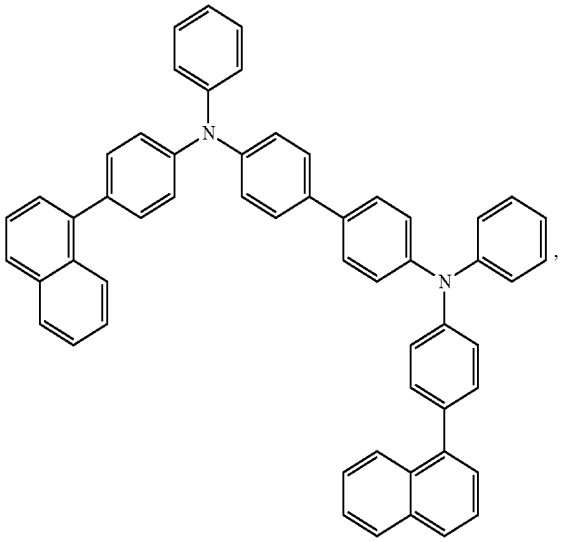

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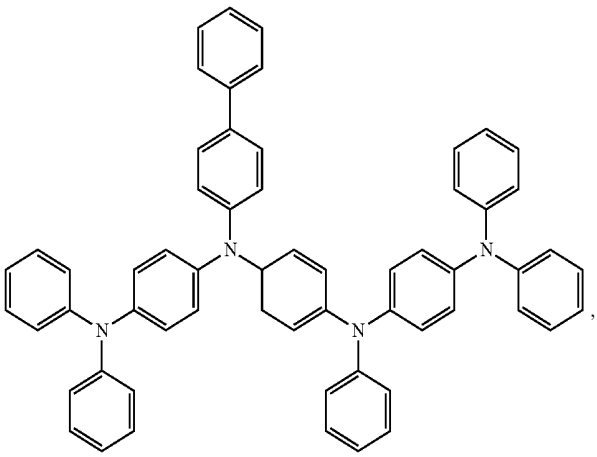

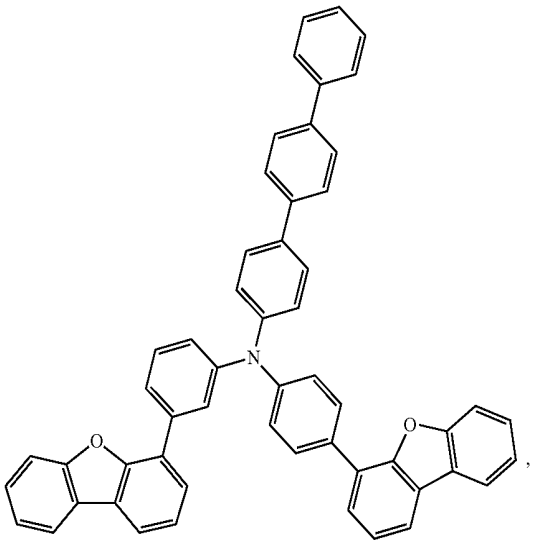

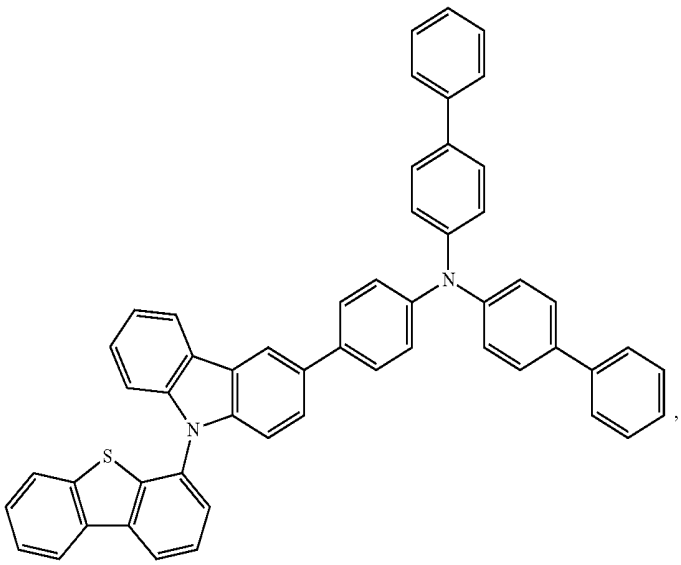

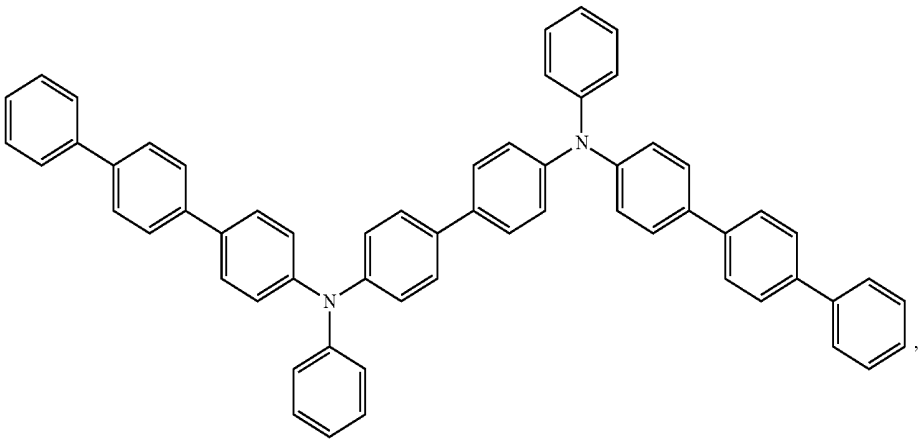

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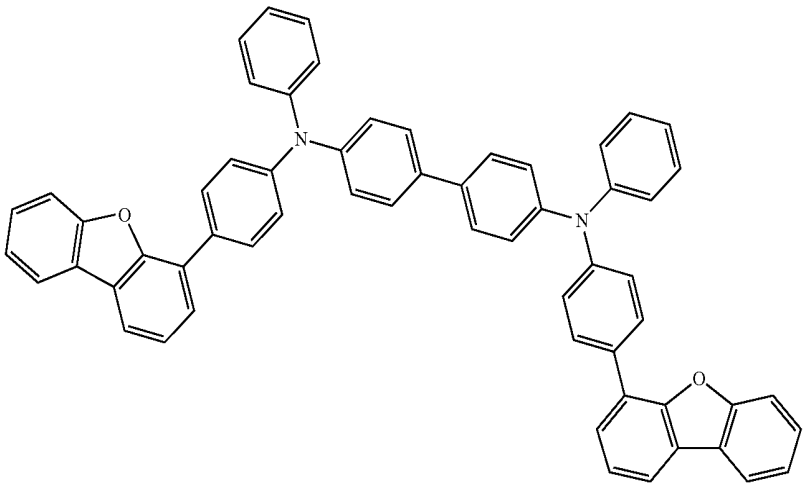

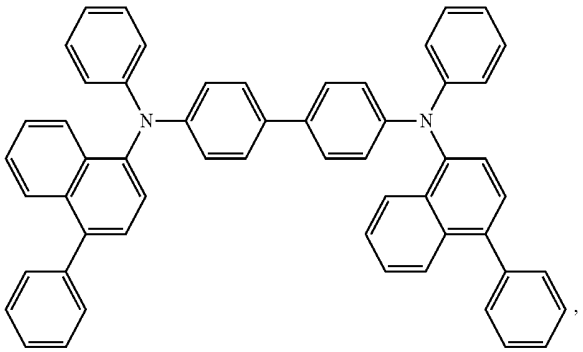

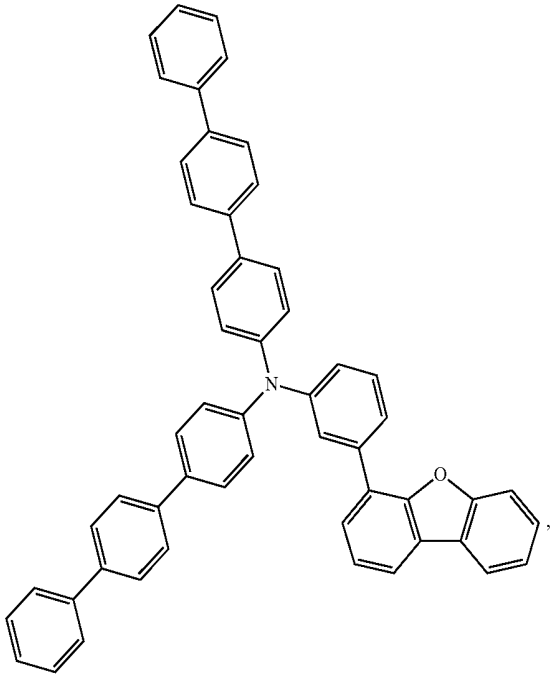

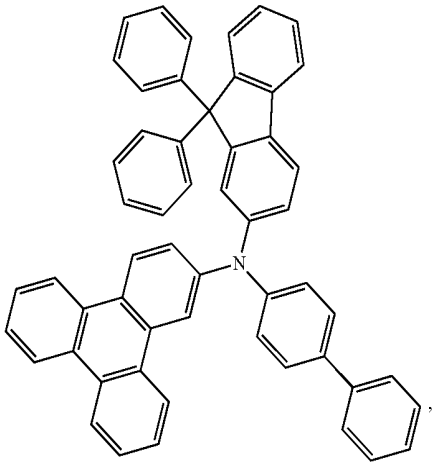

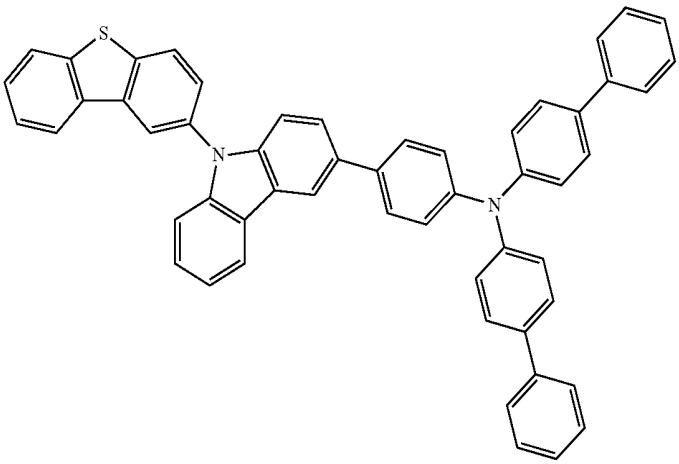

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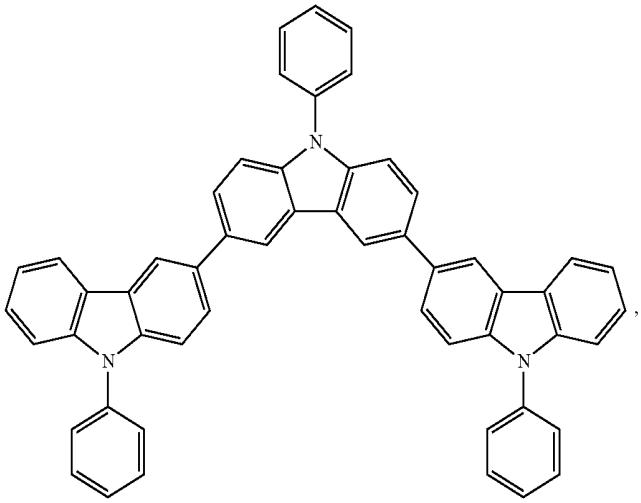

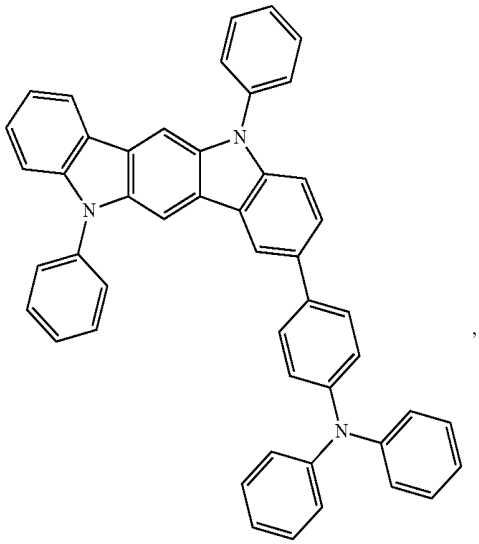

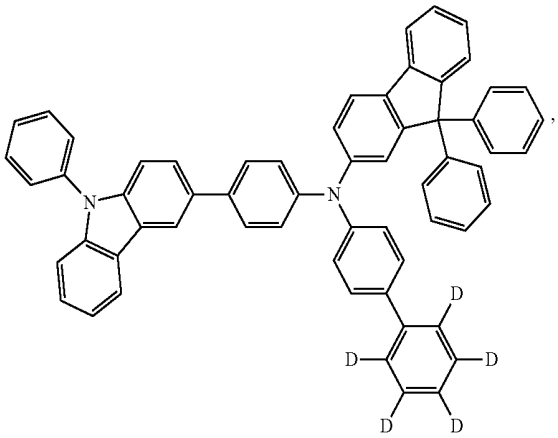

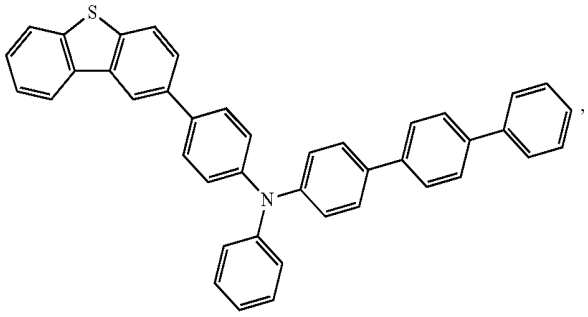

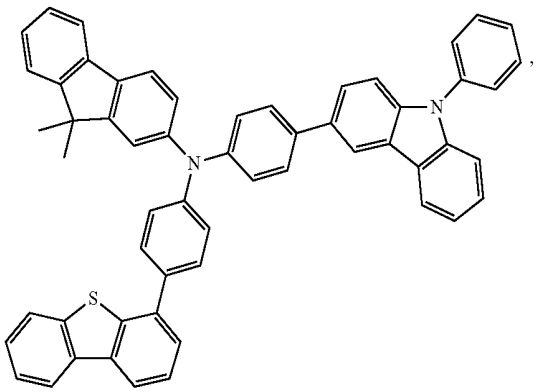

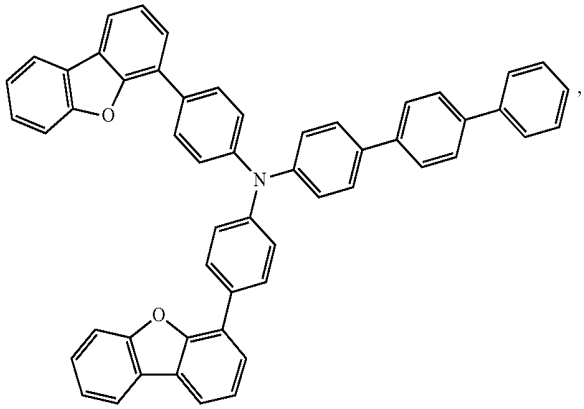

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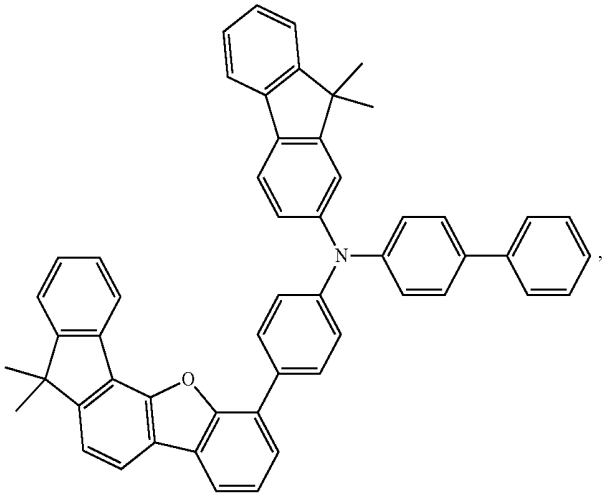

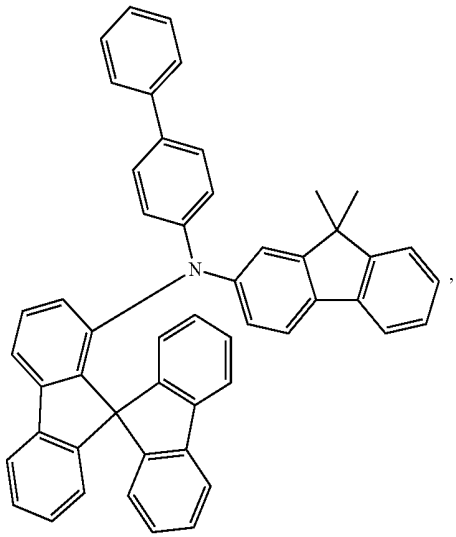

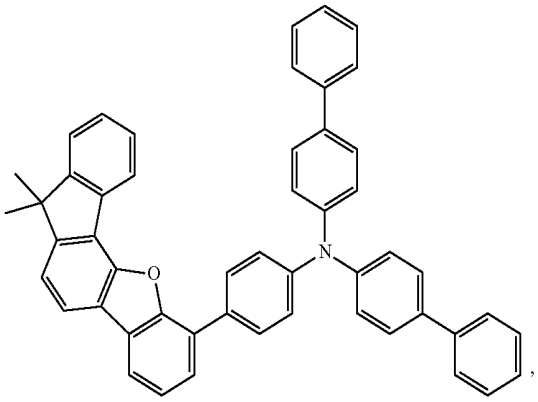

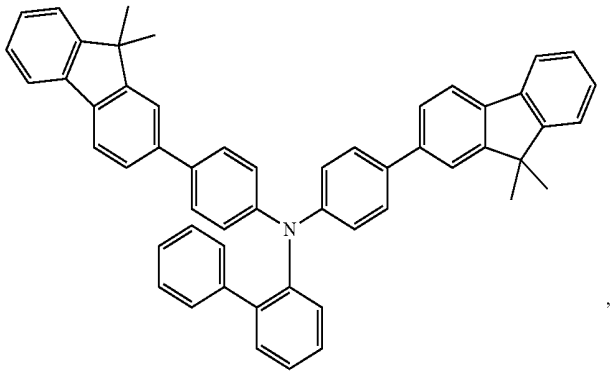

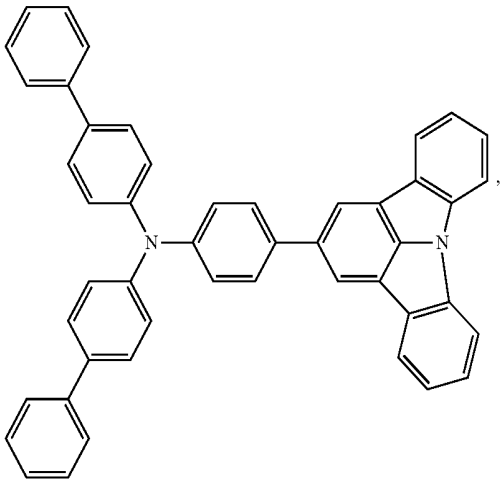

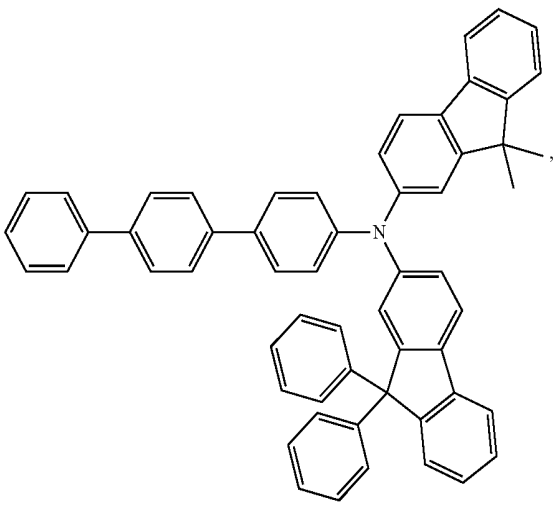

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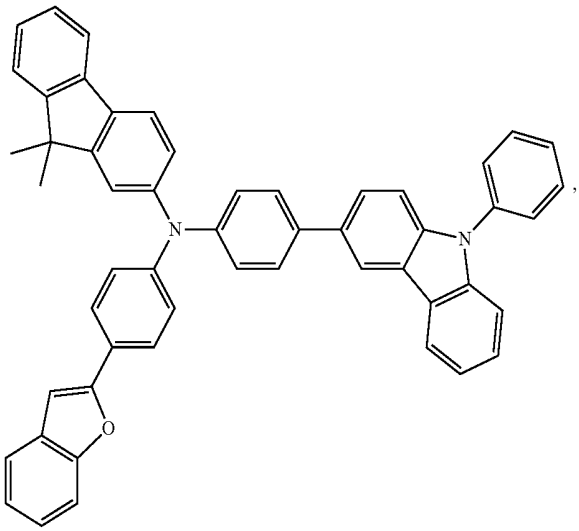

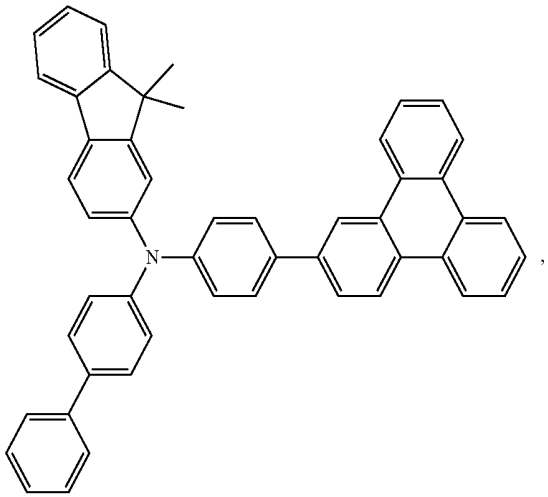

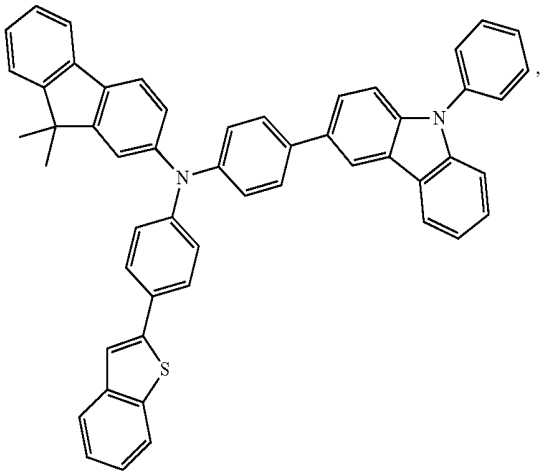

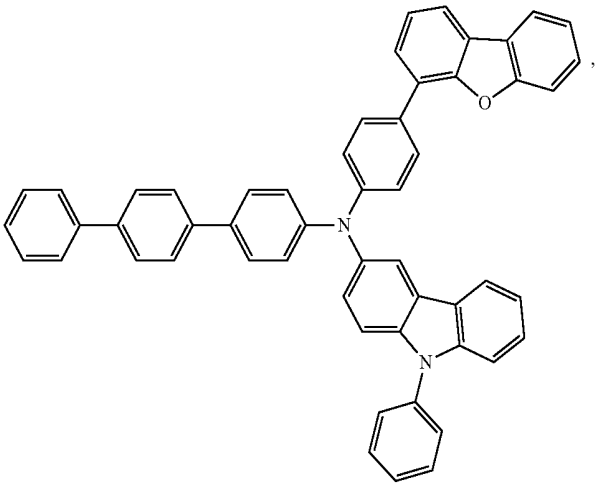

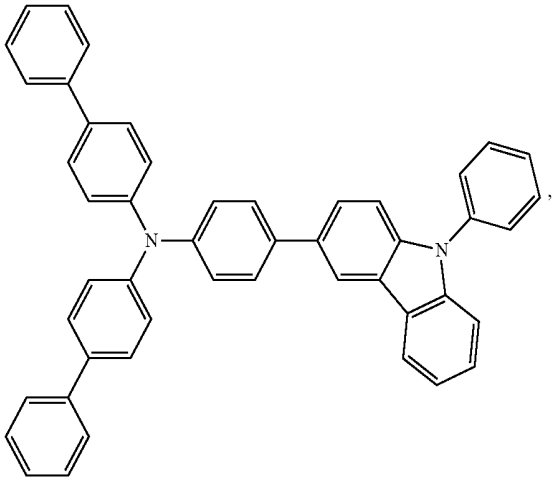

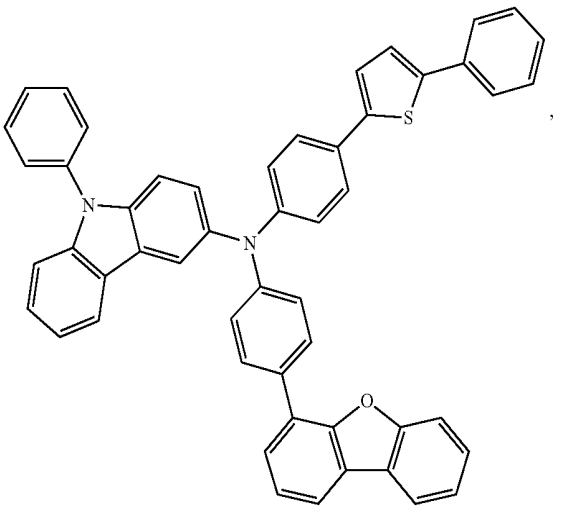

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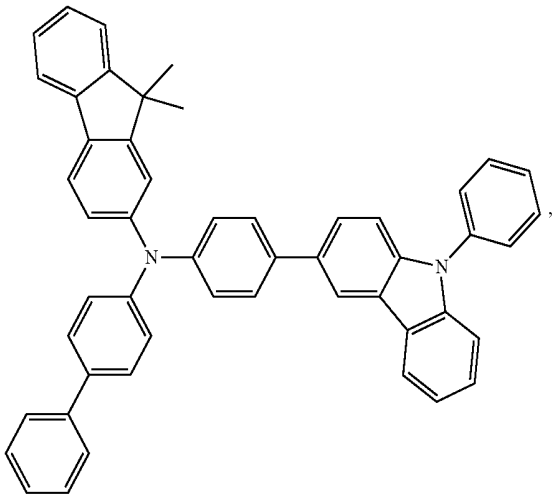

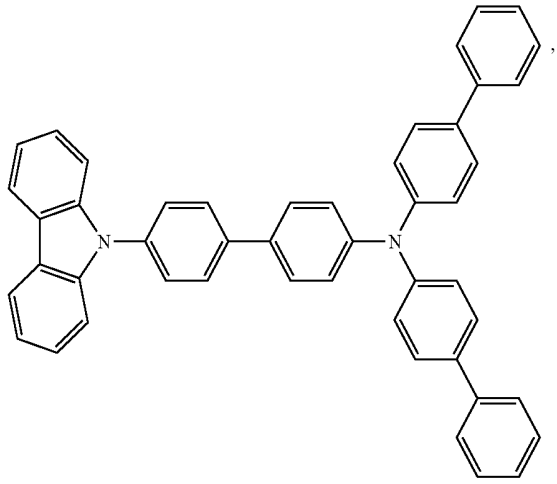

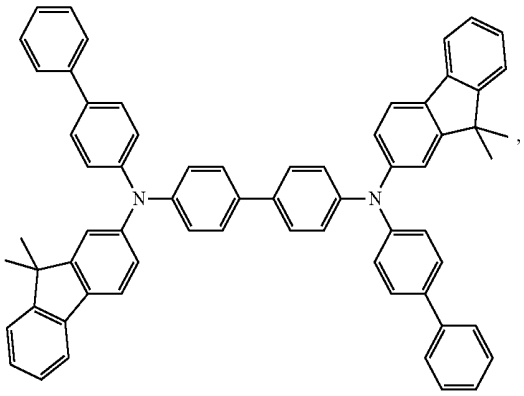

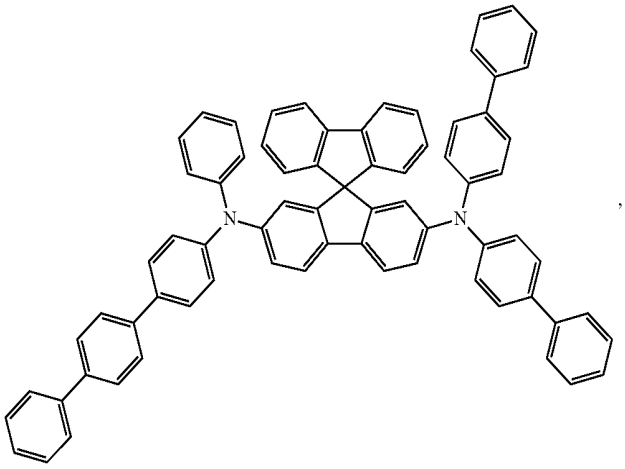

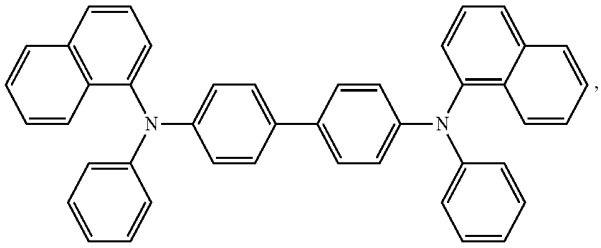

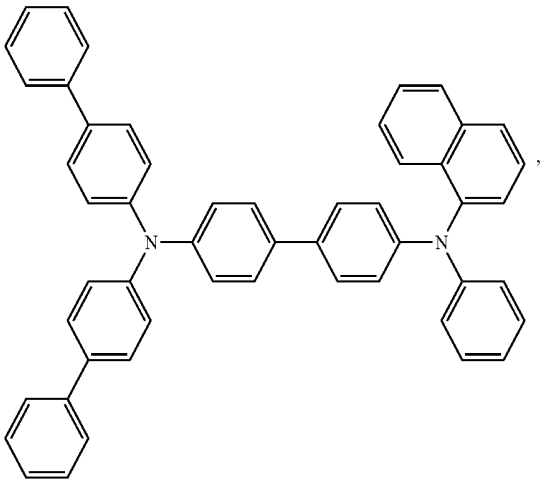

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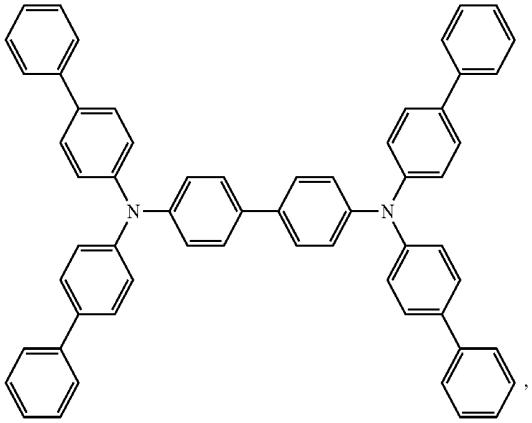

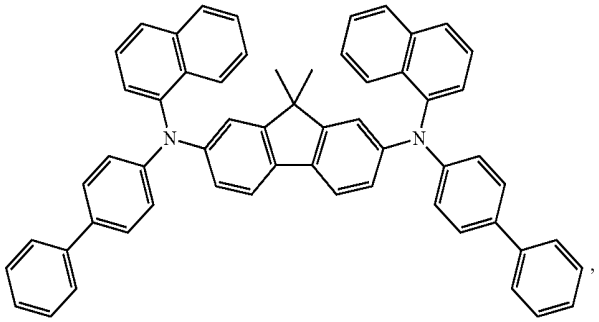

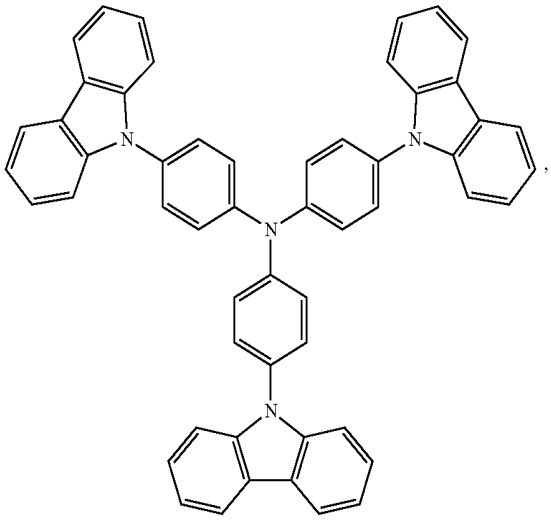

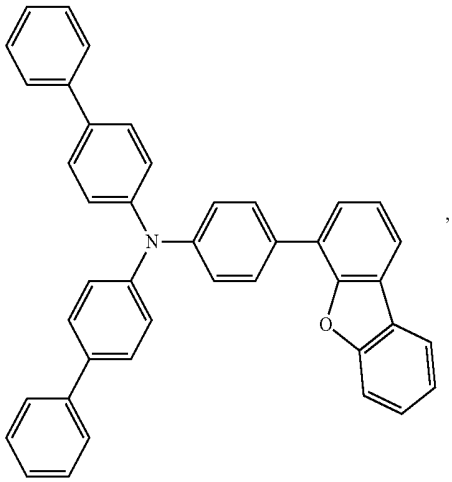

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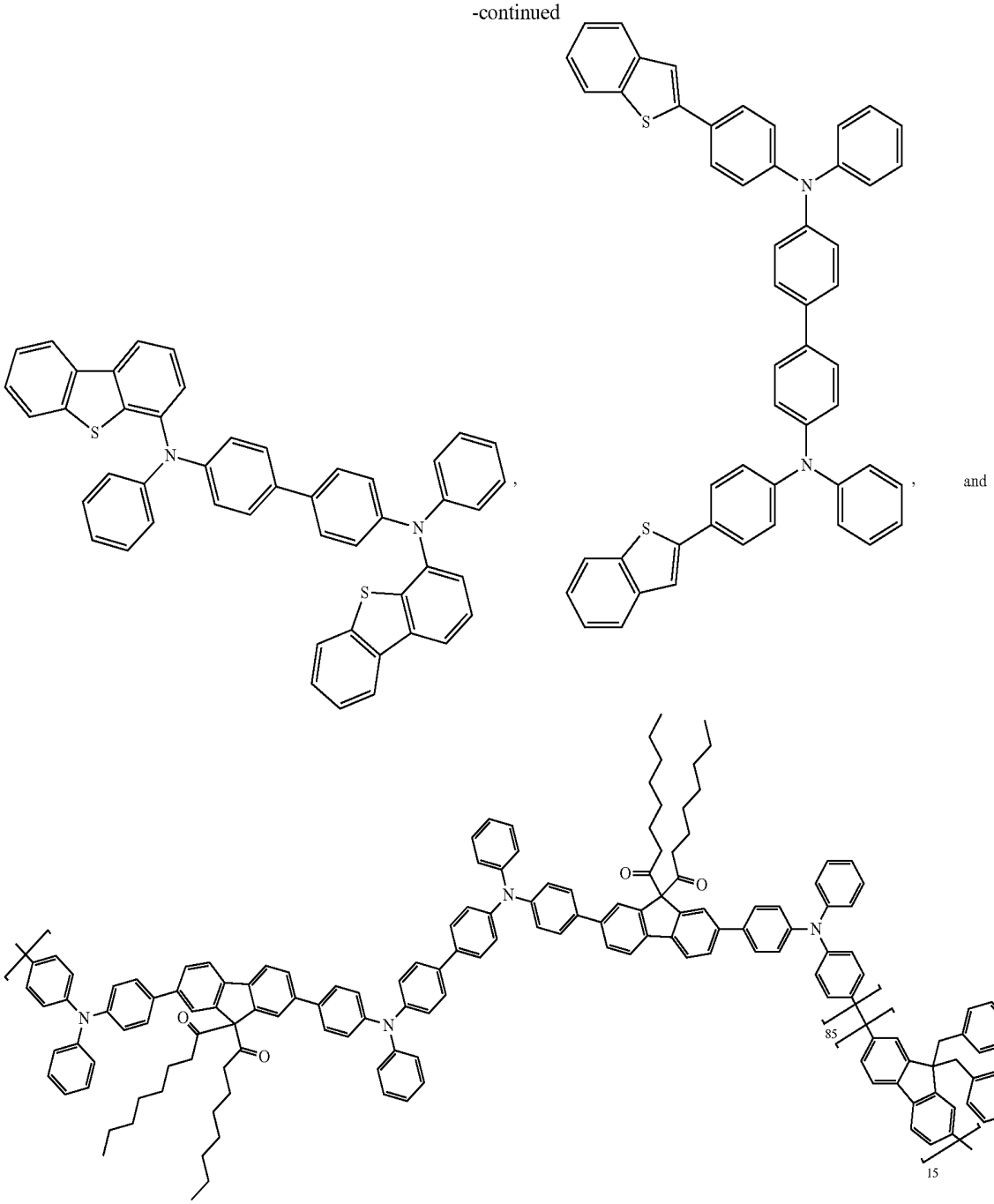


EBL:

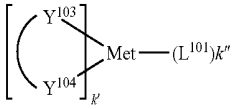
[0172] An electron blocking layer (EBL) may be used to reduce the number of electrons and/or excitons that leave the emissive layer. The presence of such a blocking layer in a device may result in substantially higher efficiencies, and/or longer lifetime, as compared to a similar device lacking a blocking layer. Also, a blocking layer may be used to confine emission to a desired region of an OLED. In some embodiments, the EBL material has a higher LUMO (closer to the vacuum level) and/or higher triplet energy than the emitter closest to the EBL interface. In some embodiments, the EBL material has a higher LUMO (closer to the vacuum level) and/or higher triplet energy than one or more of the hosts closest to the EBL interface. In one aspect, the compound used in EBL contains the same molecule or the same functional groups used as one of the hosts described below.

Additional Hosts:

[0173] The light emitting layer of the organic EL device of the present invention preferably contains at least a metal complex as light emitting dopant material, and may contain one or more additional host materials using the metal complex as a dopant material. Examples of the host material are not particularly limited, and any metal complexes or organic compounds may be used as long as the triplet energy

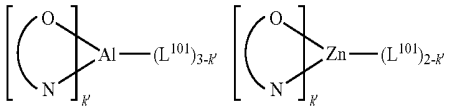
of the host is larger than that of the dopant. Any host material may be used with any dopant so long as the triplet criteria is satisfied.

[0174] Examples of metal complexes used as host are preferred to have the following general formula:



wherein Met is a metal; (Y^{103}-Y^{104}) is a bidentate ligand, Y^{103} and Y^{104} are independently selected from C, N, O, P, and S; L^{101} is an another ligand; k' is an integer value from 1 to the maximum number of ligands that may be attached to the metal; and k'+k" is the maximum number of ligands that may be attached to the metal.

[0175] In one aspect, the metal complexes are:

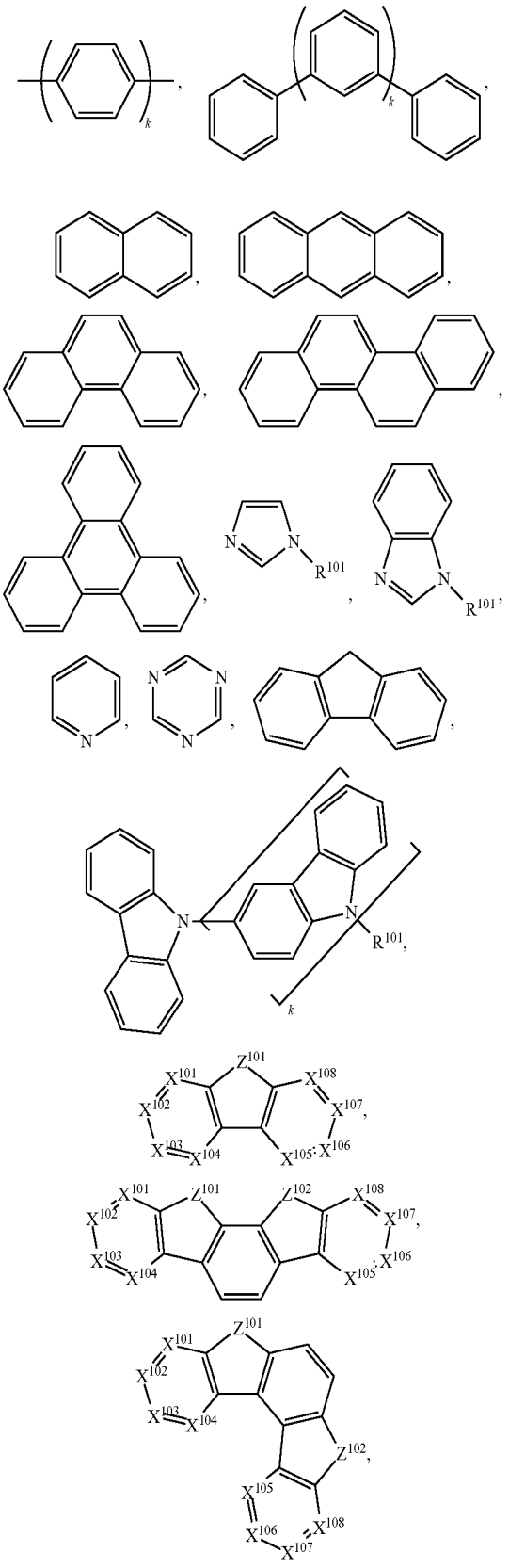


wherein (O—N) is a bidentate ligand, having metal coordinated to atoms O and N.

[0176] In another aspect, Met is selected from Ir and Pt. In a further aspect, (Y^{103}-Y^{104}) is a carbene ligand.

[0177] In one aspect, the host compound contains at least one of the following groups selected from the group consisting of aromatic hydrocarbon cyclic compounds such as benzene, biphenyl, triphenyl, triphenylene, naphthalene, anthracene, phenalene, phenanthrene, fluorene, pyrene, chrysene, perylene, azulene; group consisting aromatic heterocyclic compounds such as dibenzothiophene, dibenzofuran, dibenzoselenophene, furan, thiophene, benzofuran, benzothiophene, benzoselenophene, carbazole, indolocarbazole, pyridylindole, pyrrolodipyridine, pyrazole, imidazole, triazole, oxazole, thiazole, oxadiazole, oxatriazole, dioxazole, thiadiazole, pyridine, pyridazine, pyrimidine, pyrazine, triazine, oxazine, oxathiazine, oxadiazine, indole, benzimidazole, indazole, indoxazine, benzoxazole, benzisoxazole, benzothiazole, quinoline, isoquinoline, cinnoline, quinazoline, quinoxaline, naphthyridine, phthalazine, pteridine, xanthene, acridine, phenazine, phenothiazine, phenoxazine, benzofuropyridine, furodipyridine, benzothienopyridine, thienodipyridine, benzoselenophenopyridine, and selenophenodipyridine; and group consisting 2 to 10 cyclic structural units which are groups of the same type or different types selected from the aromatic hydrocarbon cyclic group and the aromatic heterocyclic group and are bonded to each other directly or via at least one of oxygen atom, nitrogen atom, sulfur atom, silicon atom, phosphorus atom, boron atom, chain structural unit and the aliphatic cyclic group. Wherein each group is further substituted by a substituent selected from the group consisting of hydrogen, deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acids, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, and combinations thereof.

[0178] In one aspect, host compound contains at least one of the following groups in the molecule:



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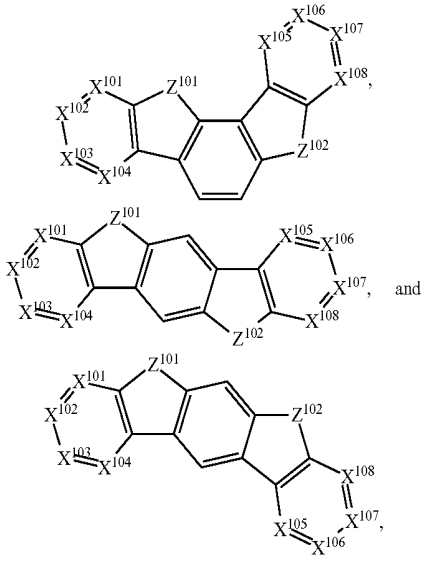
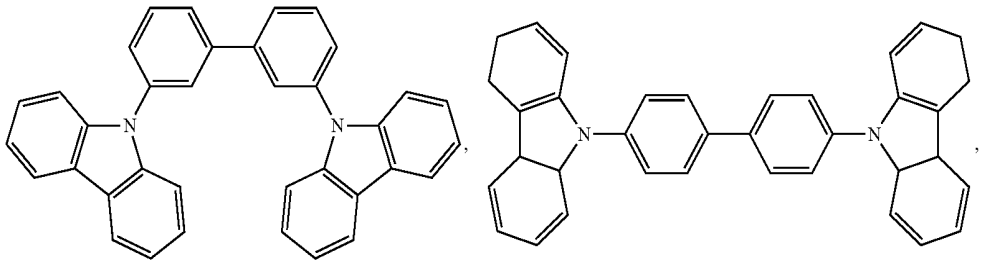
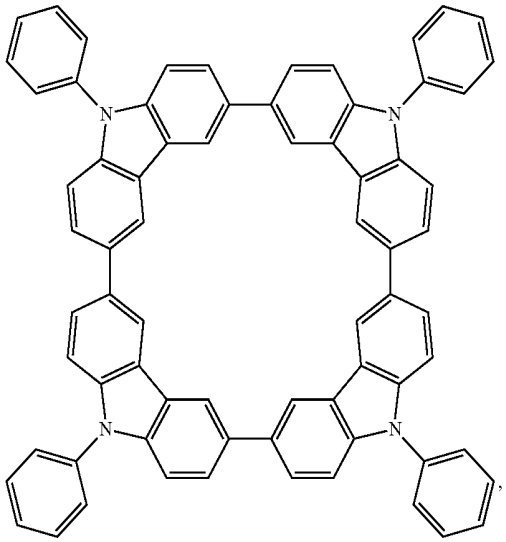


wherein R^{101} is selected from the group consisting of hydrogen, deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acids, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, and combinations thereof, when it is aryl or heteroaryl, it has the similar definition as Ar's mentioned above. k is an integer from 0 to 20 or 1 to 20. X^{101} to X^{108} are independently selected from C (including CH) or N. Z^{101} and Z^{102} are independently selected from NR^{101}, O, or S.

[0179] Non-limiting examples of the additional host materials that may be used in an OLED in combination with the host compound disclosed herein are exemplified below together with references that disclose those materials: EP2034538, EP2034538A, EP2757608, JP2007254297, KR20100079458, KR20120088644, KR20120129733, KR20130115564, TW201329200, US20030175553, US20050238919, US20060280965, US20090017330, US20090030202, US20090167162, US20090302743, US20090309488, US20100012931, US20100084966, US20100187984, US2010187984, US2012075273, US2012126221, US2013009543, US2013105787, US2013175519, US2014001446, US20140183503, US20140225088, US2014034914, U.S. Pat. No. 7,154,114, WO2001039234, WO2004093207, WO2005014551, WO2005089025, WO2006072002, WO2006114966, WO2007063754, WO2008056746, WO2009003898, WO2009021126, WO2009063833, WO2009066778, WO2009066779, WO2009086028, WO2010056066, WO2010107244, WO2011081423, WO2011081431, WO2011086863, WO2012128298, WO2012133644, WO2012133649, WO2013024872, WO2013035275, WO2013081315, WO2013191404, WO2014142472, US20170263869, US20160163995, U.S. Pat. No. 9,466,803.





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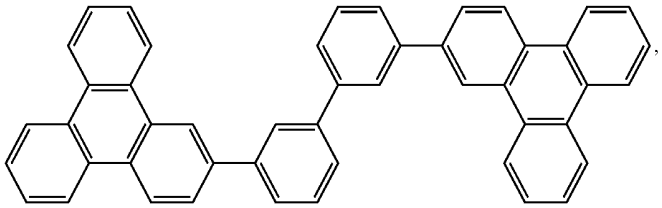

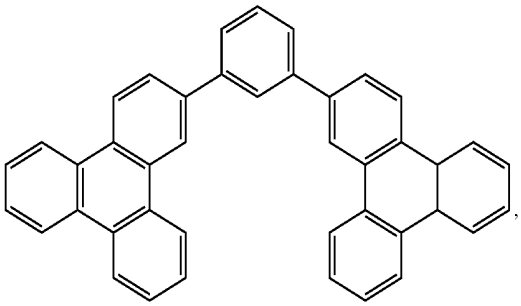

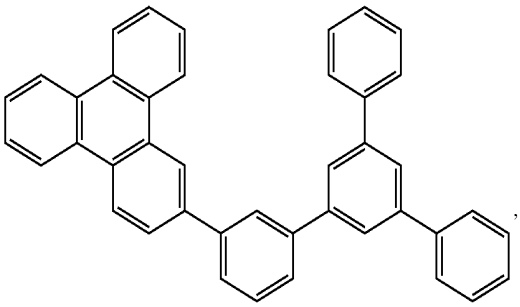

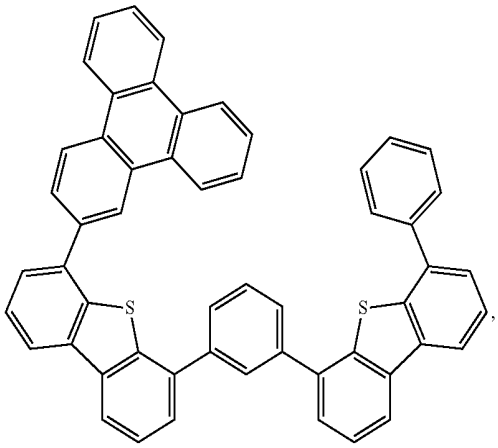

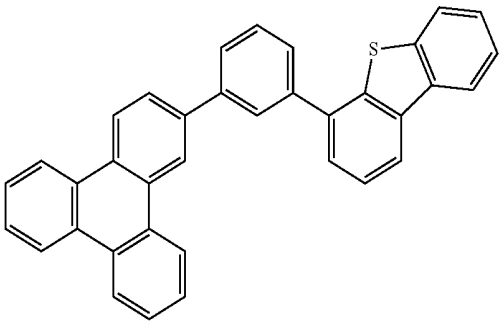

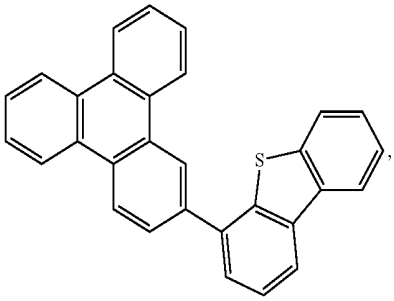

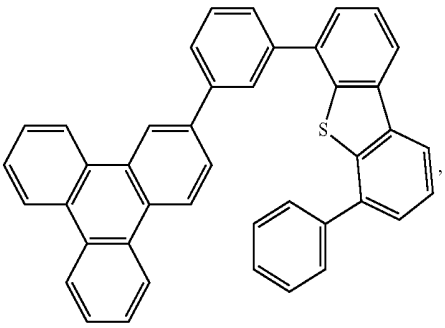

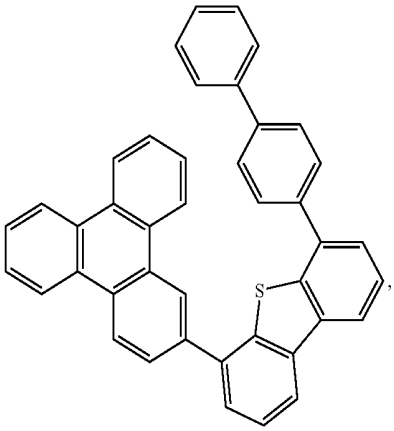

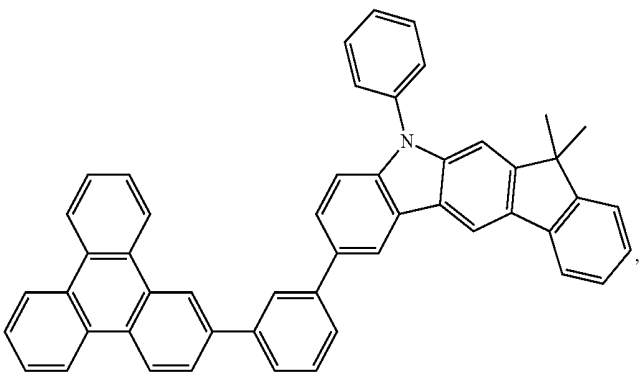

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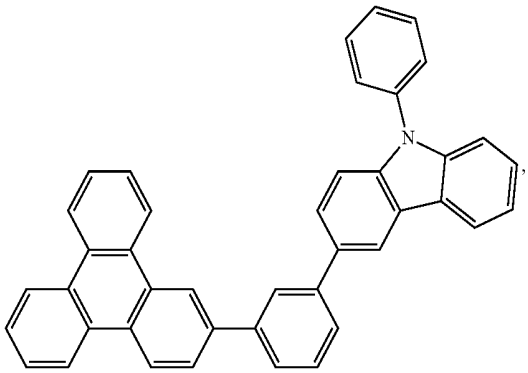

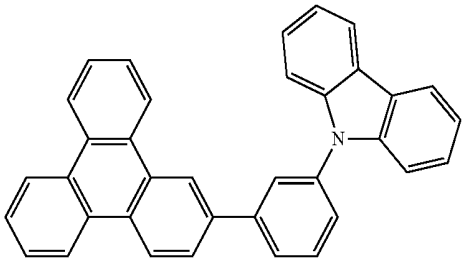

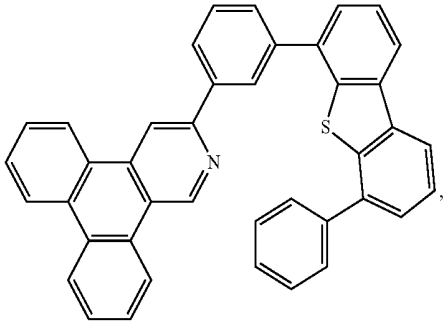

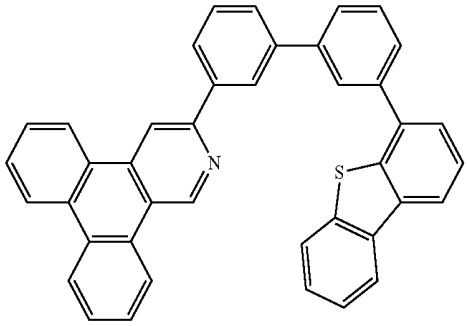

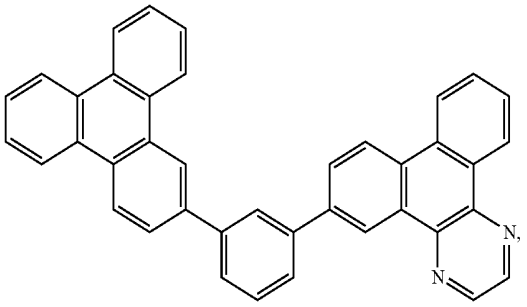

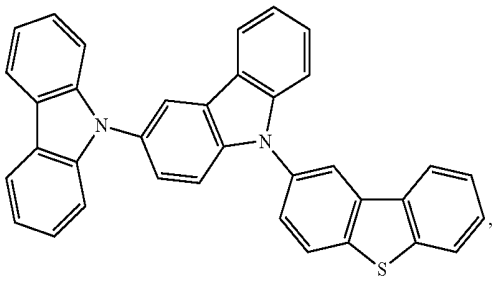

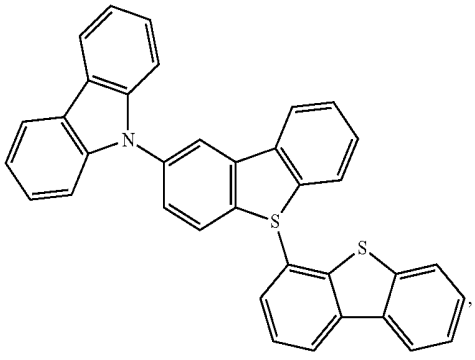

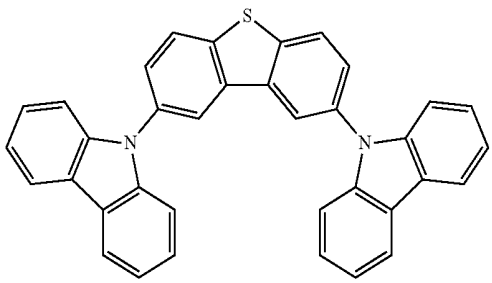

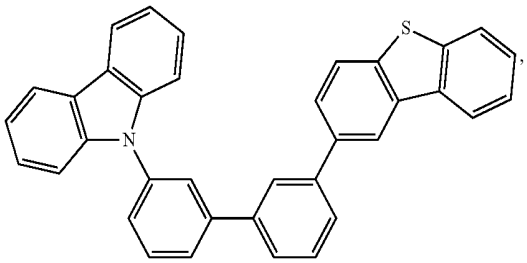

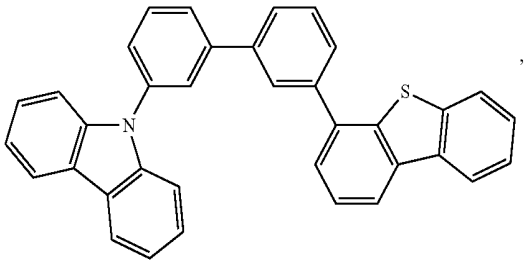

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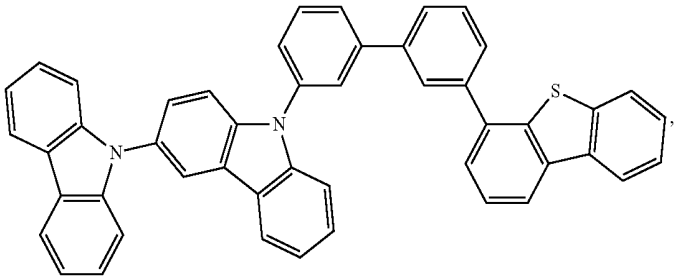

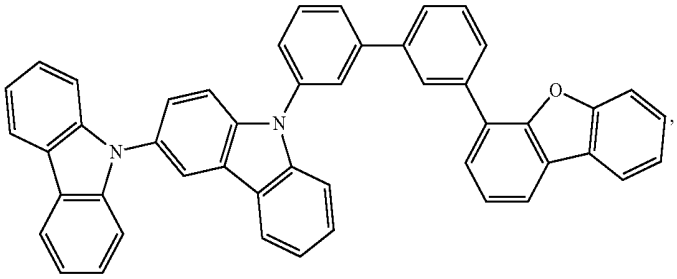

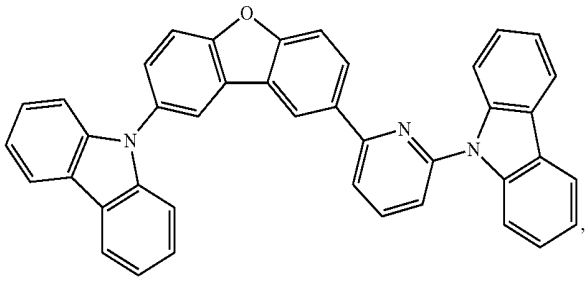

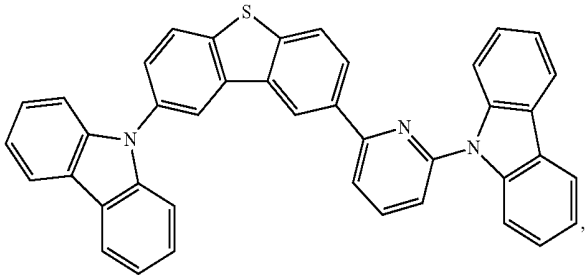

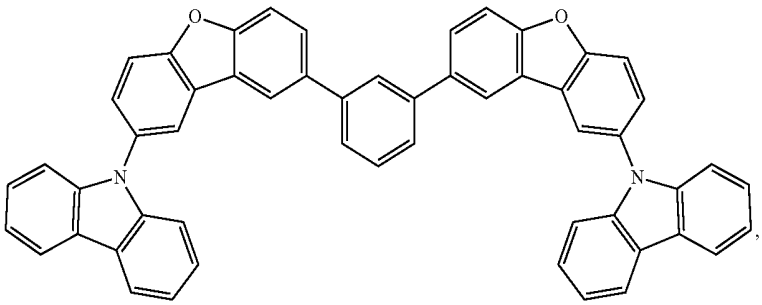

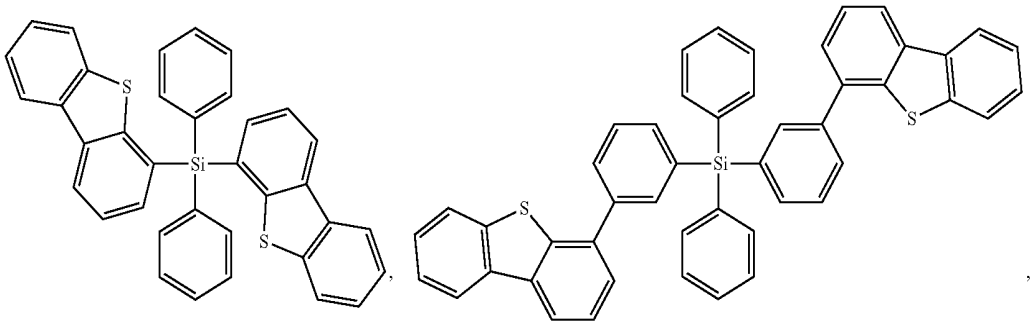

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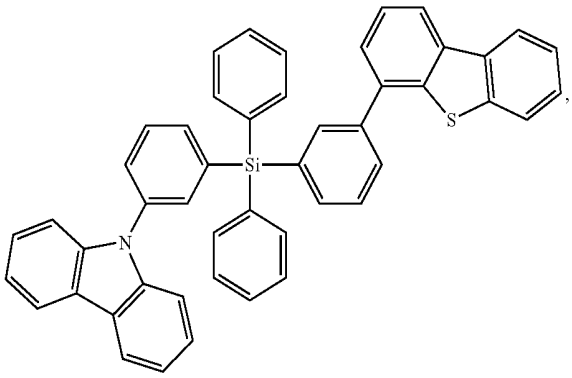

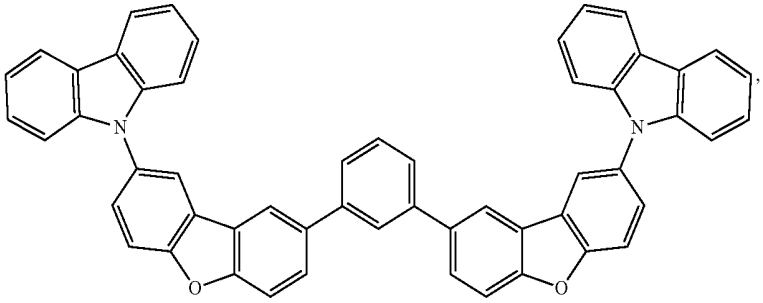

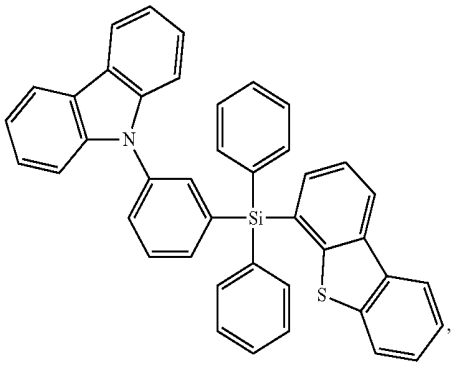

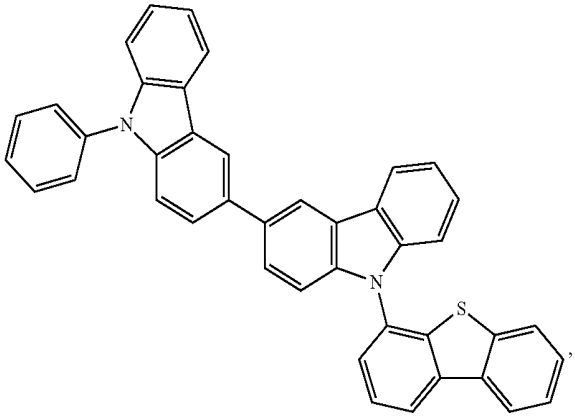

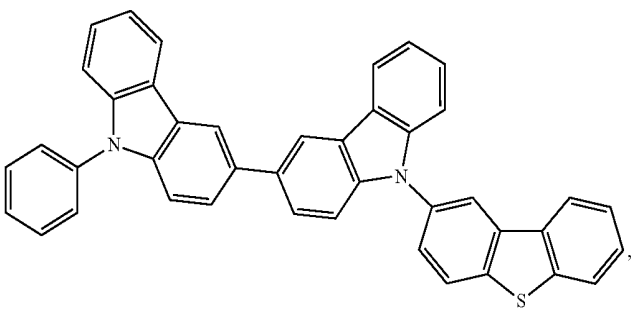

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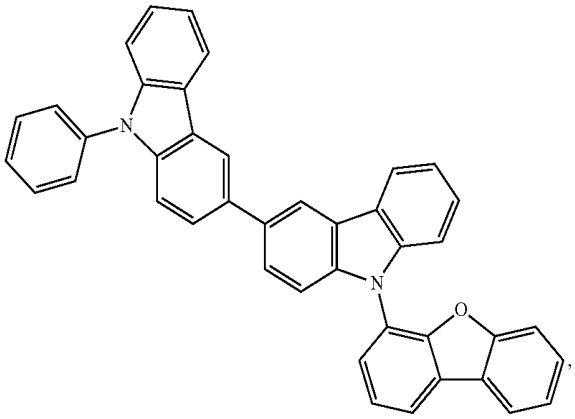

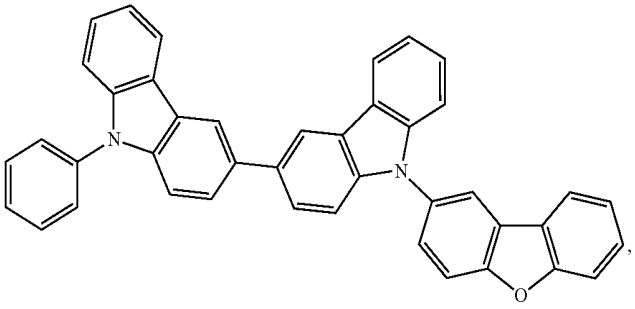

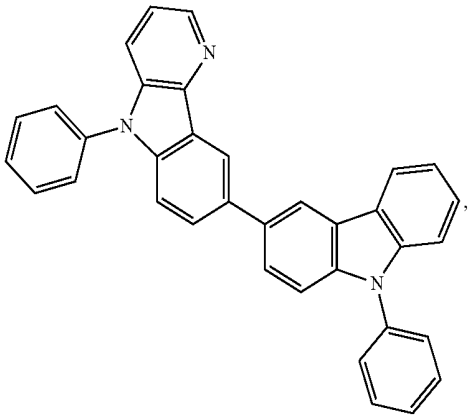

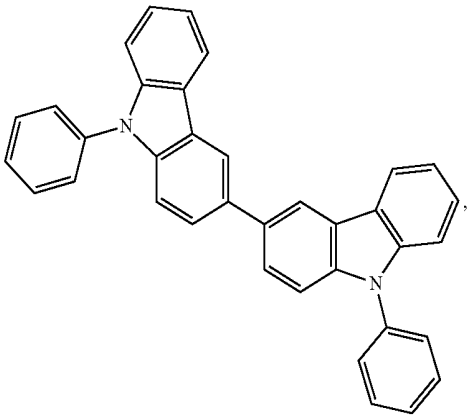

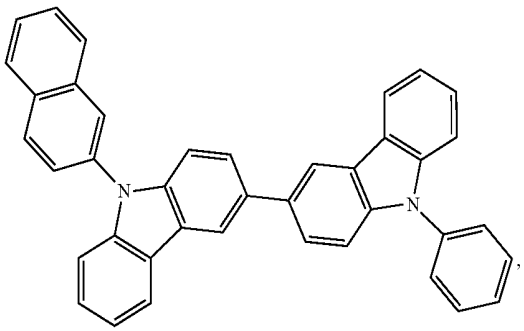

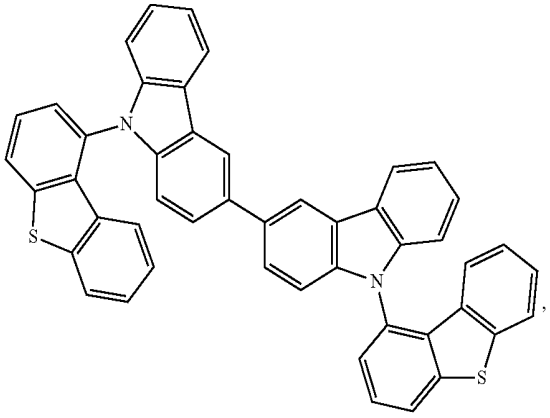

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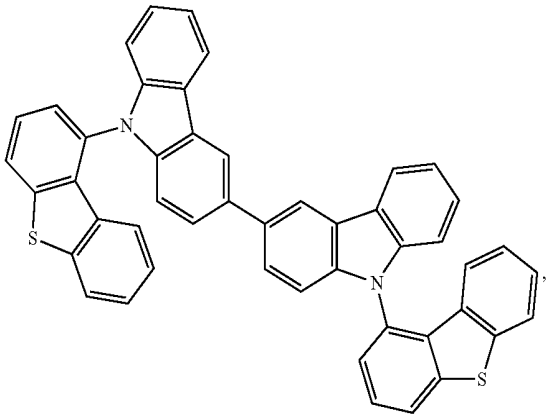

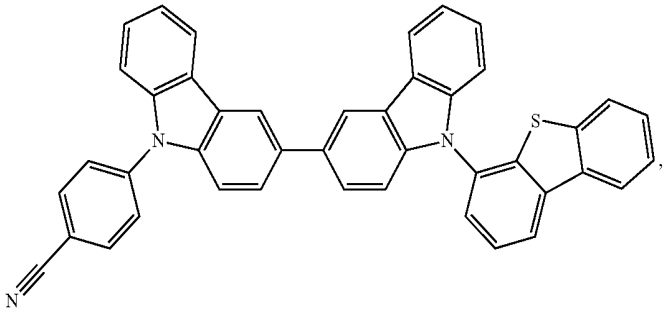

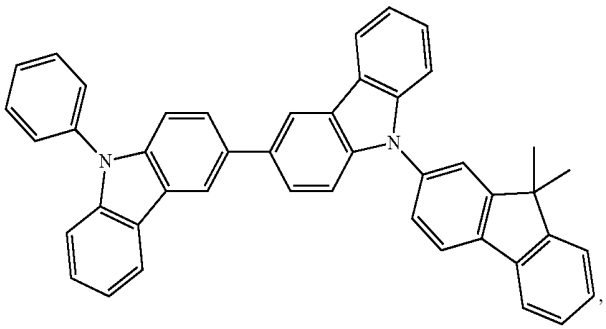

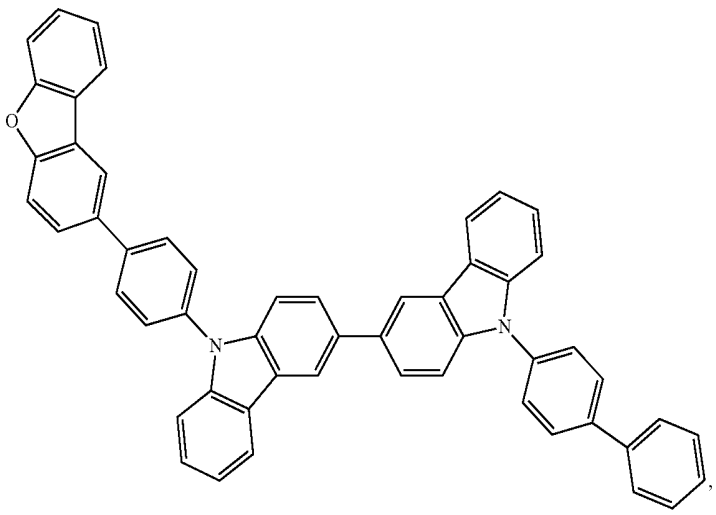

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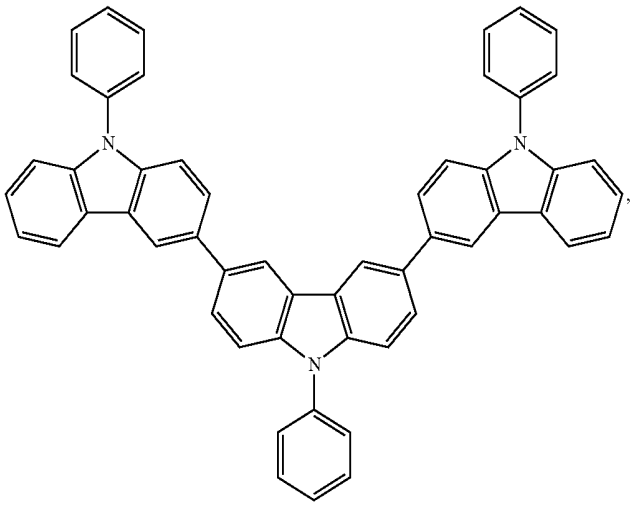

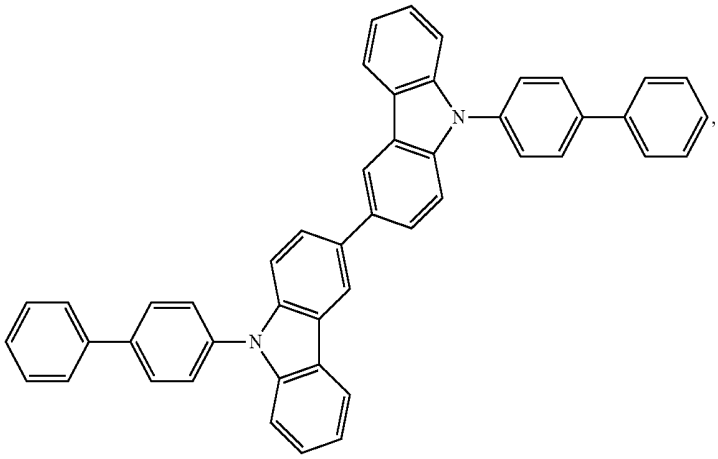

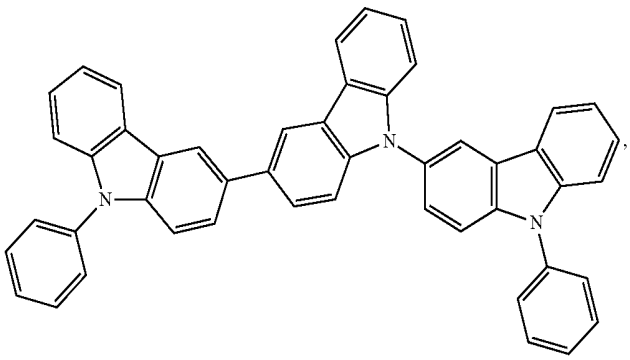

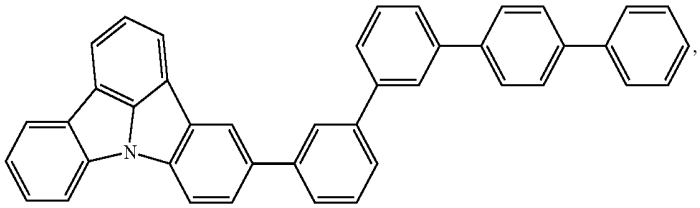

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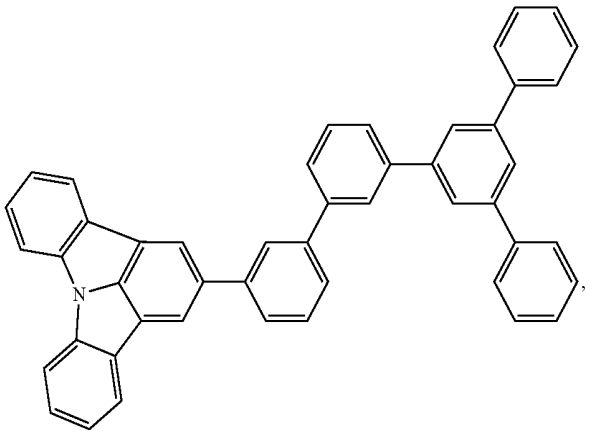

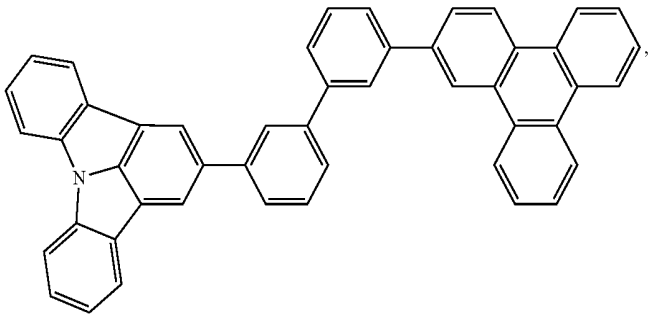

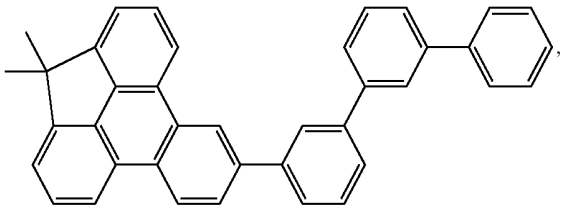

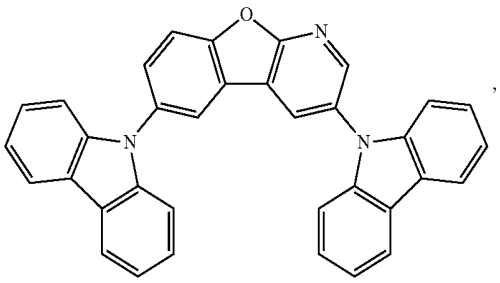

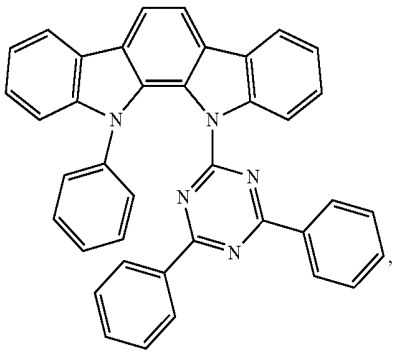

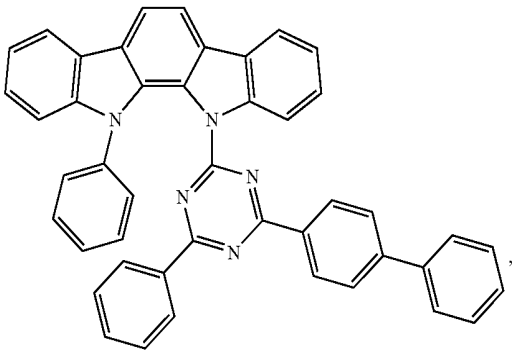

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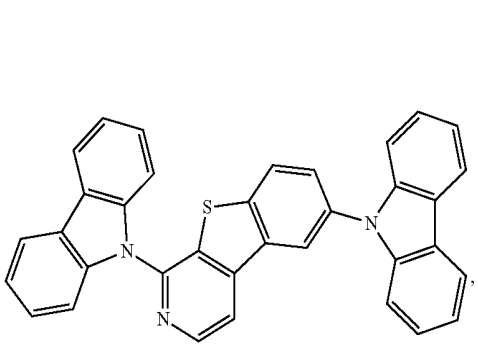

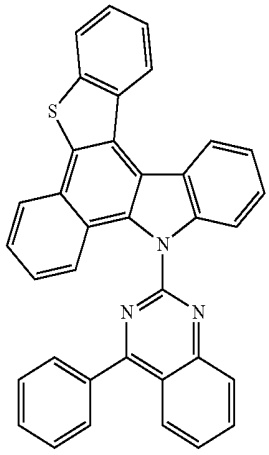

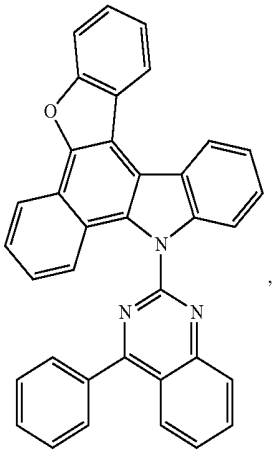

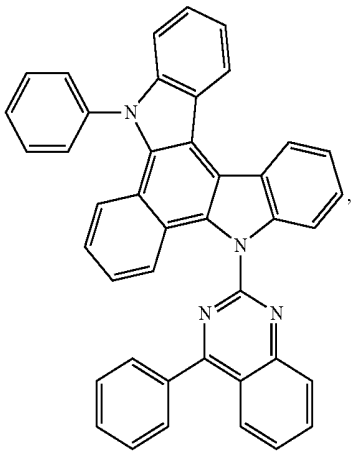

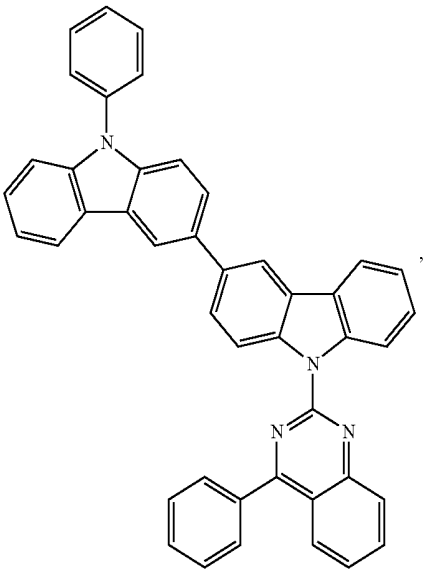

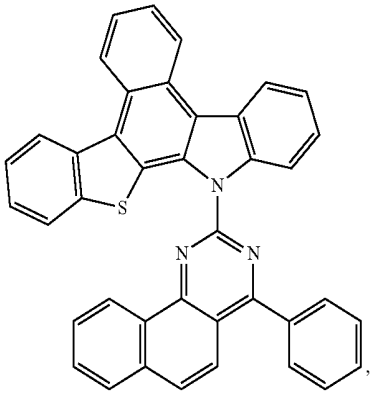

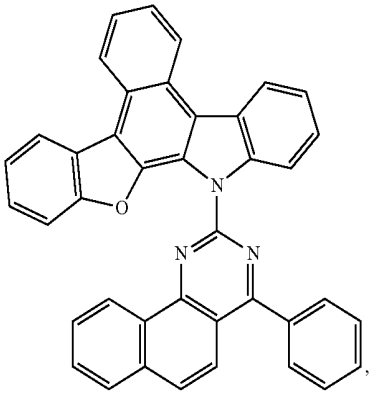

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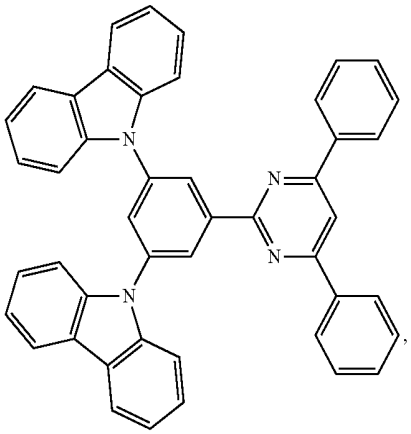

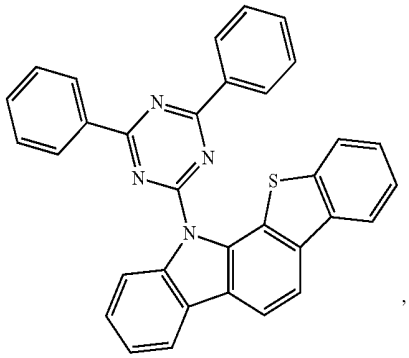

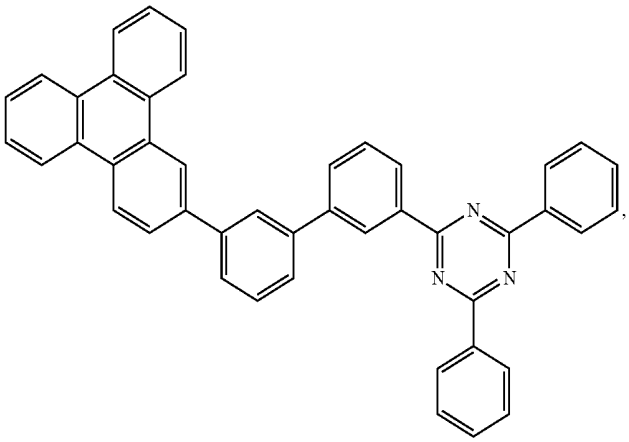

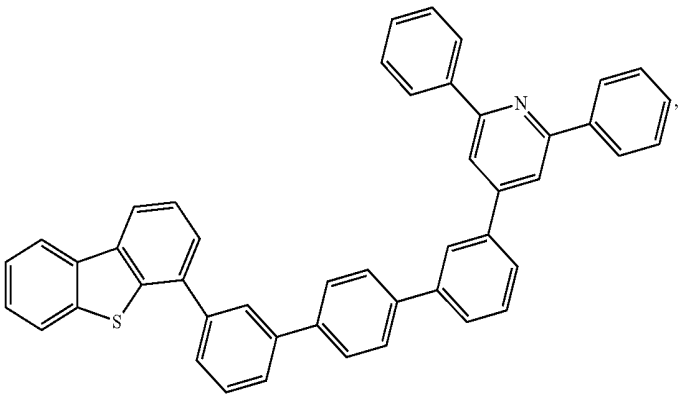

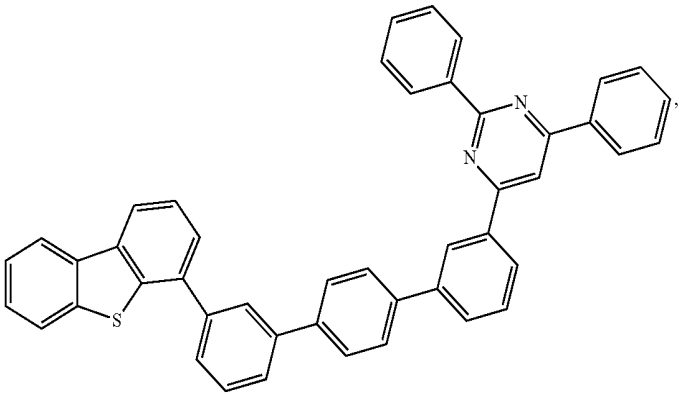

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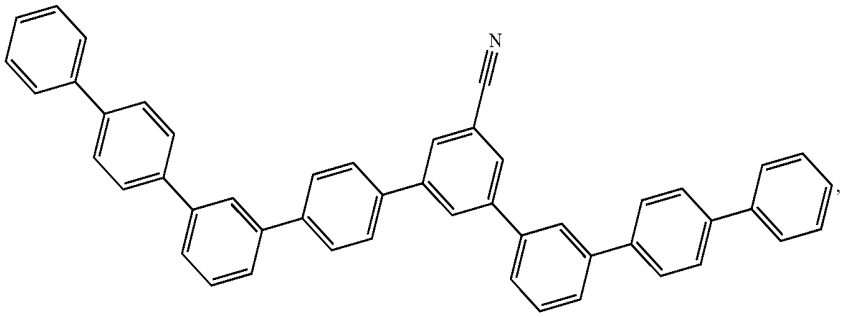

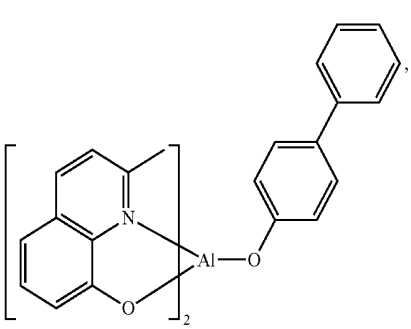

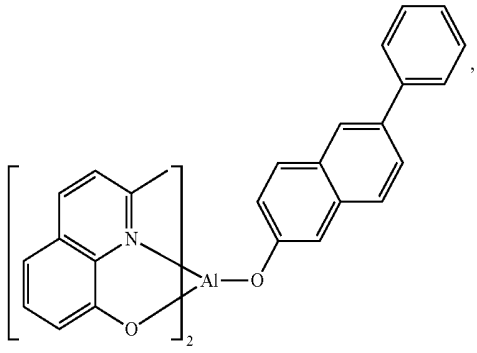

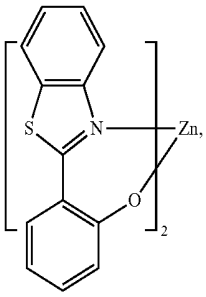

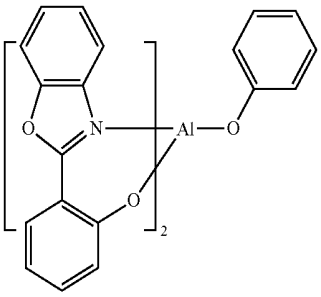

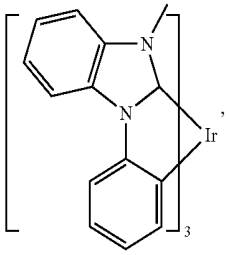

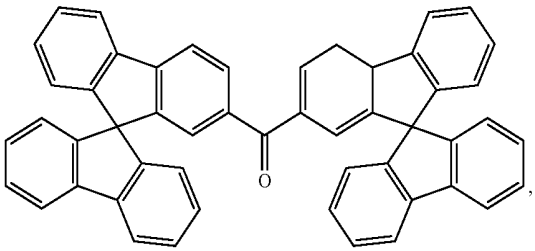

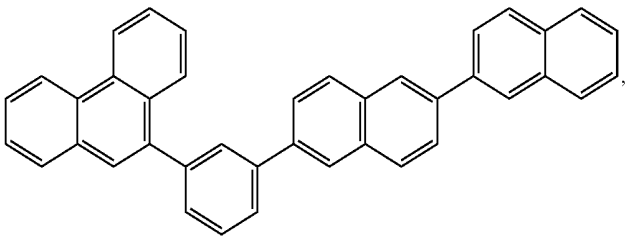

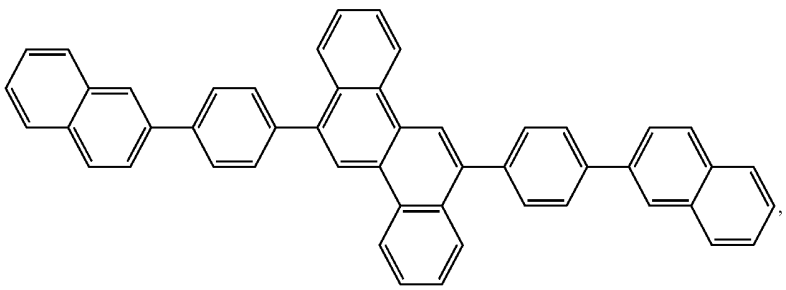

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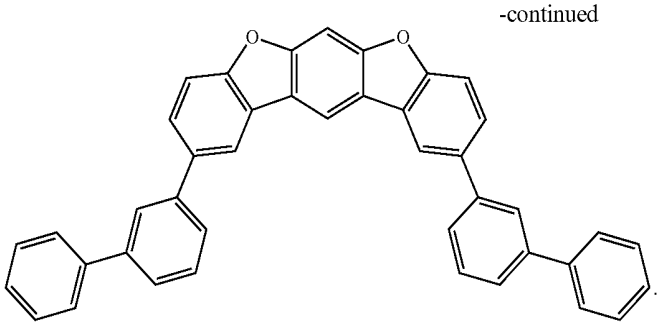
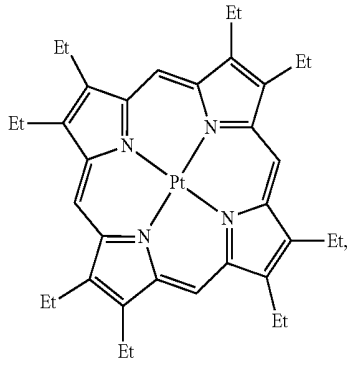
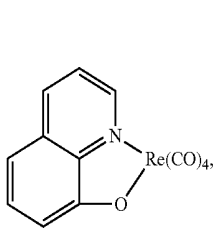


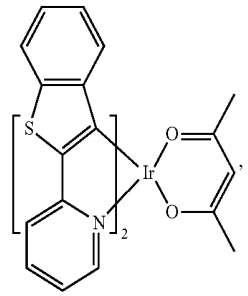
Emitter:

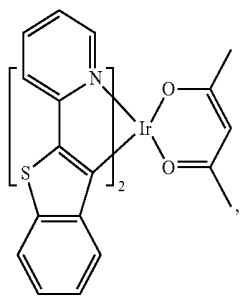
[0180] An emitter example is not particularly limited, and any compound may be used as long as the compound is typically used as an emitter material. Examples of suitable emitter materials include, but are not limited to, compounds which can produce emissions via phosphorescence, fluorescence, thermally activated delayed fluorescence, i.e., TADF (also referred to as E-type delayed fluorescence; see, e.g., U.S. application Ser. No. 15/700,352, which is hereby incorporated by reference in its entirety), triplet-triplet annihilation, or combinations of these processes. In some embodiments, the emissive dopant can be a racemic mixture, or can be enriched in one enantiomer.

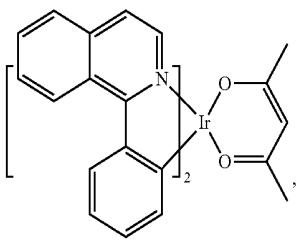
[0181] Non-limiting examples of the emitter materials that may be used in an OLED in combination with materials disclosed herein are exemplified below together with references that disclose those materials: CN103694277, CN1696137, EB01238981, EP01239526, EP01961743, EP1239526, EP1244155, EP1642951, EP1647554, EP1841834, EP1841834B, EP2062907, EP2730583, JP2012074444, JP2013110263, JP4478555, KR1020090133652, KR20120032054, KR20130043460, TW201332980, U.S. Ser. No. 06/699,599, U.S. Ser. No. 06/916,554, US20010019782, US20020034656, US20030068526, US20030072964, US20030138657, US20050123788, US20050244673, US2005123791, US2005260449, US20060008670, US20060065890, US20060127696, US20060134459, US20060134462, US20060202194, US20060251923, US20070034863, US20070087321, US20070103060, US20070111026, US20070190359, US20070231600, US2007034863, US2007104979, US2007104980, US2007138437, US2007224450, US2007278936, US20080020237, US20080233410, US20080261076, US20080297033, US200805851, US2008161567, US2008210930, US20090039776, US20090108737, US20090115322, US20090179555, US2009085476, US2009104472, US20100090591, US20100148663, US20100244004, US20100295032, US2010102716, US2010105902, US2010244004, US2010270916, US20110057559, US20110108822, US20110204333, US2011215710, US2011227049, US2011285275, US2012292601, US20130146848, US2013033172, US2013165653, US2013181190, US2013334521, US20140246656, US2014103305, U.S. Pat. Nos. 6,303,238, 6,413,656, 6,653,654, 6,670,645, 6,687,266, 6,835,469, 6,921,915, 7,279,704, 7,332,232, 7,378,162, 7,534,505, 7,675,228, 7,728,137, 7,740,957, 7,759,489, 7,951,947, 8,067,099, 8,592,586, 8,871,361, WO06081973, WO06121811, WO07018067, WO07108362, WO07115970, WO07115981, WO08035571, WO2002015645, WO2003040257, WO2005019373, WO2006056418, WO2008054584, WO2008078800, WO2008096609, WO2008101842, WO2009000673, WO2009050281, WO2009100991, WO2010028151, WO2010054731, WO2010086089, WO2010118029, WO2011044988, WO2011051404, WO2011107491, WO2012020327, WO2012163471, WO2013094620, WO2013107487, WO2013174471, WO2014007565, WO2014008982, WO2014023377, WO2014024131, WO2014031977, WO2014038456, WO2014112450,











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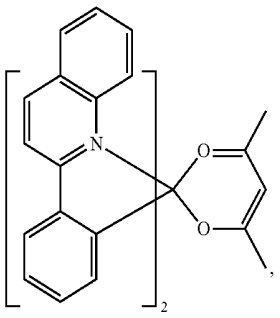

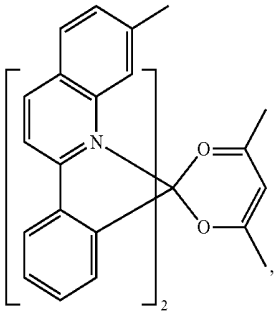

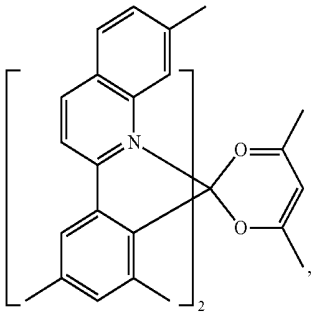

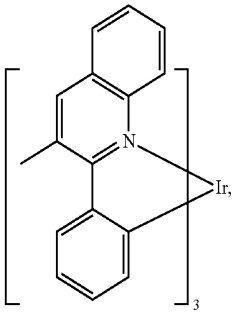

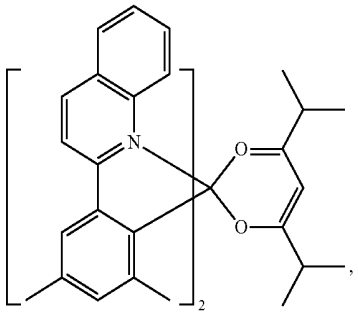

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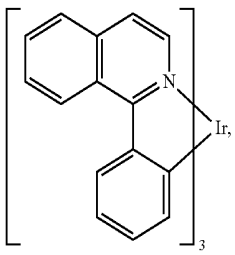

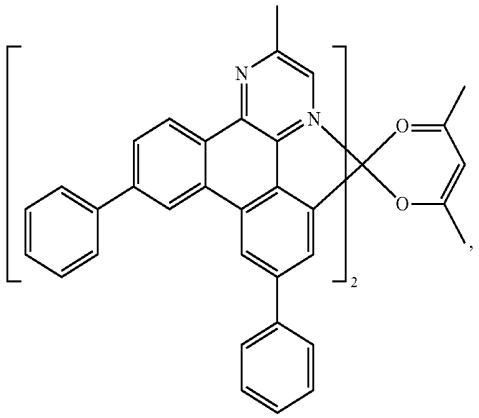

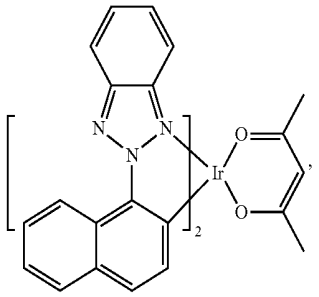

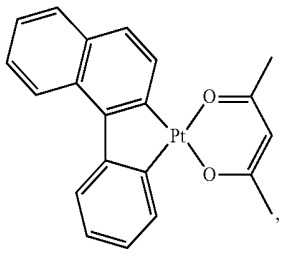

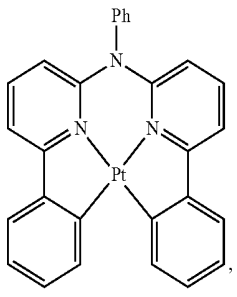

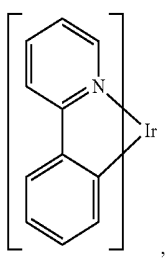

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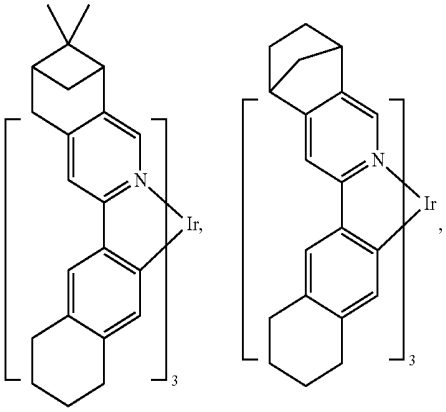

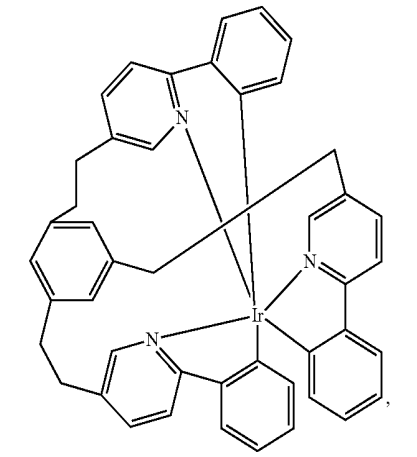

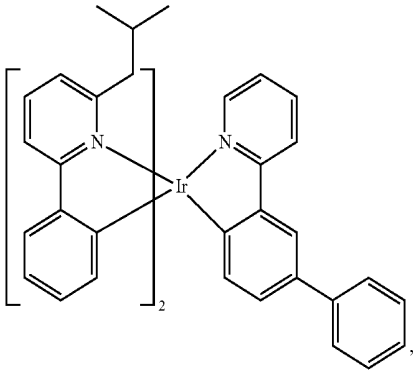

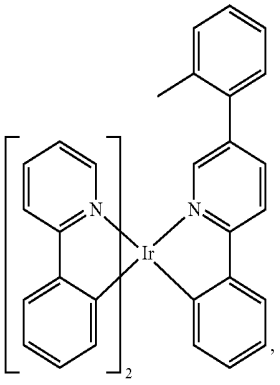

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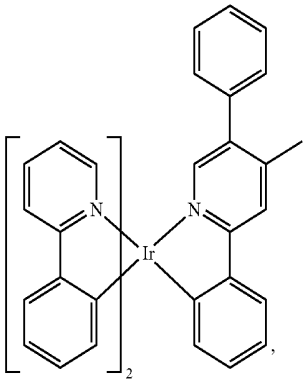

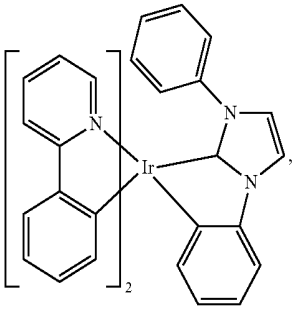

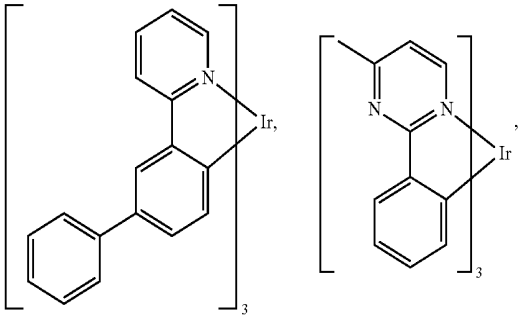

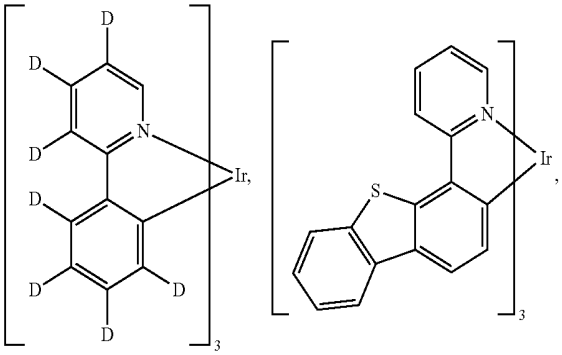

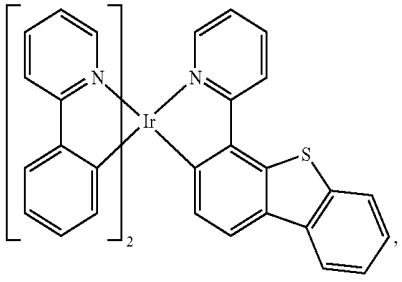

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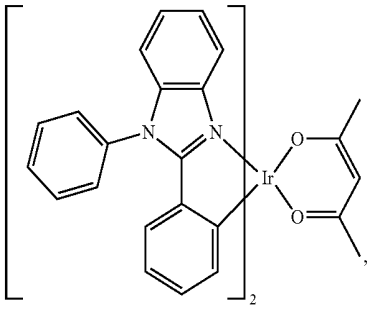

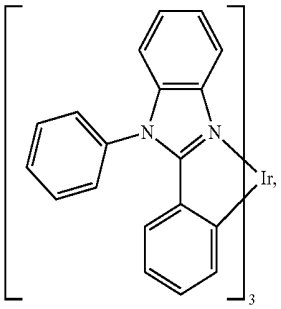

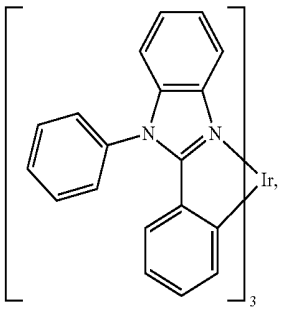

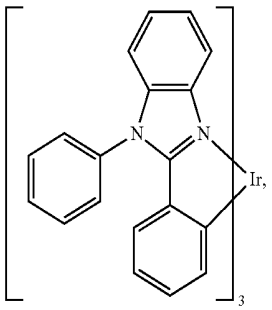

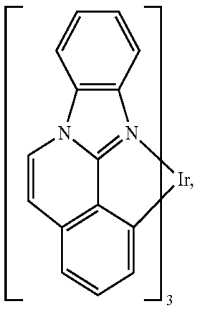

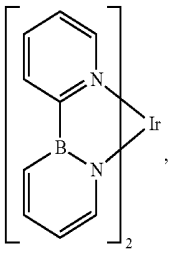

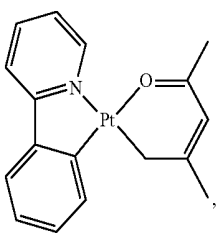

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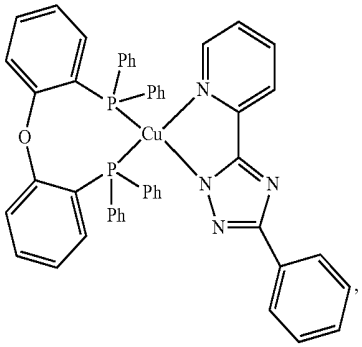

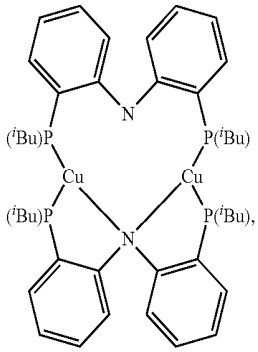

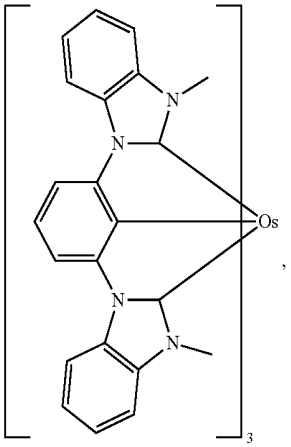

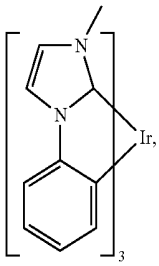

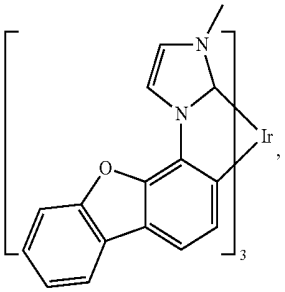

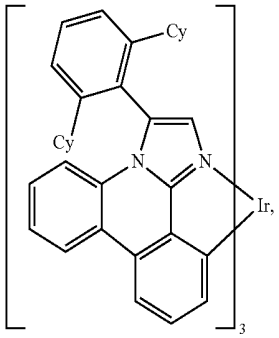

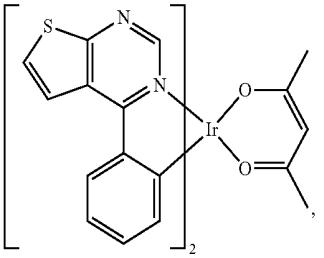

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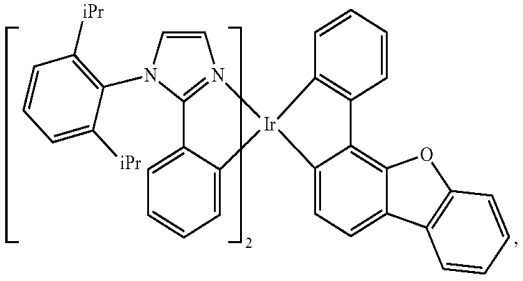

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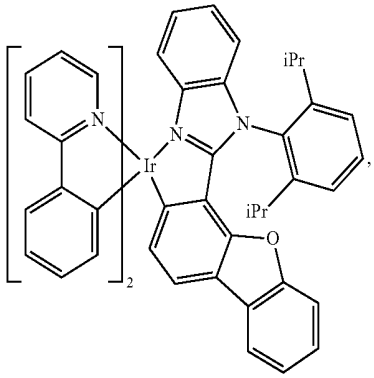

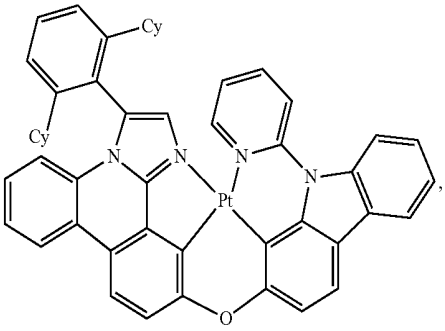

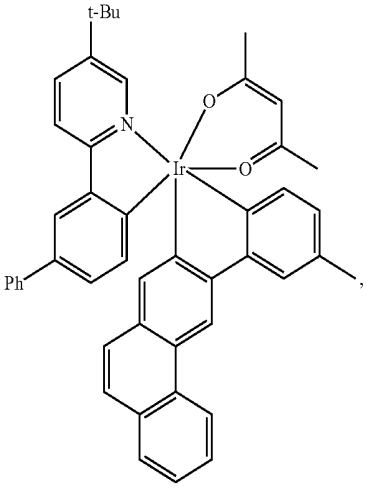

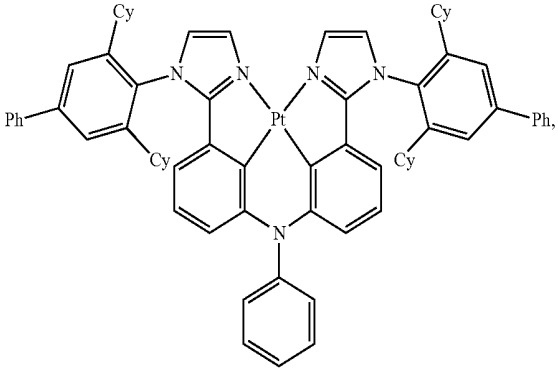

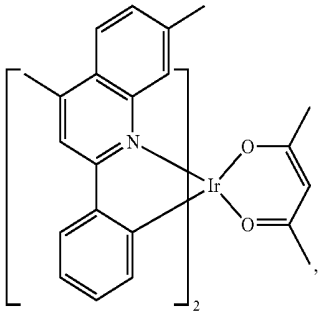

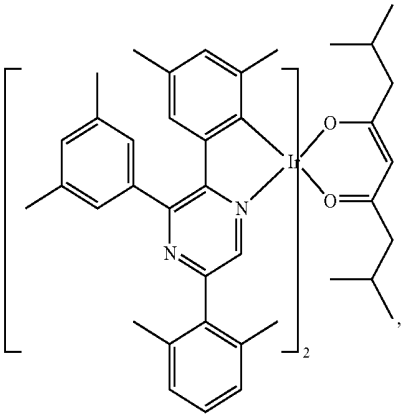

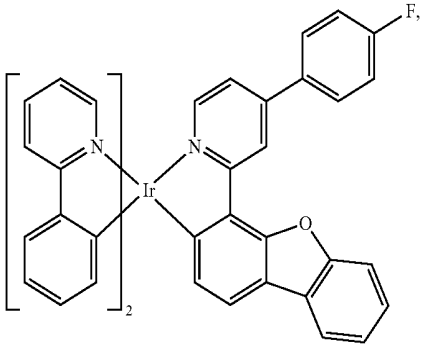

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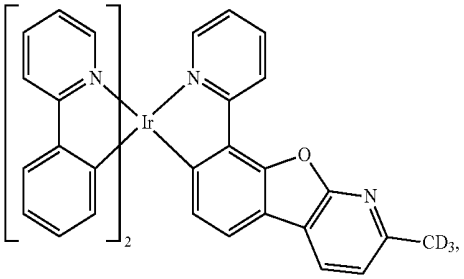

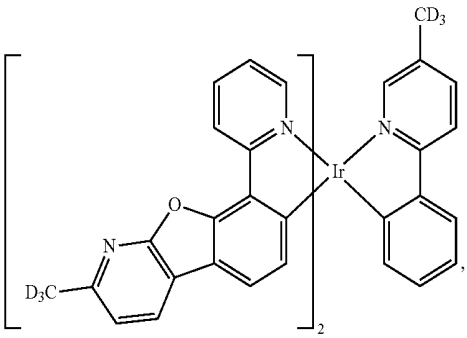

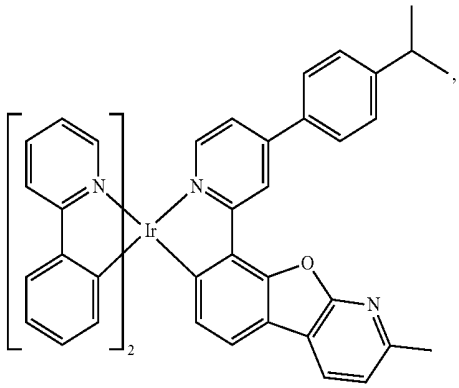

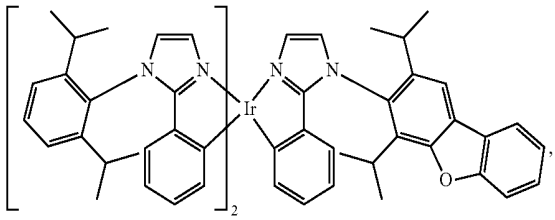

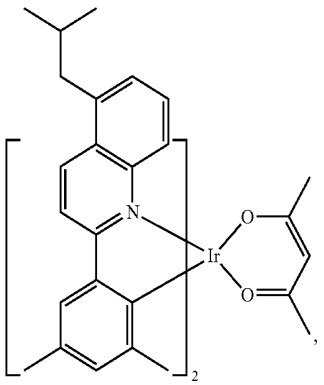

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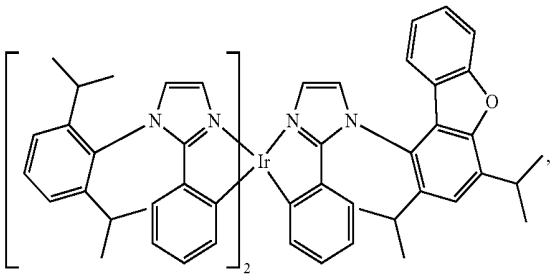

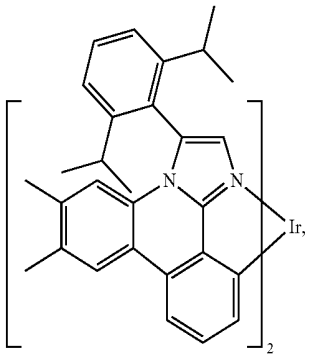

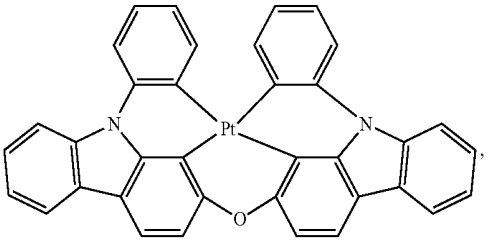

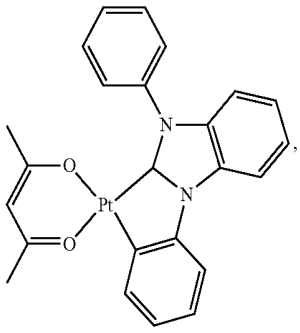

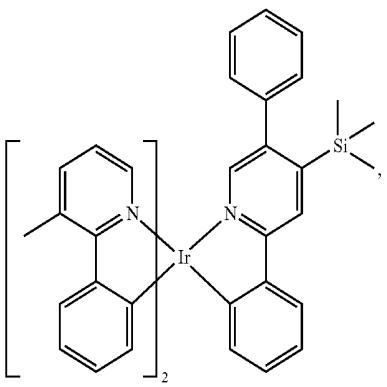

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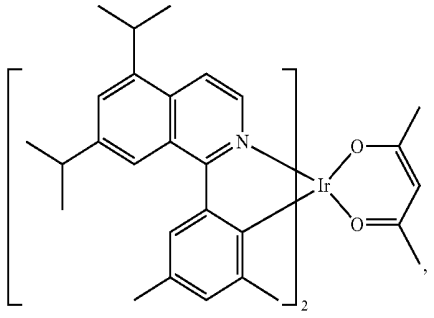

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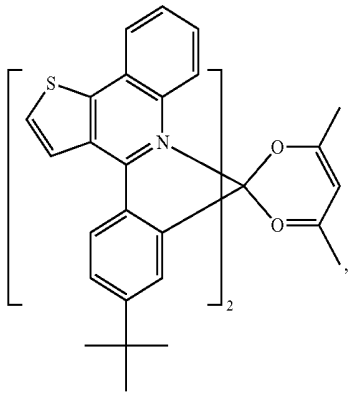

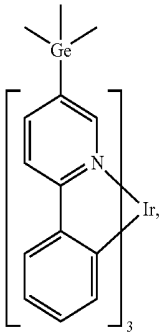

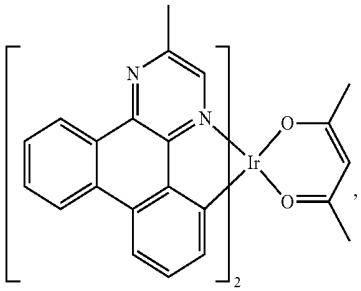

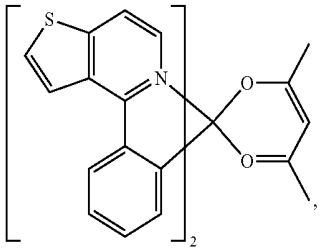

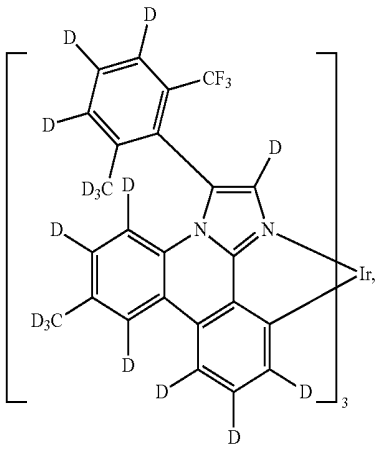

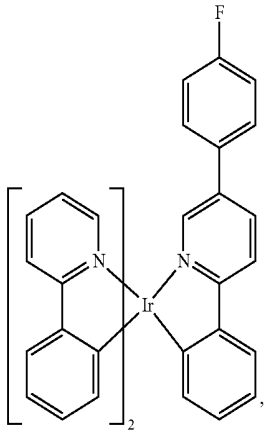

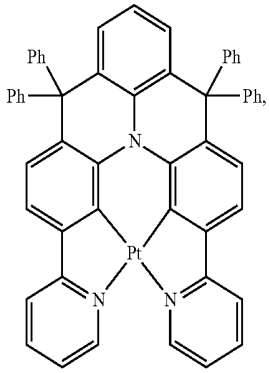

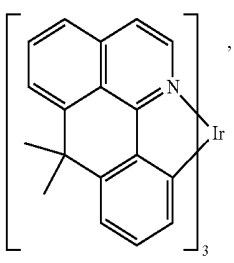

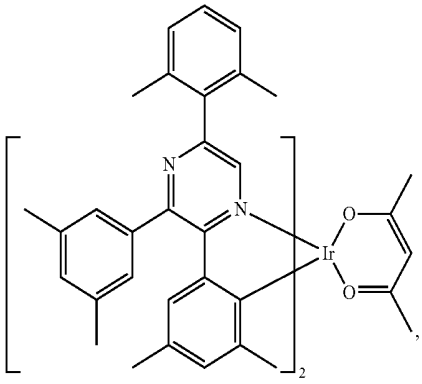

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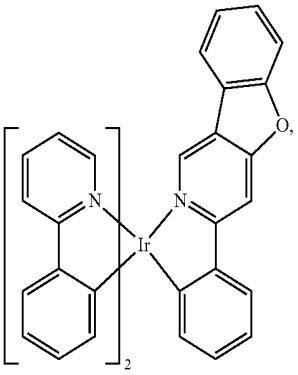

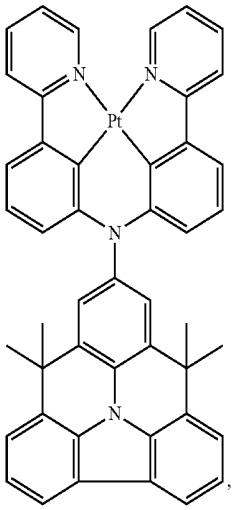

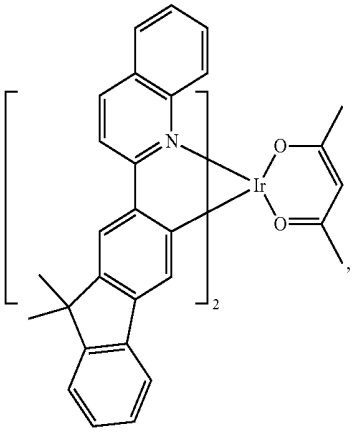

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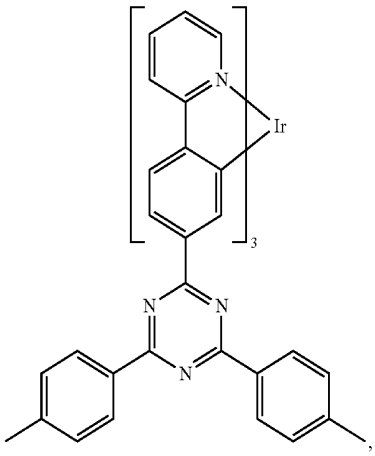

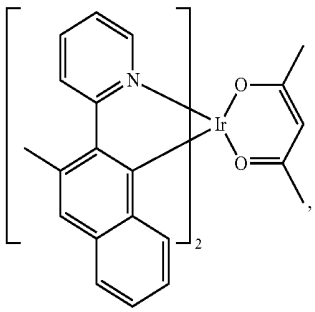

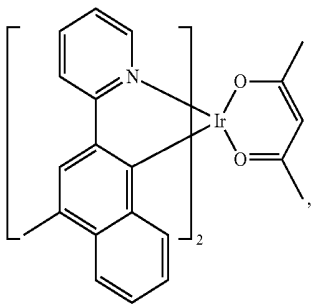

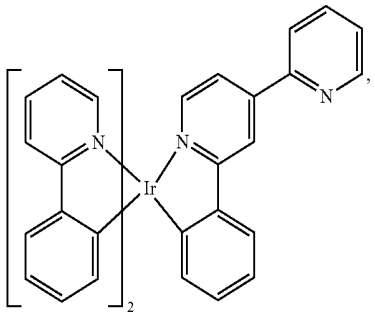

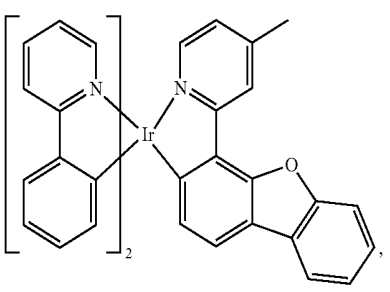

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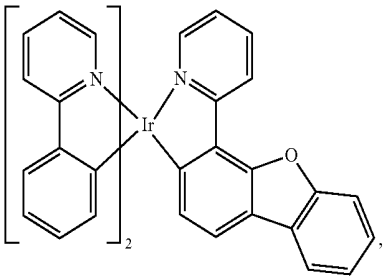

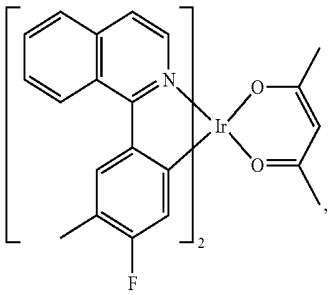

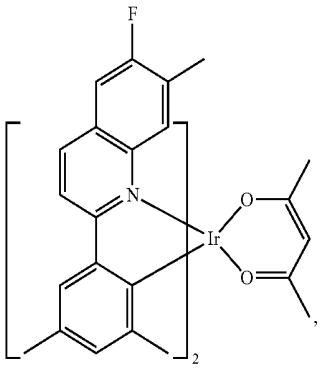

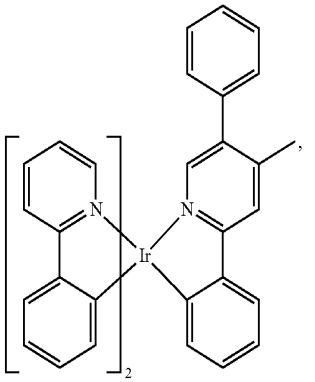

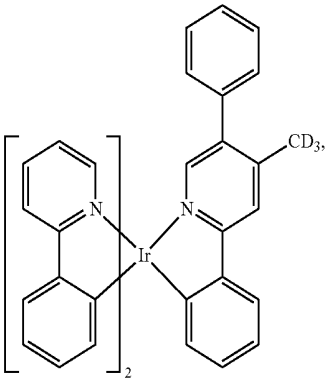

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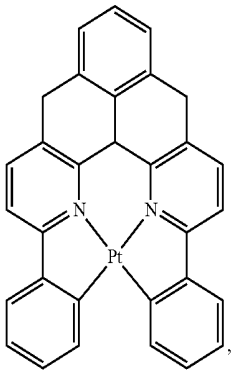

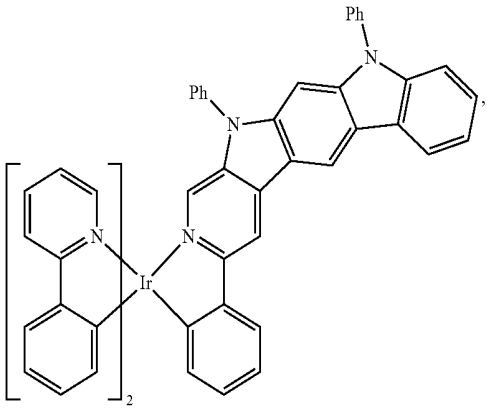

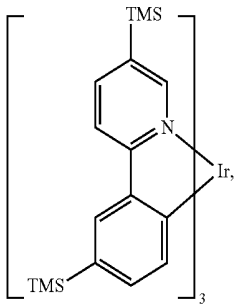

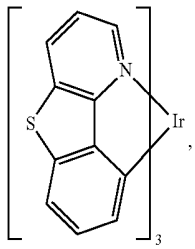

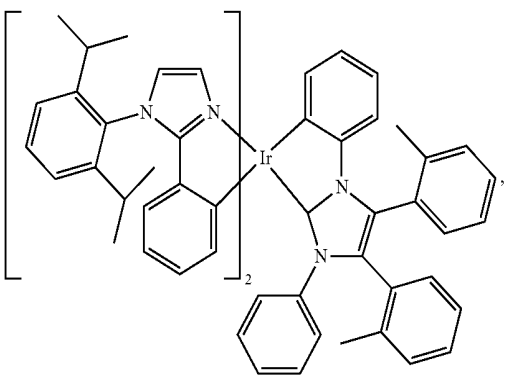

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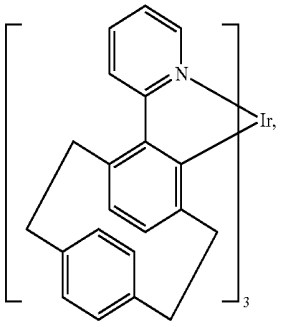

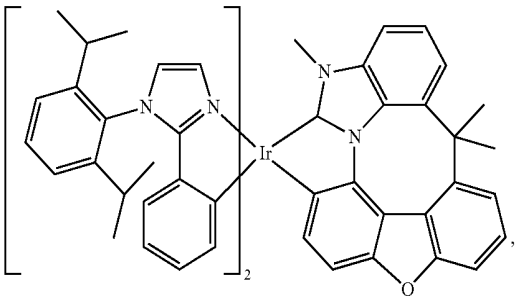

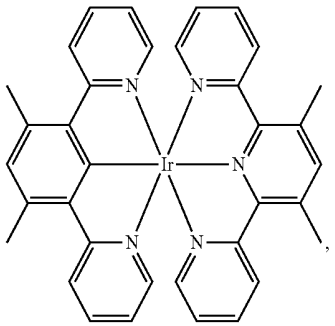

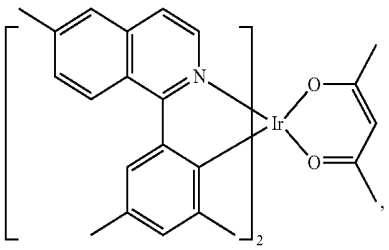

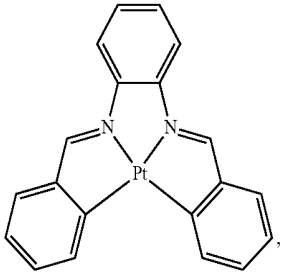

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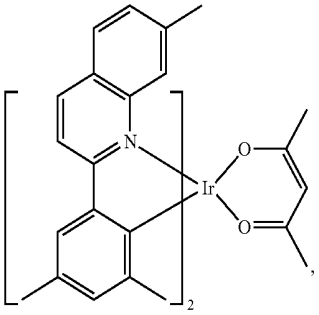

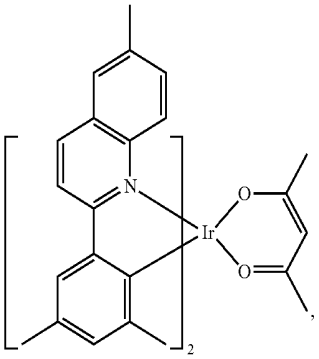

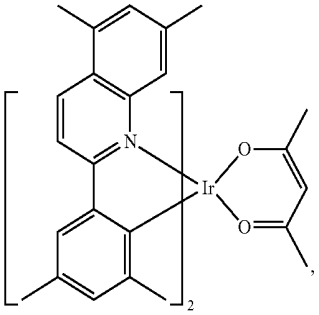

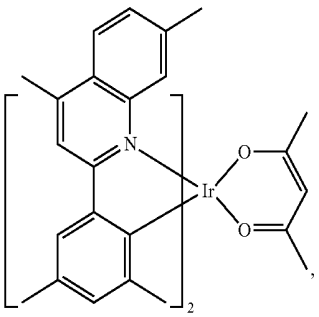

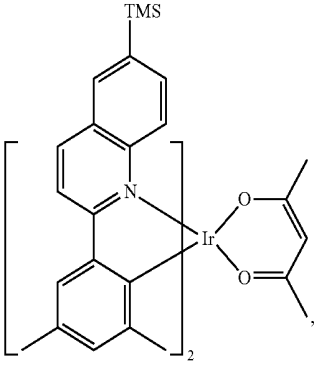

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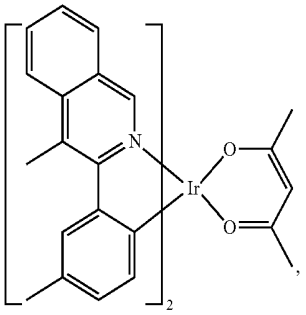

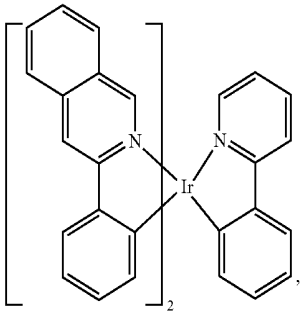

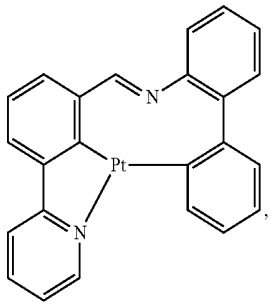

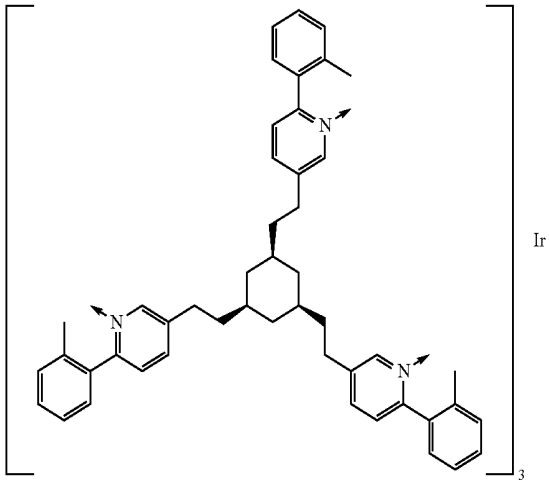

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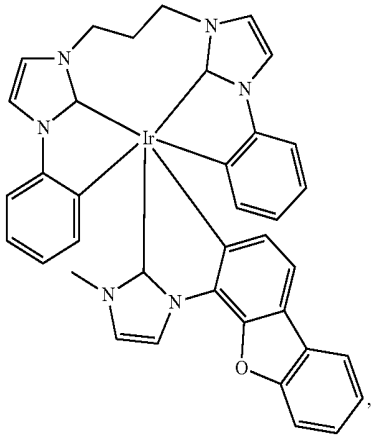

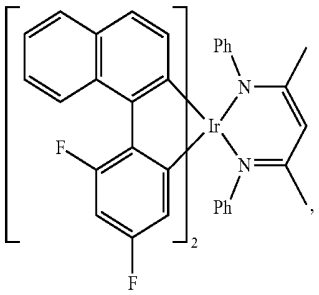

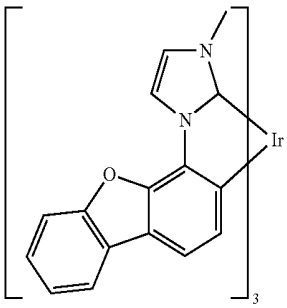

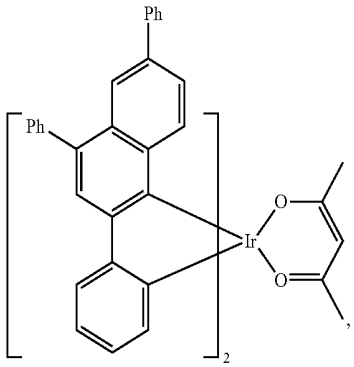

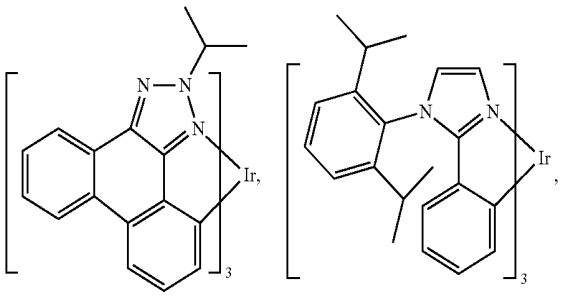

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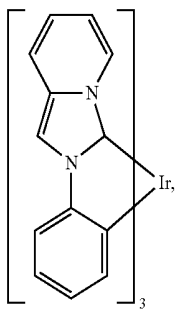

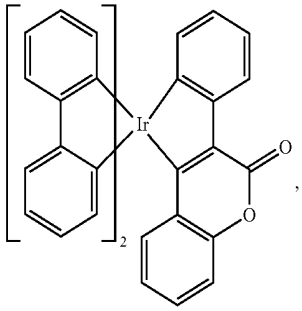

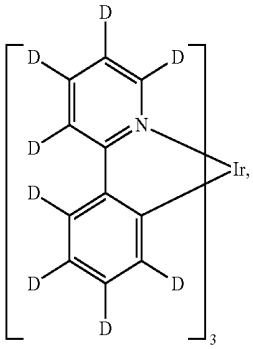

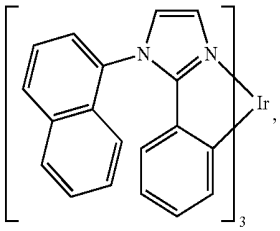

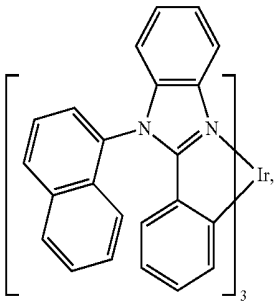

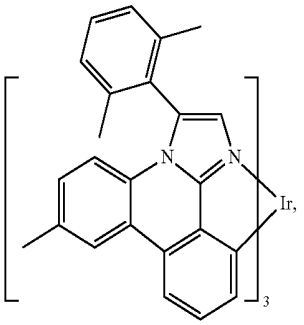

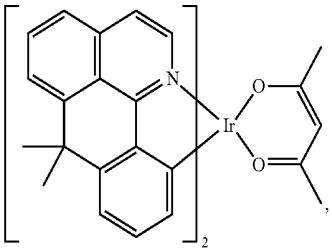

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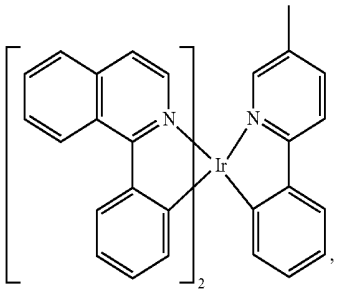
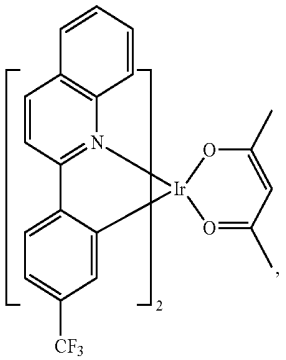
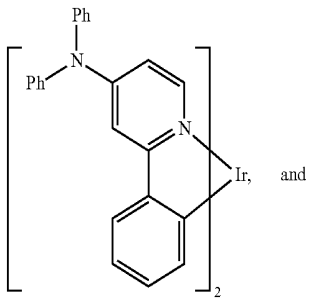
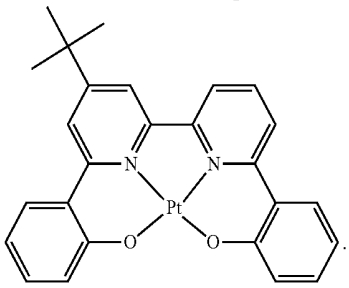






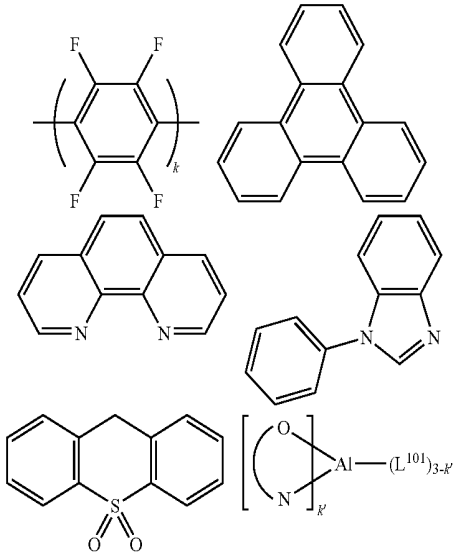


HBL:

[0182] A hole blocking layer (HBL) may be used to reduce the number of holes and/or excitons that leave the emissive layer. The presence of such a blocking layer in a device may result in substantially higher efficiencies and/or longer lifetime as compared to a similar device lacking a blocking layer. Also, a blocking layer may be used to confine emission to a desired region of an OLED. In some embodiments, the HBL material has a lower HOMO (further from the vacuum level) and or higher triplet energy than the emitter closest to the HBL interface. In some embodiments, the HBL material has a lower HOMO (further from the vacuum level) and or higher triplet energy than one or more of the hosts closest to the HBL interface.

[0183] In one aspect, compound used in HBL contains the same molecule or the same functional groups used as host described above.

[0184] In another aspect, compound used in HBL contains at least one of the following groups in the molecule:

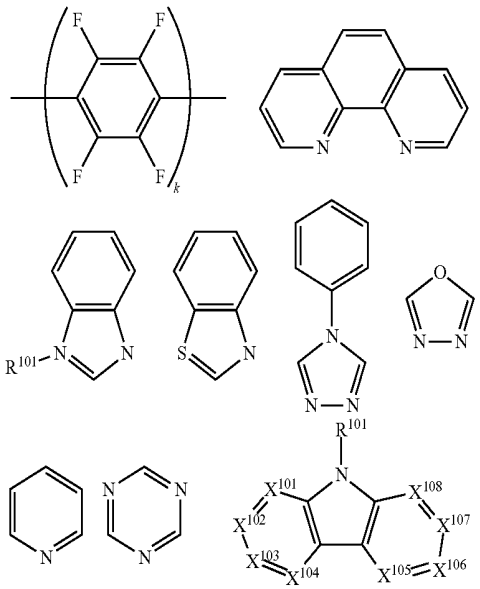


wherein k is an integer from 1 to 20; L is an another ligand, k' is an integer from 1 to 3.

ETL:

[0185] Electron transport layer (ETL) may include a material capable of transporting electrons. Electron transport layer may be intrinsic (undoped), or doped. Doping may be used to enhance conductivity. Examples of the ETL material are not particularly limited, and any metal complexes or organic compounds may be used as long as they are typically used to transport electrons.

[0186] In one aspect, compound used in ETL contains at least one of the following groups in the molecule:



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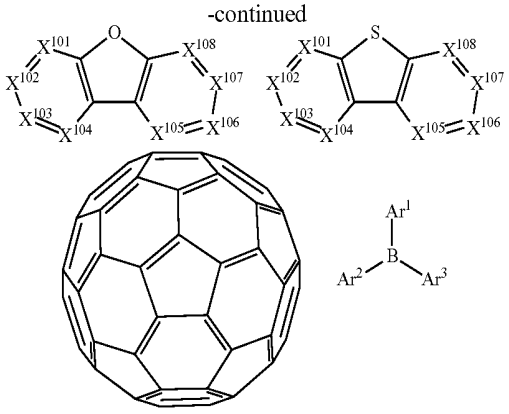
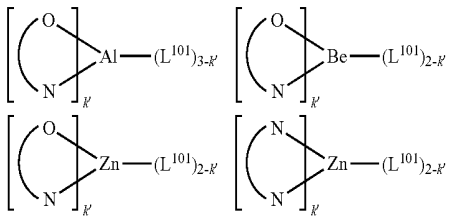


wherein R^{101} is selected from the group consisting of hydrogen, deuterium, halogen, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, alkynyl, aryl, heteroaryl, acyl, carboxylic acids, ether, ester, nitrile, isonitrile, sulfanyl, sulfinyl, sulfonyl, phosphino, and combinations thereof, when it is aryl or heteroaryl, it has the similar definition as Ar's mentioned above. Ar^1 to Ar^3 has the similar definition as Ar's mentioned above. k is an integer from 1 to 20. X^{101} to X^{108} is selected from C (including CH) or N.

[0187] In another aspect, the metal complexes used in ETL include, but are not limited to the following general formula:



wherein (O—N) or (N—N) is a bidentate ligand, having metal coordinated to atoms O, N or N, N; L^{101} is another ligand; k' is an integer value from 1 to the maximum number of ligands that may be attached to the metal.

[0188] Non-limiting examples of the ETL materials that may be used in an OLED in combination with materials disclosed herein are exemplified below together with references that disclose those materials: CN103508940, EP01602648, EP01734038, EP01956007, JP2004-022334, JP2005149918, JP2005-268199, KR0117693, KR20130108183, US20040036077, US20070104977, US2007018155, US20090101870, US20090115316, US20090140637, US20090179554, US2009218940, US2010108990, US2011156017, US2011210320, US2012193612, US2012214993, US2014014925, US2014014927, US20140284580, U.S. Pat. Nos. 6,656,612, 8,415,031, WO2003060956, WO2007111263, WO2009148269, WO2010067894, WO2010072300, WO2011074770, WO2011105373, WO2013079217, WO2013145667, WO2013180376, WO2014104499, WO2014104535,

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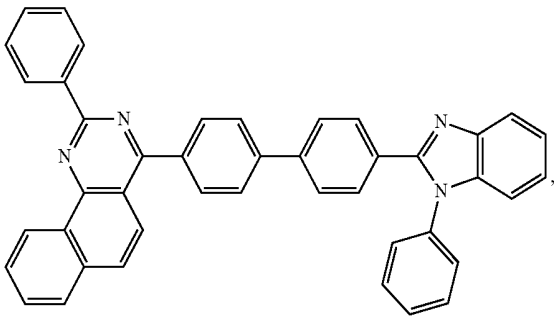

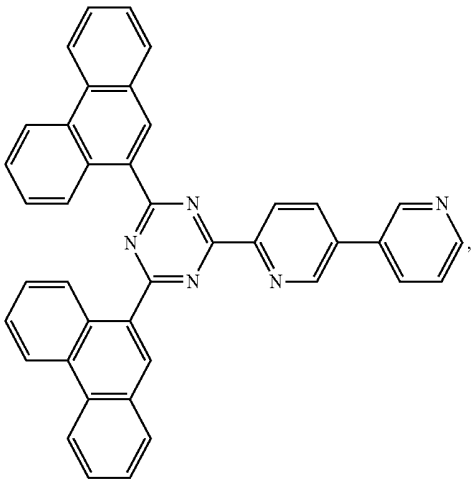

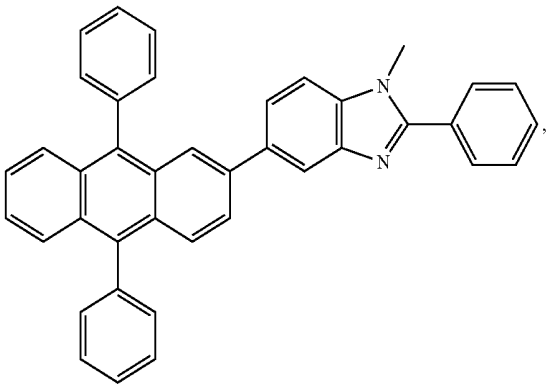

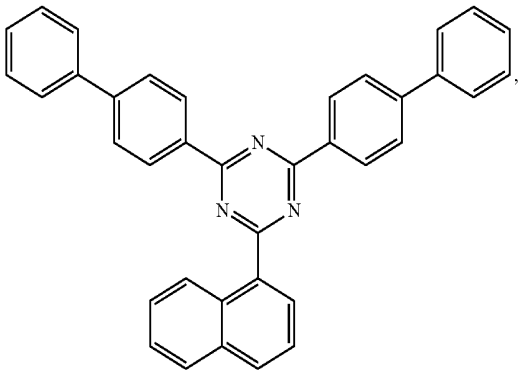

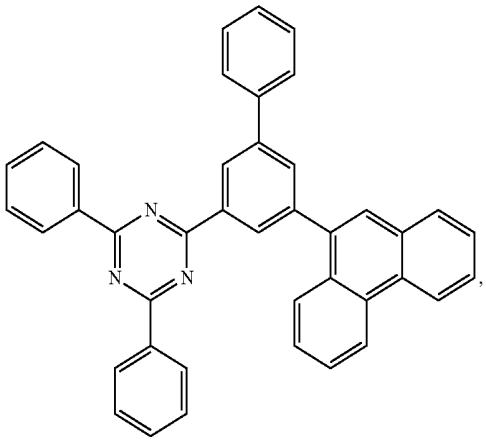

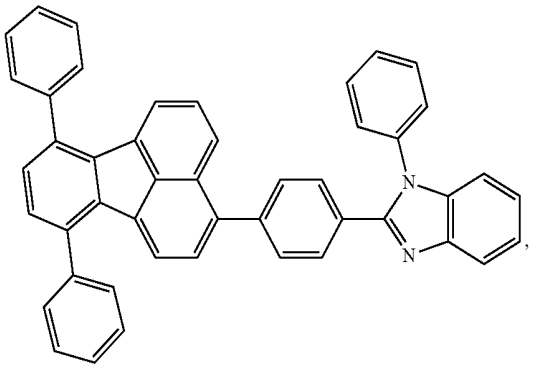

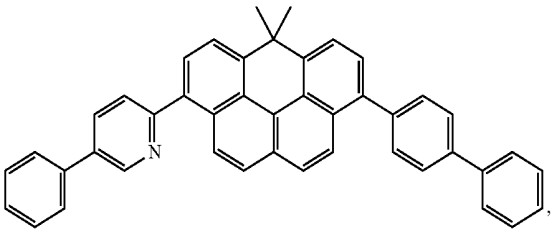

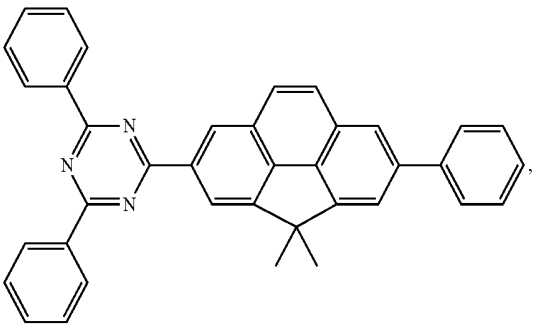

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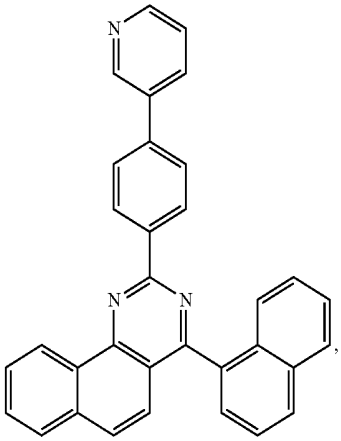

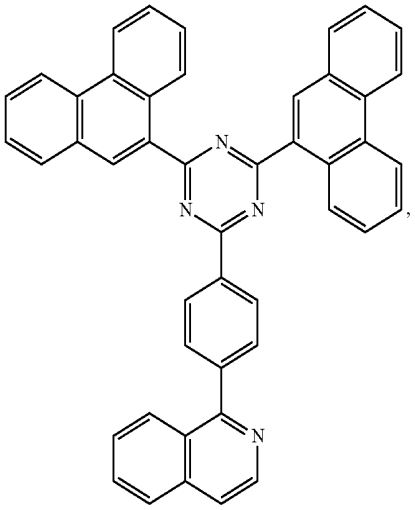

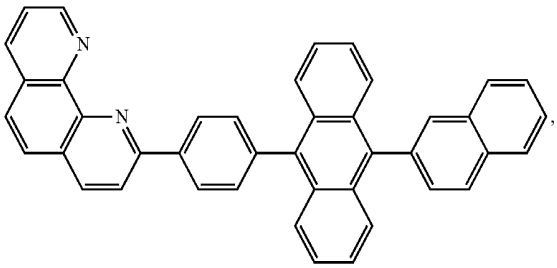

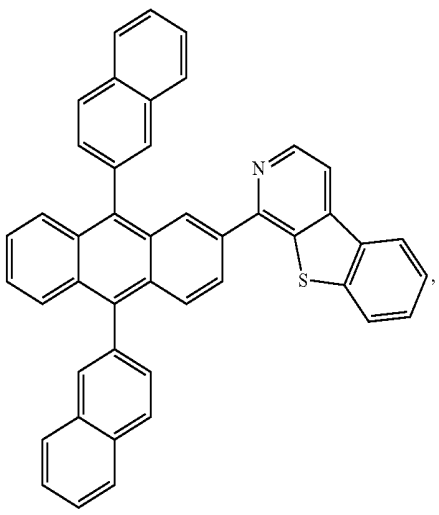

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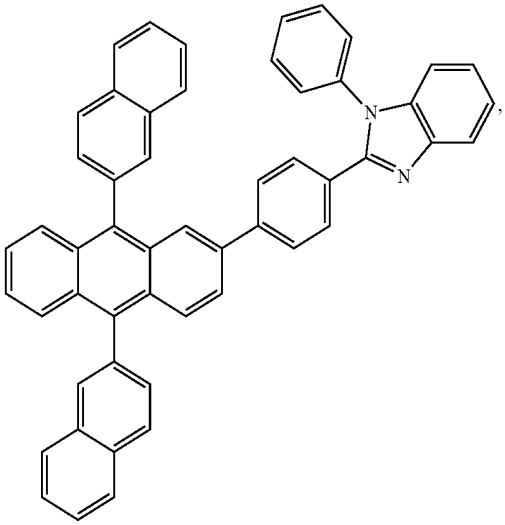

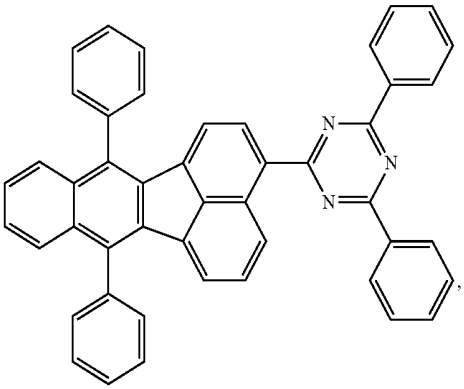

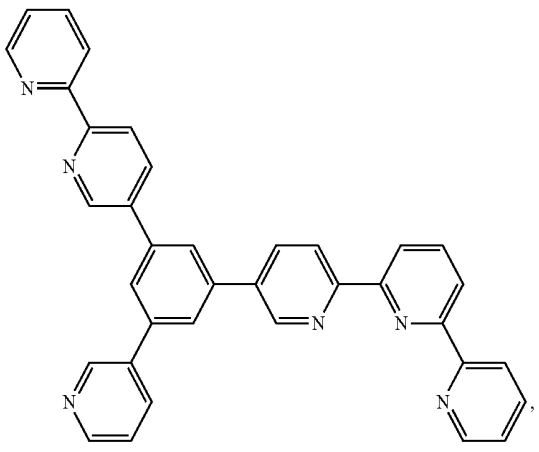

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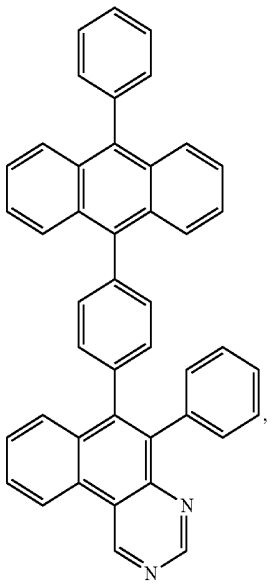

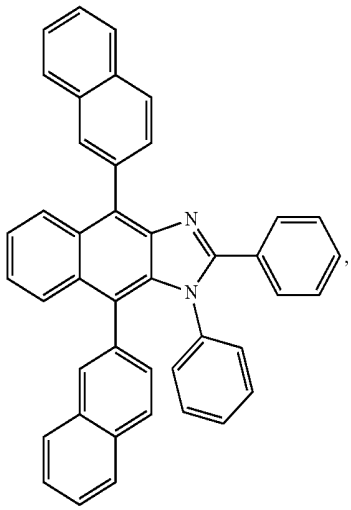

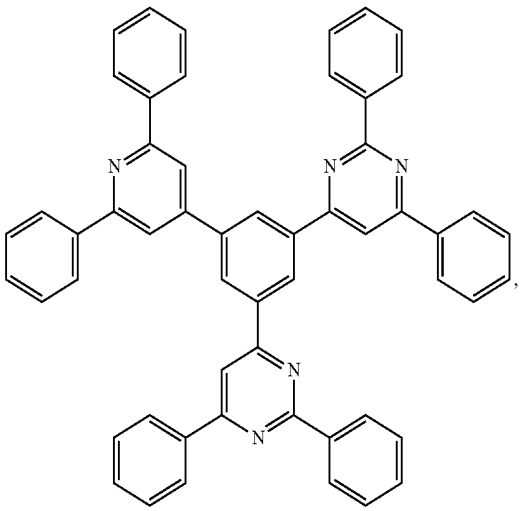

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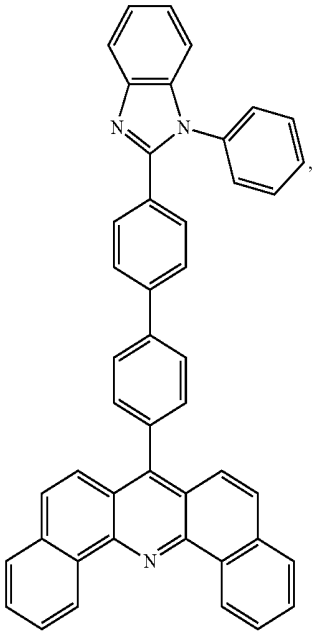

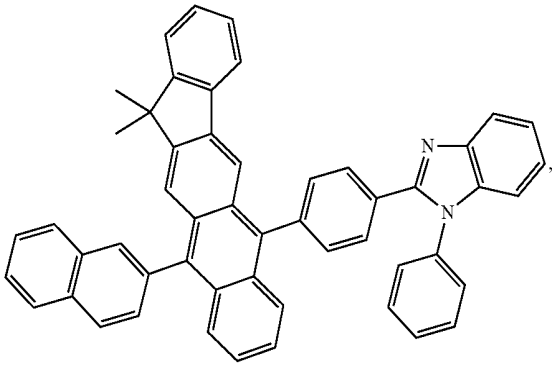

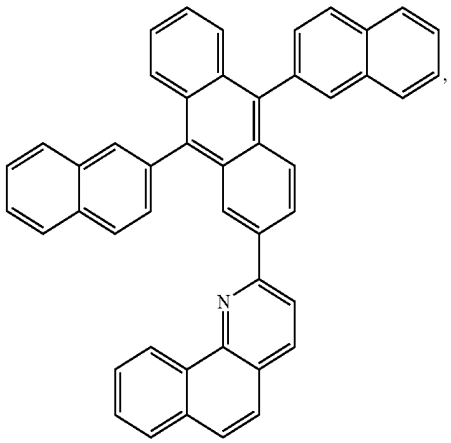

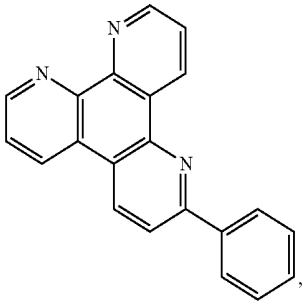

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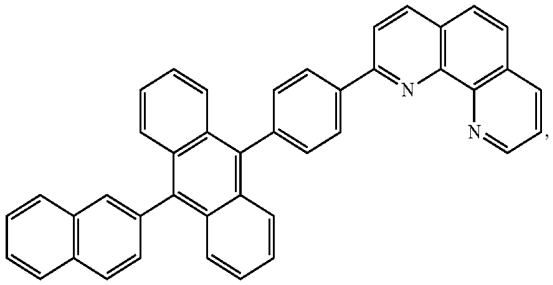

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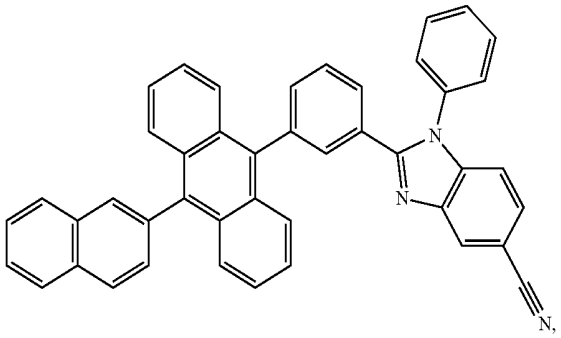

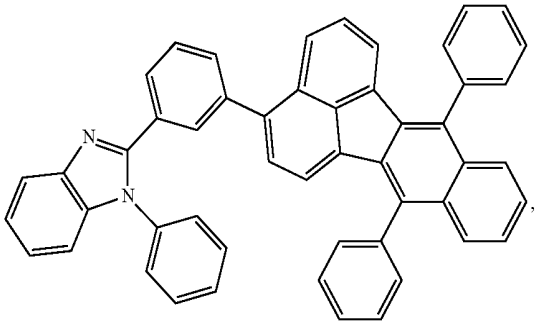

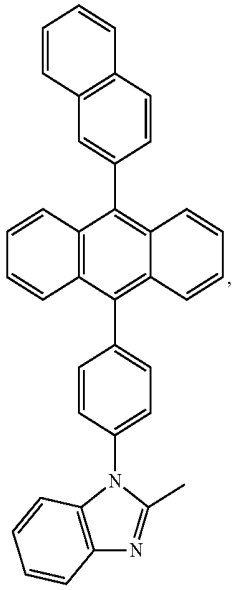

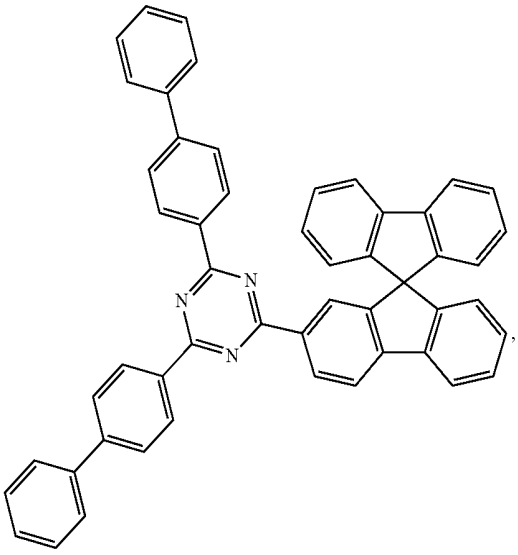

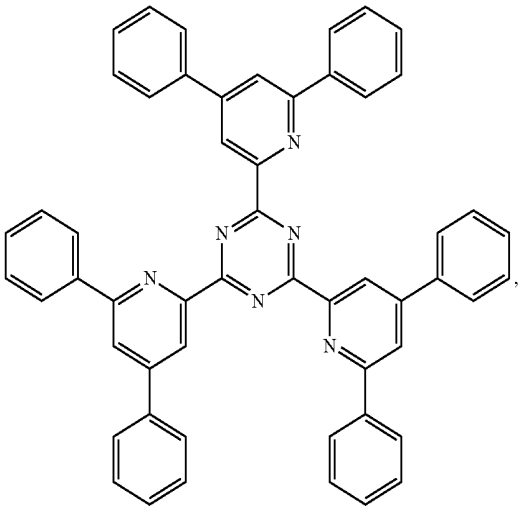

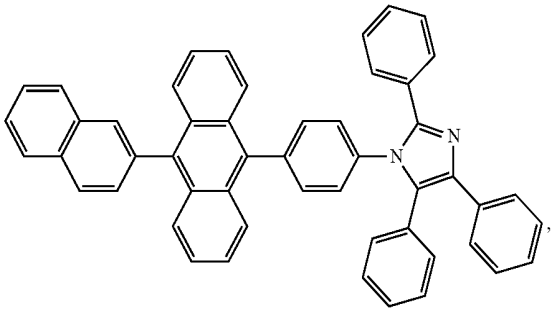

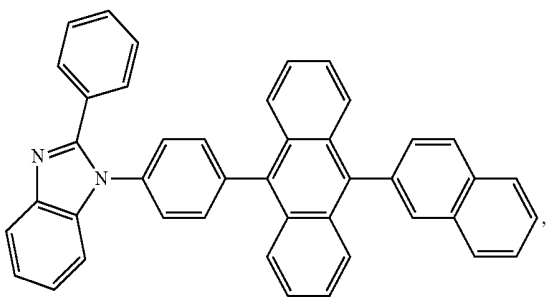

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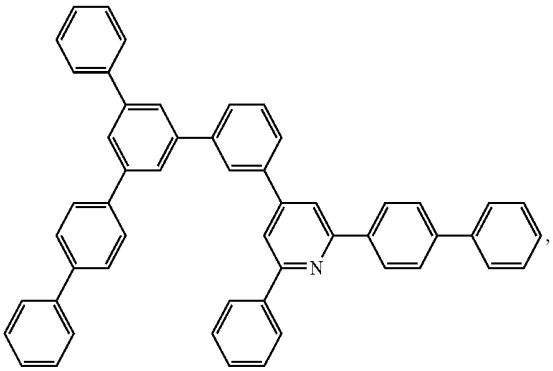

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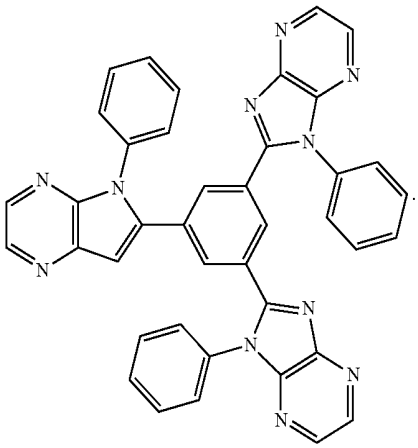
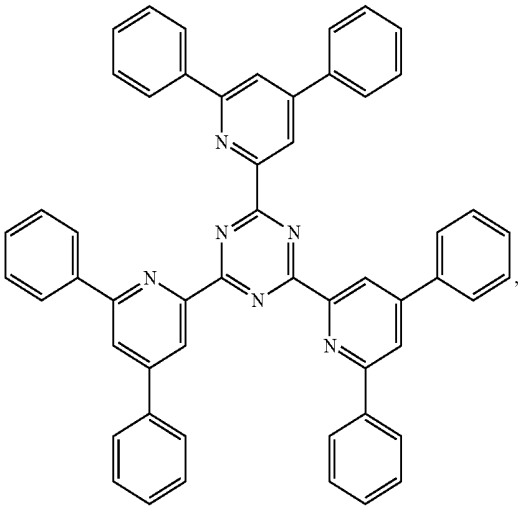
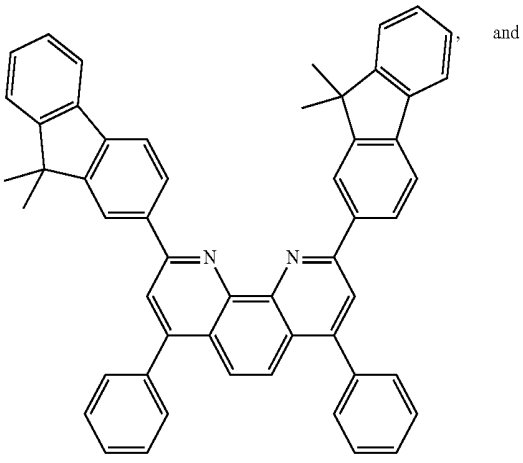




Charge Generation Layer (CGL)

[0189] In tandem or stacked OLEDs, the CGL plays an essential role in the performance, which is composed of an n-doped layer and a p-doped layer for injection of electrons and holes, respectively. Electrons and holes are supplied from the CGL and electrodes. The consumed electrons and holes in the CGL are refilled by the electrons and holes injected from the cathode and anode, respectively; then, the bipolar currents reach a steady state gradually. Typical CGL materials include n and p conductivity dopants used in the transport layers.

[0190] In any above-mentioned compounds used in each layer of the OLED device, the hydrogen atoms can be partially or fully deuterated. Thus, any specifically listed substituent, such as, without limitation, methyl, phenyl, pyridyl, etc. encompasses undeuterated, partially deuterated, and fully deuterated versions thereof. Similarly, classes of substituents such as, without limitation, alkyl, aryl, cycloalkyl, heteroaryl, etc. also encompass undeuterated, partially deuterated, and fully deuterated versions thereof.



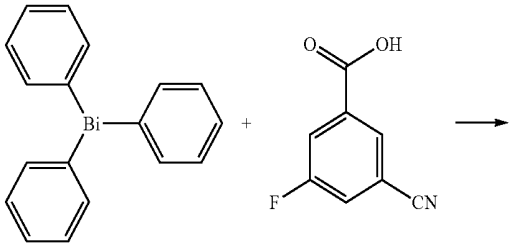
and

EXPERIMENTAL

Materials Synthesis

Tris(3-cyano-5-fluorobenzocarboxy)bismuth(III) ($Bi(L_{B1}L_{A2464})_3$)

[0191]



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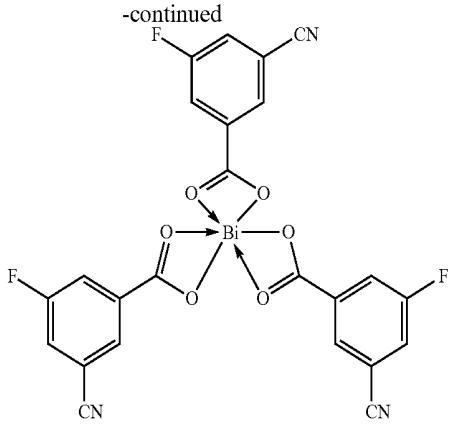
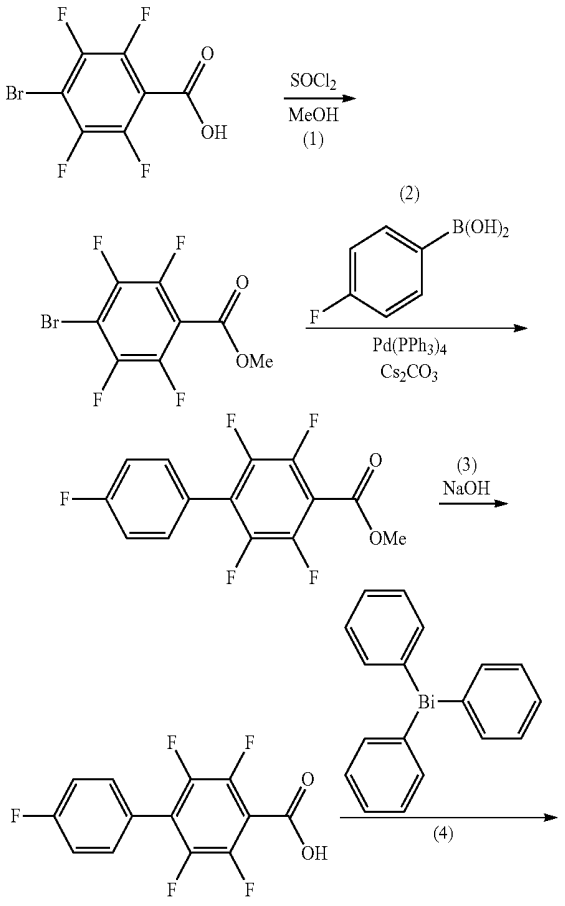


[0192] A suspension of triphenylbismuthane (2.6 g, 5.87 mmol, 1.0 equiv) and 3-cyano-5-fluorobenzoic acid (3.0 g, 18.2 mmol, 3.1 equiv) in toluene (75 mL) was heated at reflux for 18 hours. The suspension was cooled to room temperature (~22° C.) then filtered. The solids were dried in a vacuum oven at 80° C. for 96 hours to give tris(3-cyano-5-fluorobenzocarboxy)bismuth(III) (3.50 g, 58% yield) as a white solid.

Tris(2,3,4',5,6-pentafluoro-[1,1'-biphenyl]-4-carboxy)bismuth(III) ($Bi(L_{B1}L_{A3132})_3$)

[0193]



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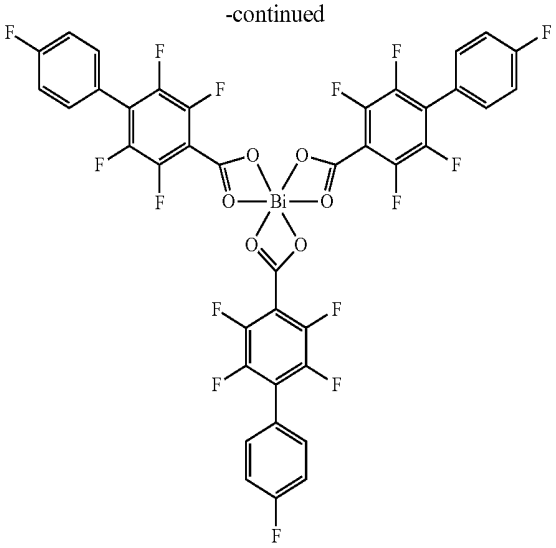


Reaction (1)—Methyl 4-bromo-2,3,5,6-tetrafluorobenzoate

[0194] Thionyl chloride (5 mL, 66 mmol, 2.0 equiv) was added dropwise to a solution of 4-bromo-2,3,5,6-tetrafluorobenzoic acid (9 g, 33 mmol, 1.0 equiv) in methanol (150 mL) and the reaction mixture heated at reflux for 30 hours. The reaction mixture was cooled to room temperature and concentrated under reduced pressure. The residue was then concentrated from toluene (2×10 volumes) to give methyl 4-bromo-2,3,5,6-tetrafluorobenzoate (10 g, >100% yield) as an off white solid.

Reaction (2)—Methyl 2,3,4',5,6-pentafluoro-[1,1'-biphenyl]-4-carboxylate

[0195] Methyl 4-bromo-2,3,5,6-tetrafluorobenzoate (9 g, 31.4 mmol, 1.0 equiv) and 4-fluoro-phenylboronic acid (6.6 g, 47 mmol, 1.5 equiv) were suspended in toluene (111 mL). Cesium carbonate (30.6 g, 94 mmol, 3.0 equiv) and water (21 mL) were added and the reaction mixture was sparged with nitrogen for 10 minutes. Tetra-kis(triphenylphosphine) palladium(0) ($Pd(PPh_3)_4$, 3.6 g, 3.1 mmol, 0.1 equiv) was added and the reaction mixture heated at reflux for 18 hours. The reaction mixture was cooled, the layers separated, and the aqueous phase was extracted with toluene (2×10 mL). The combined organic phases were dried over sodium sulfate. The resulting suspension was stirred for 30 minutes, filtered through silica gel (50 g) and the filtrate concentrated under reduced pressure to give impure product. The impure product (10.5 g) was chromatographed on silica gel (100 g), eluting with 5% ethyl acetate in heptanes. Product fractions were concentrated under reduced pressure to give 8.8 g of product. Recrystallization of the material from 5% ethyl acetate in heptanes gave methyl 2,3,4',5,6-pentafluoro-[1,1'-biphenyl]-4-carboxylate (6.0 g, 68% yield) as a white solid.

[0196] Reaction (3)—2,3,4',5,6-Pentafluoro-[1,1'-biphenyl]-4-carboxylic acid:

[0197] A solution of sodium hydroxide (6.5 g, 165 mmol, 10 equiv) in water (35 mL) was added to a solution of methyl 2,3,4',5,6-pentafluoro-[1,1'-biphenyl]-4-carboxylate (5 g, 16.5 mmol, 1.0 equiv) in tetrahydrofuran (100 mL) and the reaction mixture heated at reflux for 5 hours. The reaction

mixture was concentrated and diluted with water (100 mL). The suspension was acidified to pH~3 with 5M sulfuric acid then cooled to 10° C. The suspension was filtered and the solids washed with water (3×50 mL). The isolated solids were azeotropically concentrated from toluene (3×100 mL) to give 2,3,4',5,6-pentafluoro-[1,1'-biphenyl]-4-carboxylic acid (4.6 g, 96% yield) as a white solid.

Reaction (4)—Tris(2,3,4',5,6-pentafluoro-[1,1'-biphenyl]-4-carboxy)bismuth(III) ($Bi(L_{B1}L_{A3132})_3$)

[0198] A suspension of triphenylbismuthine (2.35 g, 5.34 mmol, 1.0 equiv) and 2,3,4',5,6-pentafluoro-[1,1'-biphenyl]-4-carboxylic acid (4.6 g, 16 mmol, 3.0 equiv) in toluene (75 mL) was heated at reflux for 18 hours. The cooled suspension was filtered. The solids were then washed with toluene (3×10 mL) and dried in a vacuum oven at 80° C. for 16 hours to give tris(2,3,4',5,6-pentafluoro-[1,1'-bi-phenyl]-4-carboxy)bismuth(III) (5.1 g, 89% yield) as an off white solid.

[0199] It is understood that the various embodiments described herein are by way of example only, and are not intended to limit the scope of the invention. For example, many of the materials and structures described herein may be substituted with other materials and structures without deviating from the spirit of the invention. The present invention as claimed may therefore include variations from the particular examples and preferred embodiments described herein, as will be apparent to one of skill in the art. It is understood that various theories as to why the invention works are not intended to be limiting.

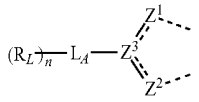
We claim:

1. A compound having a stoichiometry formula of BiL_3;

wherein Bi is Bi (III), L is mono-anionic bidentate ligand;

wherein each L can be same or different;

wherein L has the following formula:



wherein each Z^1 and Z^2 is independently selected from the group consisting of O, S, NR, and PR;

wherein Z^3 is C;

wherein Z^1 and Z^2 coordinate to Bi atom;

wherein L_A is aryl or heteroaryl, which can be further substituted by one or more substituent R_L;

wherein each R is independently hydrogen or a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, heteroaryl, and combinations thereof;

wherein each R_L is independently a substituent selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, heteroaryl, nitrile, and combinations thereof;

wherein n is an integer from 0 to the maximum allowable substitutions;

wherein at least one of the following conditions is true:

(1) L_A comprises at least one 5-membered ring;

(2) L_A comprises a condensed ring system having at least three rings fused together;

(3) n is at least 1 and at least one R_L is a non-fused aryl or heteroaryl moiety; or

(4) n is at least 2 with two different R_L and the L_A-(R_L)n moiety is not symmetrical along the axis of Z^3 and the atom from L_A attaching to Z^3.

2. The compound of claim **1**, wherein at least one of the following is true: (i) Z^1 and Z^2 are O, (ii) Z^1 and Z^2 are NR, and (iii) one of Z^1 and Z^2 is O, the other one of Z^1 and Z^2 is NR.

3. The compound of claim **1**, wherein each R is independently selected from the group consisting of aryl, heteroaryl, and combination thereof.

4. The compound of claim **1**, wherein the compound has a formula of BiL_3, or Bi_2L_6.

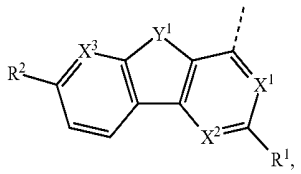
5. The compound of claim **1**, wherein L_A is a benzene, n is at least 1, and a sum of Hammett constant for the substituents R_L is larger than 0.50 and smaller than 1.20.

6. The compound of claim **1**, wherein at least one of the following is true: (i) all three Ls of the stoichiometric formula BiL_3 are the same, (ii) at least one L of the stoichiometric formula BiL_3 is different from the other two L, and (iii) all three Ls of the stoichiometric formula BiL_3 are different from each other.

7. The compound of claim **1**, wherein L_A comprises at least one of the chemical moiety selected from the group consisting of phenyl, biphenyl, terphenyl, carbazole, indolocarbazole, triphenylene, fluorene, benzothiophene, benzofuran, benzoselenophene, dibenzothiophene, dibenzofuran, dibenzoselenophene, nitrile, isonitrile, borane, fluoride, pyridine, pyrimidine, pyrazine, triazine, aza-carbazole, aza-dibenzothiophene, aza-dibenzofuran, aza-dibenzoselenophene, aza-triphenylene, imidazole, pyrazole, oxazole, thiazole, isoxazole, isothiazole, triazole, thiadiazole, and oxadiazole.

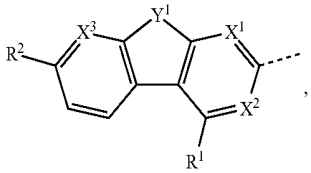
8. The compound of claim **1**, wherein the L_A-(R_L)n moiety is selected from the group consisting of L_{Ai}, where i is an integer from 1 to 3735; wherein

ligands L_{A1} to L_{A408} are based on a structure of Formula I,



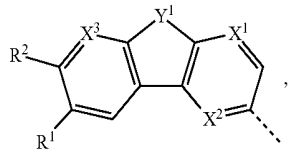
where i=m;

ligands L_{A409} to L_{A816} are based on a structure of Formula II



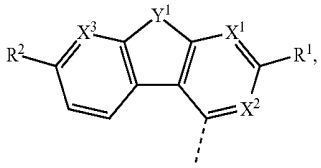
where i=408+m;

ligands L_{A817} to L_{A1224} are based on a structure of Formula III



where i=816+m;

ligands L_{A1225} to L_{A1632} are based on a structure of Formula IV



where i=1224+m;

wherein m is an integer from 1 to 408 and for each m, X^1, X^2, X^3, R^1, R^2, and Y^1 are defined in formulas I, II, III, and IV as follows:

m	X^1	X^2	X^3	R^1	R^2	Y^1
205	CH	CH	CH	H	H	S
206	CH	CH	CH	R^{A1}	H	S
207	CH	CH	CH	R^{A2}	H	S
208	CH	CH	CH	R^{A3}	H	S
209	CH	CH	CH	R^{A4}	H	S
210	CH	CH	CH	R^{A5}	H	S
211	CH	CH	CH	R^{A6}	H	S
212	CH	CH	CH	R^{A7}	H	S
213	CH	CH	CH	R^{A8}	H	S
214	CH	CH	CH	H	R^{A1}	S
215	CH	CH	CH	H	R^{A2}	S
216	CH	CH	CH	H	R^{A3}	S
217	CH	CH	CH	H	R^{A4}	S
218	CH	CH	CH	H	R^{A5}	S
219	CH	CH	CH	H	R^{A6}	S
220	CH	CH	CH	H	R^{A7}	S
221	CH	CH	CH	H	R^{A8}	S
222	N	CH	CH	H	H	S
223	N	CH	CH	R^{A1}	H	S
224	N	CH	CH	R^{A2}	H	S
225	N	CH	CH	R^{A3}	H	S
226	N	CH	CH	R^{A4}	H	S
227	N	CH	CH	R^{A5}	H	S
228	N	CH	CH	R^{A6}	H	S
229	N	CH	CH	R^{A7}	H	S
230	N	CH	CH	R^{A8}	H	S
231	N	CH	CH	H	R^{A1}	S
232	N	CH	CH	H	R^{A2}	S
233	N	CH	CH	H	R^{A3}	S
234	N	CH	CH	H	R^{A4}	S
235	N	CH	CH	H	R^{A5}	S
236	N	CH	CH	H	R^{A6}	S
237	N	CH	CH	H	R^{A7}	S
238	N	CH	CH	H	R^{A8}	S
239	N	N	CH	H	H	S
240	N	N	CH	R^{A1}	H	S
241	N	N	CH	R^{A2}	H	S
242	N	N	CH	R^{A3}	H	S
243	N	N	CH	R^{A4}	H	S
244	N	N	CH	R^{A5}	H	S
245	N	N	CH	R^{A6}	H	S

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m	X^1	X^2	X^3	R^1	R^2	Y^1
246	N	N	CH	R^{A7}	H	S
247	N	N	CH	R^{A8}	H	S
248	N	N	CH	H	R^{A1}	S
249	N	N	CH	H	R^{A2}	S
250	N	N	CH	H	R^{A3}	S
251	N	N	CH	H	R^{A4}	S
252	N	N	CH	H	R^{A5}	S
253	N	N	CH	H	R^{A6}	S
254	N	N	CH	H	R^{A7}	S
255	N	N	CH	H	R^{A8}	S
256	CH	N	CH	H	H	S
257	CH	N	CH	R^{A1}	H	S
258	CH	N	CH	R^{A2}	H	S
259	CH	N	CH	R^{A3}	H	S
260	CH	N	CH	R^{A4}	H	S
261	CH	N	CH	R^{A5}	H	S
262	CH	N	CH	R^{A6}	H	S
263	CH	N	CH	R^{A7}	H	S
264	CH	N	CH	R^{A8}	H	S
265	CH	N	CH	H	R^{A1}	S
266	CH	N	CH	H	R^{A2}	S
267	CH	N	CH	H	R^{A3}	S
268	CH	N	CH	H	R^{A4}	S
269	CH	N	CH	H	R^{A5}	S
270	CH	N	CH	H	R^{A6}	S
271	CH	N	CH	H	R^{A7}	S
272	CH	N	CH	H	R^{A8}	S
273	CH	CH	N	H	H	S
274	CH	CH	N	R^{A1}	H	S
275	CH	CH	N	R^{A2}	H	S
276	CH	CH	N	R^{A3}	H	S
277	CH	CH	N	R^{A4}	H	S
278	CH	CH	N	R^{A5}	H	S
279	CH	CH	N	R^{A6}	H	S
280	CH	CH	N	R^{A7}	H	S
281	CH	CH	N	R^{A8}	H	S
282	CH	CH	N	H	R^{A1}	S
283	CH	CH	N	H	R^{A2}	S
284	CH	CH	N	H	R^{A3}	S
285	CH	CH	N	H	R^{A4}	S
286	CH	CH	N	H	R^{A5}	S
287	CH	CH	N	H	R^{A6}	S
288	CH	CH	N	H	R^{A7}	S
289	CH	CH	N	H	R^{A8}	S
290	N	CH	N	H	H	S
291	N	CH	N	R^{A1}	H	S
292	N	CH	N	R^{A2}	H	S
293	N	CH	N	R^{A3}	H	S
294	N	CH	N	R^{A4}	H	S
295	N	CH	N	R^{A5}	H	S
296	N	CH	N	R^{A6}	H	S
297	N	CH	N	R^{A7}	H	S
298	N	CH	N	R^{A8}	H	S
299	N	CH	N	H	R^{A1}	S
300	N	CH	N	H	R^{A2}	S
301	N	CH	N	H	R^{A3}	S
302	N	CH	N	H	R^{A4}	S
303	N	CH	N	H	R^{A5}	S
304	N	CH	N	H	R^{A6}	S
305	N	CH	N	H	R^{A7}	S
306	N	CH	N	H	R^{A8}	S
307	CH	CH	CH	H	H	O
308	CH	CH	CH	R^{A1}	H	O
309	CH	CH	CH	R^{A2}	H	O
310	CH	CH	CH	R^{A3}	H	O
311	CH	CH	CH	R^{A4}	H	O
312	CH	CH	CH	R^{A5}	H	O
313	CH	CH	CH	R^{A6}	H	O
314	CH	CH	CH	R^{A7}	H	O
315	CH	CH	CH	R^{A8}	H	O
316	CH	CH	CH	H	R^{A1}	O
317	CH	CH	CH	H	R^{A2}	O
318	CH	CH	CH	H	R^{A3}	O
319	CH	CH	CH	H	R^{A4}	O

-continued

m	X^1	X^2	X^3	R^1	R^2	Y^1
320	CH	CH	CH	H	R^{A5}	O
321	CH	CH	CH	H	R^{A6}	O
322	CH	CH	CH	H	R^{A7}	O
323	CH	CH	CH	H	R^{A8}	O
324	N	CH	CH	H	H	O
325	N	CH	CH	R^{A1}	H	O
326	N	CH	CH	R^{A2}	H	O
327	N	CH	CH	R^{A3}	H	O
328	N	CH	CH	R^{A4}	H	O
329	N	CH	CH	R^{A5}	H	O
330	N	CH	CH	R^{A6}	H	O
331	N	CH	CH	R^{A7}	H	O
332	N	CH	CH	R^{A8}	H	O
333	N	CH	CH	H	R^{A1}	O
334	N	CH	CH	H	R^{A2}	O
335	N	CH	CH	H	R^{A3}	O
336	N	CH	CH	H	R^{A4}	O
337	N	CH	CH	H	R^{A5}	O
338	N	CH	CH	H	R^{A6}	O
339	N	CH	CH	H	R^{A7}	O
340	N	CH	CH	H	R^{A8}	O
341	N	N	CH	H	H	O
342	N	N	CH	R^{A1}	H	O
343	N	N	CH	R^{A2}	H	O
344	N	N	CH	R^{A3}	H	O
345	N	N	CH	R^{A4}	H	O
346	N	N	CH	R^{A5}	H	O
347	N	N	CH	R^{A6}	H	O
348	N	N	CH	R^{A7}	H	O
349	N	N	CH	R^{A8}	H	O
350	N	N	CH	H	R^{A1}	O
351	N	N	CH	H	R^{A2}	O
352	N	N	CH	H	R^{A3}	O
353	N	N	CH	H	R^{A4}	O
354	N	N	CH	H	R^{A5}	O
355	N	N	CH	H	R^{A6}	O
356	N	N	CH	H	R^{A7}	O
357	N	N	CH	H	R^{A8}	O
358	CH	N	CH	H	H	O
359	CH	N	CH	R^{A1}	H	O
360	CH	N	CH	R^{A2}	H	O
361	CH	N	CH	R^{A3}	H	O
362	CH	N	CH	R^{A4}	H	O
363	CH	N	CH	R^{A5}	H	O
364	CH	N	CH	R^{A6}	H	O
365	CH	N	CH	R^{A7}	H	O
366	CH	N	CH	R^{A8}	H	O
367	CH	N	CH	H	R^{A1}	O
368	CH	N	CH	H	R^{A2}	O
369	CH	N	CH	H	R^{A3}	O
370	CH	N	CH	H	R^{A4}	O
371	CH	N	CH	H	R^{A5}	O
372	CH	N	CH	H	R^{A6}	O
373	CH	N	CH	H	R^{A7}	O
374	CH	N	CH	H	R^{A8}	O
375	CH	CH	N	H	H	O
376	CH	CH	N	R^{A1}	H	O
377	CH	CH	N	R^{A2}	H	O
378	CH	CH	N	R^{A3}	H	O
379	CH	CH	N	R^{A4}	H	O
380	CH	CH	N	R^{A5}	H	O
381	CH	CH	N	R^{A6}	H	O
382	CH	CH	N	R^{A7}	H	O
383	CH	CH	N	R^{A8}	H	O
384	CH	CH	N	H	R^{A1}	O
385	CH	CH	N	H	R^{A2}	O
386	CH	CH	N	H	R^{A3}	O
387	CH	CH	N	H	R^{A4}	O
388	CH	CH	N	H	R^{A5}	O
389	CH	CH	N	H	R^{A6}	O
390	CH	CH	N	H	R^{A7}	O
391	CH	CH	N	H	R^{A8}	O
392	N	CH	N	H	H	O
393	N	CH	N	R^{A1}	H	O

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m	X^1	X^2	X^3	R^1	R^2	Y^1
394	N	CH	N	R^{A2}	H	O
395	N	CH	N	R^{A3}	H	O
396	N	CH	N	R^{A4}	H	O
397	N	CH	N	R^{A5}	H	O
398	N	CH	N	R^{A6}	H	O
399	N	CH	N	R^{A7}	H	O
400	N	CH	N	R^{A8}	H	O
401	N	CH	N	H	R^{A1}	O
402	N	CH	N	H	R^{A2}	O
403	N	CH	N	H	R^{A3}	O
404	N	CH	N	H	R^{A4}	O
405	N	CH	N	H	R^{A5}	O
406	N	CH	N	H	R^{A6}	O
407	N	CH	N	H	R^{A7}	O
408	N	CH	N	H	R^{A8}	O
409	CH	CH	CH	H	H	NCH_3
410	CH	CH	CH	R^{A1}	H	NCH_3
411	CH	CH	CH	R^{A2}	H	NCH_3
412	CH	CH	CH	R^{A3}	H	NCH_3
413	CH	CH	CH	R^{A4}	H	NCH_3
414	CH	CH	CH	R^{A5}	H	NCH_3
415	CH	CH	CH	R^{A6}	H	NCH_3
416	CH	CH	CH	R^{A7}	H	NCH_3
417	CH	CH	CH	R^{A8}	H	NCH_3
418	CH	CH	CH	H	R^{A1}	NCH_3
419	CH	CH	CH	H	R^{A2}	NCH_3
420	CH	CH	CH	H	R^{A3}	NCH_3
421	CH	CH	CH	H	R^{A4}	NCH_3
422	CH	CH	CH	H	R^{A5}	NCH_3
423	CH	CH	CH	H	R^{A6}	NCH_3
424	CH	CH	CH	H	R^{A7}	NCH_3
425	CH	CH	CH	H	R^{A8}	NCH_3
426	N	CH	CH	H	H	NCH_3
427	N	CH	CH	R^{A1}	H	NCH_3
428	N	CH	CH	R^{A2}	H	NCH_3
429	N	CH	CH	R^{A3}	H	NCH_3
430	N	CH	CH	R^{A4}	H	NCH_3
431	N	CH	CH	R^{A5}	H	NCH_3
432	N	CH	CH	R^{A6}	H	NCH_3
433	N	CH	CH	R^{A7}	H	NCH_3
434	N	CH	CH	R^{A8}	H	NCH_3
435	N	CH	CH	H	R^{A1}	NCH_3
436	N	CH	CH	H	R^{A2}	NCH_3
437	N	CH	CH	H	R^{A3}	NCH_3
438	N	CH	CH	H	R^{A4}	NCH_3
439	N	CH	CH	H	R^{A5}	NCH_3
440	N	CH	CH	H	R^{A6}	NCH_3
441	N	CH	CH	H	R^{A7}	NCH_3
442	N	CH	CH	H	R^{A8}	NCH_3
443	N	N	CH	H	H	NCH_3
444	N	N	CH	R^{A1}	H	NCH_3
445	N	N	CH	R^{A2}	H	NCH_3
446	N	N	CH	R^{A3}	H	NCH_3
447	N	N	CH	R^{A4}	H	NCH_3
448	N	N	CH	R^{A5}	H	NCH_3
449	N	N	CH	R^{A6}	H	NCH_3
450	N	N	CH	R^{A7}	H	NCH_3
451	N	N	CH	R^{A8}	H	NCH_3
452	N	N	CH	H	R^{A1}	NCH_3
453	N	N	CH	H	R^{A2}	NCH_3
454	N	N	CH	H	R^{A3}	NCH_3
455	N	N	CH	H	R^{A4}	NCH_3
456	N	N	CH	H	R^{A5}	NCH_3
457	N	N	CH	H	R^{A6}	NCH_3
458	N	N	CH	H	R^{A7}	NCH_3
459	N	N	CH	H	R^{A8}	NCH_3
460	CH	N	CH	H	H	NCH_3
461	CH	N	CH	R^{A1}	H	NCH_3
462	CH	N	CH	R^{A2}	H	NCH_3
463	CH	N	CH	R^{A3}	H	NCH_3
464	CH	N	CH	R^{A4}	H	NCH_3
465	CH	N	CH	R^{A5}	H	NCH_3
466	CH	N	CH	R^{A6}	H	NCH_3
467	CH	N	CH	R^{A7}	H	NCH_3

-continued

m	X^1	X^2	X^3	R^1	R^2	Y^1
468	CH	N	CH	R^{A8}	H	NCH_3
469	CH	N	CH	H	R^{A1}	NCH_3
470	CH	N	CH	H	R^{A2}	NCH_3
471	CH	N	CH	H	R^{A3}	NCH_3
472	CH	N	CH	H	R^{A4}	NCH_3
473	CH	N	CH	H	R^{A5}	NCH_3
474	CH	N	CH	H	R^{A6}	NCH_3
475	CH	N	CH	H	R^{A7}	NCH_3
476	CH	N	CH	H	R^{A8}	NCH_3
477	CH	CH	N	H	H	NCH_3
478	CH	CH	N	R^{A1}	H	NCH_3
479	CH	CH	N	R^{A2}	H	NCH_3
480	CH	CH	N	R^{A3}	H	NCH_3
481	CH	CH	N	R^{A4}	H	NCH_3
482	CH	CH	N	R^{A5}	H	NCH_3
483	CH	CH	N	R^{A6}	H	NCH_3
484	CH	CH	N	R^{A7}	H	NCH_3
485	CH	CH	N	R^{A8}	H	NCH_3
486	CH	CH	N	H	R^{A1}	NCH_3
487	CH	CH	N	H	R^{A2}	NCH_3
488	CH	CH	N	H	R^{A3}	NCH_3
489	CH	CH	N	H	R^{A4}	NCH_3
490	CH	CH	N	H	R^{A5}	NCH_3
491	CH	CH	N	H	R^{A6}	NCH_3
492	CH	CH	N	H	R^{A7}	NCH_3
493	CH	CH	N	H	R^{A8}	NCH_3
494	N	CH	N	H	H	NCH_3
495	N	CH	N	R^{A1}	H	NCH_3
496	N	CH	N	R^{A2}	H	NCH_3
497	N	CH	N	R^{A3}	H	NCH_3
498	N	CH	N	R^{A4}	H	NCH_3
499	N	CH	N	R^{A5}	H	NCH_3
500	N	CH	N	R^{A6}	H	NCH_3
501	N	CH	N	R^{A7}	H	NCH_3
502	N	CH	N	R^{A8}	H	NCH_3
503	N	CH	N	H	R^{A1}	NCH_3
504	N	CH	N	H	R^{A2}	NCH_3
505	N	CH	N	H	R^{A3}	NCH_3
506	N	CH	N	H	R^{A4}	NCH_3
507	N	CH	N	H	R^{A5}	NCH_3
508	N	CH	N	H	R^{A6}	NCH_3
509	N	CH	N	H	R^{A7}	NCH_3
510	N	CH	N	H	R^{A8}	NCH_3
511	CH	CH	CH	H	H	$C(CH_3)_2$
512	CH	CH	CH	R^{A1}	H	$C(CH_3)_2$
513	CH	CH	CH	R^{A2}	H	$C(CH_3)_2$
514	CH	CH	CH	R^{A3}	H	$C(CH_3)_2$
515	CH	CH	CH	R^{A4}	H	$C(CH_3)_2$
516	CH	CH	CH	R^{A5}	H	$C(CH_3)_2$
517	CH	CH	CH	R^{A6}	H	$C(CH_3)_2$
518	CH	CH	CH	R^{A7}	H	$C(CH_3)_2$
519	CH	CH	CH	R^{A8}	H	$C(CH_3)_2$
520	CH	CH	CH	H	R^{A1}	$C(CH_3)_2$
521	CH	CH	CH	H	R^{A2}	$C(CH_3)_2$
522	CH	CH	CH	H	R^{A3}	$C(CH_3)_2$
523	CH	CH	CH	H	R^{A4}	$C(CH_3)_2$
524	CH	CH	CH	H	R^{A5}	$C(CH_3)_2$
525	CH	CH	CH	H	R^{A6}	$C(CH_3)_2$
526	CH	CH	CH	H	R^{A7}	$C(CH_3)_2$
527	CH	CH	CH	H	R^{A8}	$C(CH_3)_2$
528	N	CH	CH	H	H	$C(CH_3)_2$
529	N	CH	CH	R^{A1}	H	$C(CH_3)_2$
530	N	CH	CH	R^{A2}	H	$C(CH_3)_2$
531	N	CH	CH	R^{A3}	H	$C(CH_3)_2$
532	N	CH	CH	R^{A4}	H	$C(CH_3)_2$
533	N	CH	CH	R^{A5}	H	$C(CH_3)_2$
534	N	CH	CH	R^{A6}	H	$C(CH_3)_2$
535	N	CH	CH	R^{A7}	H	$C(CH_3)_2$
536	N	CH	CH	R^{A8}	H	$C(CH_3)_2$
537	N	CH	CH	H	R^{A1}	$C(CH_3)_2$
538	N	CH	CH	H	R^{A2}	$C(CH_3)_2$
539	N	CH	CH	H	R^{A3}	$C(CH_3)_2$
540	N	CH	CH	H	R^{A4}	$C(CH_3)_2$
541	N	CH	CH	H	R^{A5}	$C(CH_3)_2$

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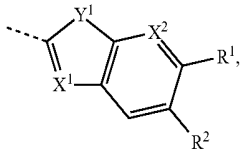
m	X^1	X^2	X^3	R^1	R^2	Y^1
542	N	CH	CH	H	R^{A6}	$C(CH_3)_2$
543	N	CH	CH	H	R^{A7}	$C(CH_3)_2$
544	N	CH	CH	H	R^{A8}	$C(CH_3)_2$
545	N	N	CH	H	H	$C(CH_3)_2$
546	N	N	CH	R^{A1}	H	$C(CH_3)_2$
547	N	N	CH	R^{A2}	H	$C(CH_3)_2$
548	N	N	CH	R^{A3}	H	$C(CH_3)_2$
549	N	N	CH	R^{A4}	H	$C(CH_3)_2$
550	N	N	CH	R^{A5}	H	$C(CH_3)_2$
551	N	N	CH	R^{A6}	H	$C(CH_3)_2$
552	N	N	CH	R^{A7}	H	$C(CH_3)_2$
553	N	N	CH	R^{A8}	H	$C(CH_3)_2$
554	N	N	CH	H	R^{A1}	$C(CH_3)_2$
555	N	N	CH	H	R^{A2}	$C(CH_3)_2$
556	N	N	CH	H	R^{A3}	$C(CH_3)_2$
557	N	N	CH	H	R^{A4}	$C(CH_3)_2$
558	N	N	CH	H	R^{A5}	$C(CH_3)_2$
559	N	N	CH	H	R^{A6}	$C(CH_3)_2$
560	N	N	CH	H	R^{A7}	$C(CH_3)_2$
561	N	N	CH	H	R^{A8}	$C(CH_3)_2$
562	CH	N	CH	H	H	$C(CH_3)_2$
563	CH	N	CH	R^{A1}	H	$C(CH_3)_2$
564	CH	N	CH	R^{A2}	H	$C(CH_3)_2$
565	CH	N	CH	R^{A3}	H	$C(CH_3)_2$
566	CH	N	CH	R^{A4}	H	$C(CH_3)_2$
567	CH	N	CH	R^{A5}	H	$C(CH_3)_2$
568	CH	N	CH	R^{A6}	H	$C(CH_3)_2$
569	CH	N	CH	R^{A7}	H	$C(CH_3)_2$
570	CH	N	CH	R^{A8}	H	$C(CH_3)_2$
571	CH	N	CH	H	R^{A1}	$C(CH_3)_2$
572	CH	N	CH	H	R^{A2}	$C(CH_3)_2$
573	CH	N	CH	H	R^{A3}	$C(CH_3)_2$
574	CH	N	CH	H	R^{A4}	$C(CH_3)_2$
575	CH	N	CH	H	R^{A5}	$C(CH_3)_2$
576	CH	N	CH	H	R^{A6}	$C(CH_3)_2$
577	CH	N	CH	H	R^{A7}	$C(CH_3)_2$
578	CH	N	CH	H	R^{A8}	$C(CH_3)_2$
579	CH	CH	N	H	H	$C(CH_3)_2$
580	CH	CH	N	R^{A1}	H	$C(CH_3)_2$
581	CH	CH	N	R^{A2}	H	$C(CH_3)_2$
582	CH	CH	N	R^{A3}	H	$C(CH_3)_2$
583	CH	CH	N	R^{A4}	H	$C(CH_3)_2$
584	CH	CH	N	R^{A5}	H	$C(CH_3)_2$
585	CH	CH	N	R^{A6}	H	$C(CH_3)_2$
586	CH	CH	N	R^{A7}	H	$C(CH_3)_2$
587	CH	CH	N	R^{A8}	H	$C(CH_3)_2$
588	CH	CH	N	H	R^{A1}	$C(CH_3)_2$
589	CH	CH	N	H	R^{A2}	$C(CH_3)_2$
590	CH	CH	N	H	R^{A3}	$C(CH_3)_2$
591	CH	CH	N	H	R^{A4}	$C(CH_3)_2$
592	CH	CH	N	H	R^{A5}	$C(CH_3)_2$
593	CH	CH	N	H	R^{A6}	$C(CH_3)_2$
594	CH	CH	N	H	R^{A7}	$C(CH_3)_2$
595	CH	CH	N	H	R^{A8}	$C(CH_3)_2$
596	N	CH	N	H	H	$C(CH_3)_2$
597	N	CH	N	R^{A1}	H	$C(CH_3)_2$
598	N	CH	N	R^{A2}	H	$C(CH_3)_2$
599	N	CH	N	R^{A3}	H	$C(CH_3)_2$
600	N	CH	N	R^{A4}	H	$C(CH_3)_2$
601	N	CH	N	R^{A5}	H	$C(CH_3)_2$
602	N	CH	N	R^{A6}	H	$C(CH_3)_2$
603	N	CH	N	R^{A7}	H	$C(CH_3)_2$
604	N	CH	N	R^{A8}	H	$C(CH_3)_2$
605	N	CH	N	H	R^{A1}	$C(CH_3)_2$
606	N	CH	N	H	R^{A2}	$C(CH_3)_2$
607	N	CH	N	H	R^{A3}	$C(CH_3)_2$
608	N	CH	N	H	R^{A4}	$C(CH_3)_2$
609	N	CH	N	H	R^{A5}	$C(CH_3)_2$
610	N	CH	N	H	R^{A6}	$C(CH_3)_2$
611	N	CH	N	H	R^{A7}	$C(CH_3)_2$
612	N	CH	N	H	R^{A8}	$C(CH_3)_2$

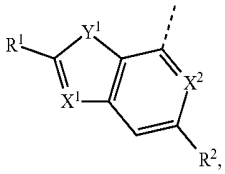
wherein:

ligands L_{A1633} to L_{A2040} are based on a structure of Formula V



where i=1224+m;

ligands L_{A2041} to L_{A2448} are based on a structure of Formula VI



where i=1632+m;

wherein m is an integer from 409 to 816 and for each m, X^1, X^2, R^1, R^2, and Y^1 are defined in formulas V and VI as follows:

m	X^1	X^2	R^1	R^2	Y^1
613	CH	CH	H	H	S
614	CH	CH	R^{A1}	H	S
615	CH	CH	R^{A2}	H	S
616	CH	CH	R^{A3}	H	S
617	CH	CH	R^{A4}	H	S
618	CH	CH	R^{A5}	H	S
619	CH	CH	R^{A6}	H	S
620	CH	CH	R^{A7}	H	S
621	CH	CH	R^{A8}	H	S
622	CH	CH	H	R^{A1}	S
623	CH	CH	H	R^{A2}	S
624	CH	CH	H	R^{A3}	S
625	CH	CH	H	R^{A4}	S
626	CH	CH	H	R^{A5}	S
627	CH	CH	H	R^{A6}	S
628	CH	CH	H	R^{A7}	S
629	CH	CH	H	R^{A8}	S
630	N	CH	H	H	S
631	N	CH	R^{A1}	H	S
632	N	CH	R^{A2}	H	S
633	N	CH	R^{A3}	H	S
634	N	CH	R^{A4}	H	S
635	N	CH	R^{A5}	H	S
636	N	CH	R^{A6}	H	S
637	N	CH	R^{A7}	H	S
638	N	CH	R^{A8}	H	S
639	N	CH	H	R^{A1}	S
640	N	CH	H	R^{A2}	S
641	N	CH	H	R^{A3}	S
642	N	CH	H	R^{A4}	S
643	N	CH	H	R^{A5}	S
644	N	CH	H	R^{A6}	S
645	N	CH	H	R^{A7}	S
646	N	CH	H	R^{A8}	S
647	N	N	H	H	S
648	N	N	R^{A1}	H	S
649	N	N	R^{A2}	H	S
650	N	N	R^{A3}	H	S
651	N	N	R^{A4}	H	S

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m	X^1	X^2	R^1	R^2	Y^1
652	N	N	R^{A5}	H	S
653	N	N	R^{A6}	H	S
654	N	N	R^{A7}	H	S
655	N	N	R^{A8}	H	S
656	N	N	H	R^{A1}	S
657	N	N	H	R^{A2}	S
658	N	N	H	R^{A3}	S
659	N	N	H	R^{A4}	S
660	N	N	H	R^{A5}	S
661	N	N	H	R^{A6}	S
662	N	N	H	R^{A7}	S
663	N	N	H	R^{A8}	S
664	CH	N	H	H	S
665	CH	N	R^{A1}	H	S
666	CH	N	R^{A2}	H	S
667	CH	N	R^{A3}	H	S
668	CH	N	R^{A4}	H	S
669	CH	N	R^{A5}	H	S
670	CH	N	R^{A6}	H	S
671	CH	N	R^{A7}	H	S
672	CH	N	R^{A8}	H	S
673	CH	N	H	R^{A1}	S
674	CH	N	H	R^{A2}	S
675	CH	N	H	R^{A3}	S
676	CH	N	H	R^{A4}	S
677	CH	N	H	R^{A5}	S
678	CH	N	H	R^{A6}	S
679	CH	N	H	R^{A7}	S
680	CH	N	H	R^{A8}	S
681	CH	CH	H	H	O
682	CH	CH	R^{A1}	H	O
683	CH	CH	R^{A2}	H	O
684	CH	CH	R^{A3}	H	O
685	CH	CH	R^{A4}	H	O
686	CH	CH	R^{A5}	H	O
687	CH	CH	R^{A6}	H	O
688	CH	CH	R^{A7}	H	O
689	CH	CH	R^{A8}	H	O
690	CH	CH	H	R^{A1}	O
691	CH	CH	H	R^{A2}	O
692	CH	CH	H	R^{A3}	O
693	CH	CH	H	R^{A4}	O
694	CH	CH	H	R^{A5}	O
695	CH	CH	H	R^{A6}	O
696	CH	CH	H	R^{A7}	O
697	CH	CH	H	R^{A8}	O
698	N	CH	H	H	O
699	N	CH	R^{A1}	H	O
700	N	CH	R^{A2}	H	O
701	N	CH	R^{A3}	H	O
702	N	CH	R^{A4}	H	O
703	N	CH	R^{A5}	H	O
704	N	CH	R^{A6}	H	O
705	N	CH	R^{A7}	H	O
706	N	CH	R^{A8}	H	O
707	N	CH	H	R^{A1}	O
708	N	CH	H	R^{A2}	O
709	N	CH	H	R^{A3}	O
710	N	CH	H	R^{A4}	O
711	N	CH	H	R^{A5}	O
712	N	CH	H	R^{A6}	O
713	N	CH	H	R^{A7}	O
714	N	CH	H	R^{A8}	O
715	N	N	H	H	O
716	N	N	R^{A1}	H	O
717	N	N	R^{A2}	H	O
718	N	N	R^{A3}	H	O
719	N	N	R^{A4}	H	O
720	N	N	R^{A5}	H	O
721	N	N	R^{A6}	H	O
722	N	N	R^{A7}	H	O
723	N	N	R^{A8}	H	O
724	N	N	H	R^{A1}	O
725	N	N	H	R^{A2}	O

-continued

m	X^1	X^2	R^1	R^2	Y^1
726	N	N	H	R^{A3}	O
727	N	N	H	R^{A4}	O
728	N	N	H	R^{A5}	O
729	N	N	H	R^{A6}	O
730	N	N	H	R^{A7}	O
731	N	N	H	R^{A8}	O
732	CH	N	H	H	O
733	CH	N	R^{A1}	H	O
734	CH	N	R^{A2}	H	O
735	CH	N	R^{A3}	H	O
736	CH	N	R^{A4}	H	O
737	CH	N	R^{A5}	H	O
738	CH	N	R^{A6}	H	O
739	CH	N	R^{A7}	H	O
740	CH	N	R^{A8}	H	O
741	CH	N	H	R^{A1}	O
742	CH	N	H	R^{A2}	O
743	CH	N	H	R^{A3}	O
744	CH	N	H	R^{A4}	O
745	CH	N	H	R^{A5}	O
746	CH	N	H	R^{A6}	O
747	CH	N	H	R^{A7}	O
748	CH	N	H	R^{A8}	O
749	CH	CH	H	H	$C(CH_3)_2$
750	CH	CH	R^{A1}	H	$C(CH_3)_2$
751	CH	CH	R^{A2}	H	$C(CH_3)_2$
752	CH	CH	R^{A3}	H	$C(CH_3)_2$
753	CH	CH	R^{A4}	H	$C(CH_3)_2$
754	CH	CH	R^{A5}	H	$C(CH_3)_2$
755	CH	CH	R^{A6}	H	$C(CH_3)_2$
756	CH	CH	R^{A7}	H	$C(CH_3)_2$
757	CH	CH	R^{A8}	H	$C(CH_3)_2$
758	CH	CH	H	R^{A1}	$C(CH_3)_2$
759	CH	CH	H	R^{A2}	$C(CH_3)_2$
760	CH	CH	H	R^{A3}	$C(CH_3)_2$
761	CH	CH	H	R^{A4}	$C(CH_3)_2$
762	CH	CH	H	R^{A5}	$C(CH_3)_2$
763	CH	CH	H	R^{A6}	$C(CH_3)_2$
764	CH	CH	H	R^{A7}	$C(CH_3)_2$
765	CH	CH	H	R^{A8}	$C(CH_3)_2$
766	N	CH	H	H	$C(CH_3)_2$
767	N	CH	R^{A1}	H	$C(CH_3)_2$
768	N	CH	R^{A2}	H	$C(CH_3)_2$
769	N	CH	R^{A3}	H	$C(CH_3)_2$
770	N	CH	R^{A4}	H	$C(CH_3)_2$
771	N	CH	R^{A5}	H	$C(CH_3)_2$
772	N	CH	R^{A6}	H	$C(CH_3)_2$
773	N	CH	R^{A7}	H	$C(CH_3)_2$
774	N	CH	R^{A8}	H	$C(CH_3)_2$
775	N	CH	H	R^{A1}	$C(CH_3)_2$
776	N	CH	H	R^{A2}	$C(CH_3)_2$
777	N	CH	H	R^{A3}	$C(CH_3)_2$
778	N	CH	H	R^{A4}	$C(CH_3)_2$
779	N	CH	H	R^{A5}	$C(CH_3)_2$
780	N	CH	H	R^{A6}	$C(CH_3)_2$
781	N	CH	H	R^{A7}	$C(CH_3)_2$
782	N	CH	H	R^{A8}	$C(CH_3)_2$
783	N	N	H	H	$C(CH_3)_2$
784	N	N	R^{A1}	H	$C(CH_3)_2$
785	N	N	R^{A2}	H	$C(CH_3)_2$
786	N	N	R^{A3}	H	$C(CH_3)_2$
787	N	N	R^{A4}	H	$C(CH_3)_2$
788	N	N	R^{A5}	H	$C(CH_3)_2$
789	N	N	R^{A6}	H	$C(CH_3)_2$
790	N	N	R^{A7}	H	$C(CH_3)_2$
791	N	N	R^{A8}	H	$C(CH_3)_2$
792	N	N	H	R^{A1}	$C(CH_3)_2$
793	N	N	H	R^{A2}	$C(CH_3)_2$
794	N	N	H	R^{A3}	$C(CH_3)_2$
795	N	N	H	R^{A4}	$C(CH_3)_2$
796	N	N	H	R^{A5}	$C(CH_3)_2$
797	N	N	H	R^{A6}	$C(CH_3)_2$
798	N	N	H	R^{A7}	$C(CH_3)_2$
799	N	N	H	R^{A8}	$C(CH_3)_2$

-continued

m	X^1	X^2	R^1	R^2	Y^1
800	CH	N	H	H	$C(CH_3)_2$
801	CH	N	R^{A1}	H	$C(CH_3)_2$
802	CH	N	R^{A2}	H	$C(CH_3)_2$
803	CH	N	R^{A3}	H	$C(CH_3)_2$
804	CH	N	R^{A4}	H	$C(CH_3)_2$
805	CH	N	R^{A5}	H	$C(CH_3)_2$
806	CH	N	R^{A6}	H	$C(CH_3)_2$
807	CH	N	R^{A7}	H	$C(CH_3)_2$
808	CH	N	R^{A8}	H	$C(CH_3)_2$
809	CH	N	H	R^{A1}	$C(CH_3)_2$
810	CH	N	H	R^{A2}	$C(CH_3)_2$
811	CH	N	H	R^{A3}	$C(CH_3)_2$
812	CH	N	H	R^{A4}	$C(CH_3)_2$
813	CH	N	H	R^{A5}	$C(CH_3)_2$
814	CH	N	H	R^{A6}	$C(CH_3)_2$
815	CH	N	H	R^{A7}	$C(CH_3)_2$
816	CH	N	H	R^{A8}	$C(CH_3)_2$
817	CH	CH	H	H	NCH_3
818	CH	CH	R^{A1}	H	NCH_3
819	CH	CH	R^{A2}	H	NCH_3
820	CH	CH	R^{A3}	H	NCH_3
821	CH	CH	R^{A4}	H	NCH_3
822	CH	CH	R^{A5}	H	NCH_3
823	CH	CH	R^{A6}	H	NCH_3
824	CH	CH	R^{A7}	H	NCH_3
825	CH	CH	R^{A8}	H	NCH_3
826	CH	CH	H	R^{A1}	NCH_3
827	CH	CH	H	R^{A2}	NCH_3
828	CH	CH	H	R^{A3}	NCH_3
829	CH	CH	H	R^{A4}	NCH_3
830	CH	CH	H	R^{A5}	NCH_3
831	CH	CH	H	R^{A6}	NCH_3
832	CH	CH	H	R^{A7}	NCH_3
833	CH	CH	H	R^{A8}	NCH_3
834	N	CH	H	H	NCH_3
835	N	CH	R^{A1}	H	NCH_3
836	N	CH	R^{A2}	H	NCH_3
837	N	CH	R^{A3}	H	NCH_3
838	N	CH	R^{A4}	H	NCH_3
839	N	CH	R^{A5}	H	NCH_3
840	N	CH	R^{A6}	H	NCH_3
841	N	CH	R^{A7}	H	NCH_3
842	N	CH	R^{A8}	H	NCH_3
843	N	CH	H	R^{A1}	NCH_3
844	N	CH	H	R^{A2}	NCH_3
845	N	CH	H	R^{A3}	NCH_3
846	N	CH	H	R^{A4}	NCH_3
847	N	CH	H	R^{A5}	NCH_3
848	N	CH	H	R^{A6}	NCH_3
849	N	CH	H	R^{A7}	NCH_3
850	N	CH	H	R^{A8}	NCH_3
851	N	N	H	H	NCH_3
852	N	N	R^{A1}	H	NCH_3
853	N	N	R^{A2}	H	NCH_3
854	N	N	R^{A3}	H	NCH_3
855	N	N	R^{A4}	H	NCH_3
856	N	N	R^{A5}	H	NCH_3
857	N	N	R^{A6}	H	NCH_3
858	N	N	R^{A7}	H	NCH_3
859	N	N	R^{A8}	H	NCH_3
860	N	N	H	R^{A1}	NCH_3
861	N	N	H	R^{A2}	NCH_3
862	N	N	H	R^{A3}	NCH_3
863	N	N	H	R^{A4}	NCH_3
864	N	N	H	R^{A5}	NCH_3
865	N	N	H	R^{A6}	NCH_3
866	N	N	H	R^{A7}	NCH_3
867	N	N	H	R^{A8}	NCH_3
868	CH	N	H	H	NCH_3
869	CH	N	R^{A1}	H	NCH_3
870	CH	N	R^{A2}	H	NCH_3
871	CH	N	R^{A3}	H	NCH_3
872	CH	N	R^{A4}	H	NCH_3
873	CH	N	R^{A5}	H	NCH_3

-continued

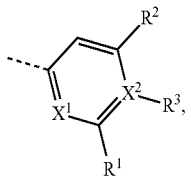
m	X^1	X^2	R^1	R^2	Y^1
874	CH	N	R^{A6}	H	NCH_3
875	CH	N	R^{A7}	H	NCH_3
876	CH	N	R^{A8}	H	NCH_3
877	CH	N	H	R^{A1}	NCH_3
878	CH	N	H	R^{A2}	NCH_3
879	CH	N	H	R^{A3}	NCH_3
880	CH	N	H	R^{A4}	NCH_3
881	CH	N	H	R^{A5}	NCH_3
882	CH	N	H	R^{A6}	NCH_3
883	CH	N	H	R^{A7}	NCH_3
884	CH	N	H	R^{A8}	NCH_3
885	CH	CH	H	H	$N(R_{A6})$
886	CH	CH	R^{A1}	H	$N(R_{A6})$
887	CH	CH	R^{A2}	H	$N(R_{A6})$
888	CH	CH	R^{A3}	H	$N(R_{A6})$
889	CH	CH	R^{A4}	H	$N(R_{A6})$
890	CH	CH	R^{A5}	H	$N(R_{A6})$
891	CH	CH	R^{A6}	H	$N(R_{A6})$
892	CH	CH	R^{A7}	H	$N(R_{A6})$
893	CH	CH	R^{A8}	H	$N(R_{A6})$
894	CH	CH	H	R^{A1}	$N(R_{A6})$
895	CH	CH	H	R^{A2}	$N(R_{A6})$
896	CH	CH	H	R^{A3}	$N(R_{A6})$
897	CH	CH	H	R^{A4}	$N(R_{A6})$
898	CH	CH	H	R^{A5}	$N(R_{A6})$
899	CH	CH	H	R^{A6}	$N(R_{A6})$
900	CH	CH	H	R^{A7}	$N(R_{A6})$
901	CH	CH	H	R^{A8}	$N(R_{A6})$
902	N	CH	H	H	$N(R_{A6})$
903	N	CH	R^{A1}	H	$N(R_{A6})$
904	N	CH	R^{A2}	H	$N(R_{A6})$
905	N	CH	R^{A3}	H	$N(R_{A6})$
906	N	CH	R^{A4}	H	$N(R_{A6})$
907	N	CH	R^{A5}	H	$N(R_{A6})$
908	N	CH	R^{A6}	H	$N(R_{A6})$
909	N	CH	R^{A7}	H	$N(R_{A6})$
910	N	CH	R^{A8}	H	$N(R_{A6})$
911	N	CH	H	R^{A1}	$N(R_{A6})$
912	N	CH	H	R^{A2}	$N(R_{A6})$
913	N	CH	H	R^{A3}	$N(R_{A6})$
914	N	CH	H	R^{A4}	$N(R_{A6})$
915	N	CH	H	R^{A5}	$N(R_{A6})$
916	N	CH	H	R^{A6}	$N(R_{A6})$
917	N	CH	H	R^{A7}	$N(R_{A6})$
918	N	CH	H	R^{A8}	$N(R_{A6})$
919	N	N	H	H	$N(R_{A6})$
920	N	N	R^{A1}	H	$N(R_{A6})$
921	N	N	R^{A2}	H	$N(R_{A6})$
922	N	N	R^{A3}	H	$N(R_{A6})$
923	N	N	R^{A4}	H	$N(R_{A6})$
924	N	N	R^{A5}	H	$N(R_{A6})$
925	N	N	R^{A6}	H	$N(R_{A6})$
926	N	N	R^{A7}	H	$N(R_{A6})$
927	N	N	R^{A8}	H	$N(R_{A6})$
928	N	N	H	R^{A1}	$N(R_{A6})$
929	N	N	H	R^{A2}	$N(R_{A6})$
930	N	N	H	R^{A3}	$N(R_{A6})$
931	N	N	H	R^{A4}	$N(R_{A6})$
932	N	N	H	R^{A5}	$N(R_{A6})$
933	N	N	H	R^{A6}	$N(R_{A6})$
934	N	N	H	R^{A7}	$N(R_{A6})$
935	N	N	H	R^{A8}	$N(R_{A6})$
936	CH	N	H	H	$N(R_{A6})$
937	CH	N	R^{A1}	H	$N(R_{A6})$
938	CH	N	R^{A2}	H	$N(R_{A6})$
939	CH	N	R^{A3}	H	$N(R_{A6})$
940	CH	N	R^{A4}	H	$N(R_{A6})$
941	CH	N	R^{A5}	H	$N(R_{A6})$
942	CH	N	R^{A6}	H	$N(R_{A6})$
943	CH	N	R^{A7}	H	$N(R_{A6})$
944	CH	N	R^{A8}	H	$N(R_{A6})$
945	CH	N	H	R^{A1}	$N(R_{A6})$
946	CH	N	H	R^{A2}	$N(R_{A6})$
947	CH	N	H	R^{A3}	$N(R_{A6})$

-continued

m	X^1	X^2	R^1	R^2	Y^1
948	CH	N	H	R^{A4}	$N(R_{A6})$
949	CH	N	H	R^{A5}	$N(R_{A6})$
950	CH	N	H	R^{A6}	$N(R_{A6})$
951	CH	N	H	R^{A7}	$N(R_{A6})$
952	CH	N	H	R^{A8}	$N(R_{A6})$
953	CH	CH	H	H	$Si(CH_3)_2$
954	CH	CH	R^{A1}	H	$Si(CH_3)_2$
955	CH	CH	R^{A2}	H	$Si(CH_3)_2$
956	CH	CH	R^{A3}	H	$Si(CH_3)_2$
957	CH	CH	R^{A4}	H	$Si(CH_3)_2$
958	CH	CH	R^{A5}	H	$Si(CH_3)_2$
959	CH	CH	R^{A6}	H	$Si(CH_3)_2$
960	CH	CH	R^{A7}	H	$Si(CH_3)_2$
961	CH	CH	R^{A8}	H	$Si(CH_3)_2$
962	CH	CH	H	R^{A1}	$Si(CH_3)_2$
963	CH	CH	H	R^{A2}	$Si(CH_3)_2$
964	CH	CH	H	R^{A3}	$Si(CH_3)_2$
965	CH	CH	H	R^{A4}	$Si(CH_3)_2$
966	CH	CH	H	R^{A5}	$Si(CH_3)_2$
967	CH	CH	H	R^{A6}	$Si(CH_3)_2$
968	CH	CH	H	R^{A7}	$Si(CH_3)_2$
969	CH	CH	H	R^{A8}	$Si(CH_3)_2$
970	N	CH	H	H	$Si(CH_3)_2$
971	N	CH	R^{A1}	H	$Si(CH_3)_2$
972	N	CH	R^{A2}	H	$Si(CH_3)_2$
973	N	CH	R^{A3}	H	$Si(CH_3)_2$
974	N	CH	R^{A4}	H	$Si(CH_3)_2$
975	N	CH	R^{A5}	H	$Si(CH_3)_2$
976	N	CH	R^{A6}	H	$Si(CH_3)_2$
977	N	CH	R^{A7}	H	$Si(CH_3)_2$
978	N	CH	R^{A8}	H	$Si(CH_3)_2$
979	N	CH	H	R^{A1}	$Si(CH_3)_2$
980	N	CH	H	R^{A2}	$Si(CH_3)_2$
981	N	CH	H	R^{A3}	$Si(CH_3)_2$
982	N	CH	H	R^{A4}	$Si(CH_3)_2$
983	N	CH	H	R^{A5}	$Si(CH_3)_2$
984	N	CH	H	R^{A6}	$Si(CH_3)_2$
985	N	CH	H	R^{A7}	$Si(CH_3)_2$
986	N	CH	H	R^{A8}	$Si(CH_3)_2$
987	N	N	H	H	$Si(CH_3)_2$
988	N	N	R^{A1}	H	$Si(CH_3)_2$
989	N	N	R^{A2}	H	$Si(CH_3)_2$
990	N	N	R^{A3}	H	$Si(CH_3)_2$
991	N	N	R^{A4}	H	$Si(CH_3)_2$
992	N	N	R^{A5}	H	$Si(CH_3)_2$
993	N	N	R^{A6}	H	$Si(CH_3)_2$
994	N	N	R^{A7}	H	$Si(CH_3)_2$
995	N	N	R^{A8}	H	$Si(CH_3)_2$
996	N	N	H	R^{A1}	$Si(CH_3)_2$
997	N	N	H	R^{A2}	$Si(CH_3)_2$
998	N	N	H	R^{A3}	$Si(CH_3)_2$
999	N	N	H	R^{A4}	$Si(CH_3)_2$
1000	N	N	H	R^{A5}	$Si(CH_3)_2$
1001	N	N	H	R^{A6}	$Si(CH_3)_2$
1002	N	N	H	R^{A7}	$Si(CH_3)_2$
1003	N	N	H	R^{A8}	$Si(CH_3)_2$
1004	CH	N	H	H	$Si(CH_3)_2$
1005	CH	N	R^{A1}	H	$Si(CH_3)_2$
1006	CH	N	R^{A2}	H	$Si(CH_3)_2$
1007	CH	N	R^{A3}	H	$Si(CH_3)_2$
1008	CH	N	R^{A4}	H	$Si(CH_3)_2$
1009	CH	N	R^{A5}	H	$Si(CH_3)_2$
1010	CH	N	R^{A6}	H	$Si(CH_3)_2$
1011	CH	N	R^{A7}	H	$Si(CH_3)_2$
1012	CH	N	R^{A8}	H	$Si(CH_3)_2$
1013	CH	N	H	R^{A1}	$Si(CH_3)_2$
1014	CH	N	H	R^{A2}	$Si(CH_3)_2$
1015	CH	N	H	R^{A3}	$Si(CH_3)_2$
1016	CH	N	H	R^{A4}	$Si(CH_3)_2$
1017	CH	N	H	R^{A5}	$Si(CH_3)_2$
1018	CH	N	H	R^{A6}	$Si(CH_3)_2$
1019	CH	N	H	R^{A7}	$Si(CH_3)_2$
1020	CH	N	H	R^{A8}	$Si(CH_3)_2$

Wherein:

ligands L_{A2449} to L_{A2850} are based on a structure of Formula VII



where i=1632+m

wherein m is an integer from 817 to 1218 and for each m, X^1, X^2, R^1, R^2, and R^3 are defined in formula VII as follows:

m	X^1	X^2	R^1	R^2	R^3
1018	CH	CH	R^{A1}	H	H
1019	CH	CH	R^{A1}	R^{A2}	H
1020	CH	CH	R^{A1}	R^{A3}	H
1021	CH	CH	R^{A1}	R^{A4}	H
1022	CH	CH	R^{A1}	R^{A5}	H
1023	CH	CH	R^{A1}	R^{A6}	H
1024	CH	CH	R^{A1}	R^{A7}	H
1025	CH	CH	R^{A1}	R^{A8}	H
1026	CH	CH	R^{A2}	H	H
1027	CH	CH	R^{A2}	R^{A1}	H
1028	CH	CH	R^{A2}	R^{A3}	H
1029	CH	CH	R^{A2}	R^{A4}	H
1030	CH	CH	R^{A2}	R^{A5}	H
1031	CH	CH	R^{A2}	R^{A6}	H
1032	CH	CH	R^{A2}	R^{A7}	H
1033	CH	CH	R^{A2}	R^{A8}	H
1034	CH	CH	R^{A3}	H	H
1035	CH	CH	R^{A3}	R^{A1}	H
1036	CH	CH	R^{A3}	R^{A2}	H
1037	CH	CH	R^{A3}	R^{A4}	H
1038	CH	CH	R^{A3}	R^{A5}	H
1039	CH	CH	R^{A3}	R^{A6}	H
1040	CH	CH	R^{A3}	R^{A7}	H
1041	CH	CH	R^{A3}	R^{A8}	H
1042	CH	CH	R^{A4}	H	H
1043	CH	CH	R^{A4}	R^{A1}	H
1044	CH	CH	R^{A4}	R^{A2}	H
1045	CH	CH	R^{A4}	R^{A3}	H
1046	CH	CH	R^{A4}	R^{A5}	H
1047	CH	CH	R^{A4}	R^{A6}	H
1048	CH	CH	R^{A4}	R^{A7}	H
1049	CH	CH	R^{A4}	R^{A8}	H
1050	CH	CH	R^{A5}	H	H
1051	CH	CH	R^{A5}	R^{A1}	H
1052	CH	CH	R^{A5}	R^{A2}	H
1053	CH	CH	R^{A5}	R^{A3}	H
1054	CH	CH	R^{A5}	R^{A4}	H
1055	CH	CH	R^{A5}	R^{A6}	H
1056	CH	CH	R^{A5}	R^{A7}	H
1057	CH	CH	R^{A5}	R^{A8}	H
1058	CH	CH	R^{A6}	H	H
1059	CH	CH	R^{A6}	R^{A1}	H
1060	CH	CH	R^{A6}	R^{A2}	H
1061	CH	CH	R^{A6}	R^{A3}	H
1062	CH	CH	R^{A6}	R^{A4}	H
1063	CH	CH	R^{A6}	R^{A5}	H
1064	CH	CH	R^{A6}	R^{A7}	H
1065	CH	CH	R^{A6}	R^{A8}	H
1066	CH	CH	R^{A7}	H	H
1067	CH	CH	R^{A7}	R^{A1}	H
1068	CH	CH	R^{A7}	R^{A2}	H
1069	CH	CH	R^{A7}	R^{A3}	H
1070	CH	CH	R^{A7}	R^{A4}	H
1071	CH	CH	R^{A7}	R^{A5}	H
1072	CH	CH	R^{A7}	R^{A6}	H
1073	CH	CH	R^{A7}	R^{A8}	H
1074	CH	CH	R^{A8}	H	H
1075	CH	CH	R^{A8}	R^{A1}	H
1076	CH	CH	R^{A8}	R^{A2}	H
1077	CH	CH	R^{A8}	R^{A3}	H
1078	CH	CH	R^{A8}	R^{A4}	H
1079	CH	CH	R^{A8}	R^{A5}	H
1080	CH	CH	R^{A8}	R^{A6}	H
1081	CH	CH	R^{A8}	R^{A8}	H
1082	N	CH	H	H	H
1083	N	CH	R^{A1}	H	H
1084	N	CH	R^{A1}	R^{A2}	H
1085	N	CH	R^{A1}	R^{A3}	H
1086	N	CH	R^{A1}	R^{A4}	H
1087	N	CH	R^{A1}	R^{A5}	H
1088	N	CH	R^{A1}	R^{A6}	H
1089	N	CH	R^{A1}	R^{A7}	H
1090	N	CH	R^{A1}	R^{A8}	H
1091	N	CH	R^{A2}	H	H
1092	N	CH	R^{A2}	R^{A1}	H
1093	N	CH	R^{A2}	R^{A3}	H
1094	N	CH	R^{A2}	R^{A4}	H
1095	N	CH	R^{A2}	R^{A5}	H
1096	N	CH	R^{A2}	R^{A6}	H
1097	N	CH	R^{A2}	R^{A7}	H
1098	N	CH	R^{A2}	R^{A8}	H
1099	N	CH	R^{A3}	H	H
1100	N	CH	R^{A3}	R^{A1}	H
1101	N	CH	R^{A3}	R^{A2}	H
1102	N	CH	R^{A3}	R^{A4}	H
1103	N	CH	R^{A3}	R^{A5}	H
1104	N	CH	R^{A3}	R^{A6}	H
1105	N	CH	R^{A3}	R^{A7}	H
1106	N	CH	R^{A3}	R^{A8}	H
1107	N	CH	R^{A4}	H	H
1108	N	CH	R^{A4}	R^{A1}	H
1109	N	CH	R^{A4}	R^{A2}	H
1110	N	CH	R^{A4}	R^{A3}	H
1111	N	CH	R^{A4}	R^{A5}	H
1112	N	CH	R^{A4}	R^{A6}	H
1113	N	CH	R^{A4}	R^{A7}	H
1114	N	CH	R^{A4}	R^{A8}	H
1115	N	CH	R^{A5}	H	H
1116	N	CH	R^{A5}	R^{A1}	H
1117	N	CH	R^{A5}	R^{A2}	H
1118	N	CH	R^{A5}	R^{A3}	H
1119	N	CH	R^{A5}	R^{A4}	H
1120	N	CH	R^{A5}	R^{A6}	H
1121	N	CH	R^{A5}	R^{A7}	H
1122	N	CH	R^{A5}	R^{A8}	H
1123	N	CH	R^{A6}	H	H
1124	N	CH	R^{A6}	R^{A1}	H
1125	N	CH	R^{A6}	R^{A2}	H
1126	N	CH	R^{A6}	R^{A3}	H
1127	N	CH	R^{A6}	R^{A4}	H
1128	N	CH	R^{A6}	R^{A5}	H
1129	N	CH	R^{A6}	R^{A7}	H
1130	N	CH	R^{A6}	R^{A8}	H
1131	N	CH	R^{A7}	H	H
1132	N	CH	R^{A7}	R^{A1}	H
1133	N	CH	R^{A7}	R^{A2}	H
1134	N	CH	R^{A7}	R^{A3}	H
1135	N	CH	R^{A7}	R^{A4}	H
1136	N	CH	R^{A7}	R^{A5}	H
1137	N	CH	R^{A7}	R^{A6}	H
1138	N	CH	R^{A7}	R^{A8}	H
1139	N	CH	R^{A8}	H	H
1140	N	CH	R^{A8}	R^{A1}	H
1141	N	CH	R^{A8}	R^{A2}	H
1142	N	CH	R^{A8}	R^{A3}	H
1143	N	CH	R^{A8}	R^{A4}	H
1144	N	CH	R^{A8}	R^{A5}	H
1145	N	CH	R^{A8}	R^{A6}	H

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m	X^1	X^2	R^1	R^2	R^3
1146	N	CH	R^{A8}	R^{A7}	H
1147	N	CH	R^{A1}	R^{A1}	H
1148	N	CH	R^{A2}	R^{A2}	H
1149	N	CH	R^{A3}	R^{A3}	H
1150	N	CH	R^{A4}	R^{A4}	H
1151	N	CH	R^{A5}	R^{A5}	H
1152	N	CH	R^{A6}	R^{A6}	H
1153	N	CH	R^{A7}	R^{A7}	H
1154	N	CH	R^{A8}	R^{A8}	H
1155	N	N	H	H	—
1156	N	N	R^{A1}	H	—
1157	N	N	R^{A1}	R^{A2}	—
1158	N	N	R^{A1}	R^{A3}	—
1159	N	N	R^{A1}	R^{A4}	—
1160	N	N	R^{A1}	R^{A5}	—
1161	N	N	R^{A1}	R^{A6}	—
1162	N	N	R^{A1}	R^{A7}	—
1163	N	N	R^{A1}	R^{A8}	—
1164	N	N	R^{A2}	H	—
1165	N	N	R^{A2}	R^{A1}	—
1166	N	N	R^{A2}	R^{A3}	—
1167	N	N	R^{A2}	R^{A4}	—
1168	N	N	R^{A2}	R^{A5}	—
1169	N	N	R^{A2}	R^{A6}	—
1170	N	N	R^{A2}	R^{A7}	—
1171	N	N	R^{A2}	R^{A8}	—
1172	N	N	R^{A3}	H	—
1173	N	N	R^{A3}	R^{A1}	—
1174	N	N	R^{A3}	R^{A2}	—
1175	N	N	R^{A3}	R^{A4}	—
1176	N	N	R^{A3}	R^{A5}	—
1177	N	N	R^{A3}	R^{A6}	—
1178	N	N	R^{A3}	R^{A7}	—
1179	N	N	R^{A3}	R^{A8}	—
1180	N	N	R^{A4}	H	—
1181	N	N	R^{A4}	R^{A1}	—
1182	N	N	R^{A4}	R^{A2}	—
1183	N	N	R^{A4}	R^{A3}	—
1184	N	N	R^{A4}	R^{A5}	—
1185	N	N	R^{A4}	R^{A6}	—
1186	N	N	R^{A4}	R^{A7}	—
1187	N	N	R^{A4}	R^{A8}	—
1188	N	N	R^{A5}	H	—
1189	N	N	R^{A5}	R^{A1}	—
1190	N	N	R^{A5}	R^{A2}	—
1191	N	N	R^{A5}	R^{A3}	—
1192	N	N	R^{A5}	R^{A4}	—
1193	N	N	R^{A5}	R^{A6}	—
1194	N	N	R^{A5}	R^{A7}	—
1195	N	N	R^{A5}	R^{A8}	—
1196	N	N	R^{A6}	H	—
1197	N	N	R^{A6}	R^{A1}	—
1198	N	N	R^{A6}	R^{A2}	—
1199	N	N	R^{A6}	R^{A3}	—
1200	N	N	R^{A6}	R^{A4}	—
1201	N	N	R^{A6}	R^{A5}	—
1202	N	N	R^{A6}	R^{A7}	—
1203	N	N	R^{A6}	R^{A8}	—
1204	N	N	R^{A7}	H	—
1205	N	N	R^{A7}	R^{A1}	—
1206	N	N	R^{A7}	R^{A2}	—
1207	N	N	R^{A7}	R^{A3}	—
1208	N	N	R^{A7}	R^{A4}	—
1209	N	N	R^{A7}	R^{A5}	—
1210	N	N	R^{A7}	R^{A6}	—
1211	N	N	R^{A7}	R^{A8}	—
1212	N	N	R^{A8}	H	—
1213	N	N	R^{A8}	R^{A1}	—
1214	N	N	R^{A8}	R^{A2}	—
1215	N	N	R^{A8}	R^{A3}	—
1216	N	N	R^{A8}	R^{A4}	—
1217	N	N	R^{A8}	R^{A5}	—
1218	N	N	R^{A8}	R^{A6}	—
1219	N	N	R^{A8}	R^{A7}	—

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m	X^1	X^2	R^1	R^2	R^3
1220	N	N	R^{A1}	R^{A1}	—
1221	N	N	R^{A2}	R^{A2}	—
1222	N	N	R^{A3}	R^{A3}	—
1223	N	N	R^{A4}	R^{A4}	—
1224	N	N	R^{A5}	R^{A5}	—
1225	N	N	R^{A6}	R^{A6}	—
1226	N	N	R^{A7}	R^{A7}	—
1227	N	N	R^{A8}	R^{A8}	—
1228	CH	C	R^{A1}	H	R^{A6}
1229	CH	C	R^{A1}	R^{A2}	R^{A6}
1230	CH	C	R^{A1}	R^{A3}	R^{A6}
1231	CH	C	R^{A1}	R^{A4}	R^{A6}
1232	CH	C	R^{A1}	R^{A5}	R^{A6}
1233	CH	C	R^{A1}	R^{A6}	R^{A6}
1234	CH	C	R^{A1}	R^{A7}	R^{A6}
1235	CH	C	R^{A1}	R^{A8}	R^{A6}
1236	CH	C	R^{A2}	H	R^{A6}
1237	CH	C	R^{A2}	R^{A1}	R^{A6}
1238	CH	C	R^{A2}	R^{A3}	R^{A6}
1239	CH	C	R^{A2}	R^{A4}	R^{A6}
1240	CH	C	R^{A2}	R^{A5}	R^{A6}
1241	CH	C	R^{A2}	R^{A6}	R^{A6}
1242	CH	C	R^{A2}	R^{A7}	R^{A6}
1243	CH	C	R^{A2}	R^{A8}	R^{A6}
1244	CH	C	R^{A3}	H	R^{A6}
1245	CH	C	R^{A3}	R^{A1}	R^{A6}
1246	CH	C	R^{A3}	R^{A2}	R^{A6}
1247	CH	C	R^{A3}	R^{A4}	R^{A6}
1248	CH	C	R^{A3}	R^{A5}	R^{A6}
1249	CH	C	R^{A3}	R^{A6}	R^{A6}
1250	CH	C	R^{A3}	R^{A7}	R^{A6}
1251	CH	C	R^{A3}	R^{A8}	R^{A6}
1252	CH	C	R^{A4}	H	R^{A6}
1253	CH	C	R^{A4}	R^{A1}	R^{A6}
1254	CH	C	R^{A4}	R^{A2}	R^{A6}
1255	CH	C	R^{A4}	R^{A3}	R^{A6}
1256	CH	C	R^{A4}	R^{A5}	R^{A6}
1257	CH	C	R^{A4}	R^{A6}	R^{A6}
1258	CH	C	R^{A4}	R^{A7}	R^{A6}
1259	CH	C	R^{A4}	R^{A8}	R^{A6}
1260	CH	C	R^{A5}	H	R^{A6}
1261	CH	C	R^{A5}	R^{A1}	R^{A6}
1262	CH	C	R^{A5}	R^{A2}	R^{A6}
1263	CH	C	R^{A5}	R^{A3}	R^{A6}
1264	CH	C	R^{A5}	R^{A4}	R^{A6}
1265	CH	C	R^{A5}	R^{A6}	R^{A6}
1266	CH	C	R^{A5}	R^{A7}	R^{A6}
1267	CH	C	R^{A5}	R^{A8}	R^{A6}
1268	CH	C	R^{A6}	H	R^{A6}
1269	CH	C	R^{A6}	R^{A1}	R^{A6}
1270	CH	C	R^{A6}	R^{A2}	R^{A6}
1271	CH	C	R^{A6}	R^{A3}	R^{A6}
1272	CH	C	R^{A6}	R^{A4}	R^{A6}
1273	CH	C	R^{A6}	R^{A5}	R^{A6}
1274	CH	C	R^{A6}	R^{A7}	R^{A6}
1275	CH	C	R^{A6}	R^{A8}	R^{A6}
1276	CH	C	R^{A7}	H	R^{A6}
1277	CH	C	R^{A7}	R^{A1}	R^{A6}
1278	CH	C	R^{A7}	R^{A2}	R^{A6}
1279	CH	C	R^{A7}	R^{A3}	R^{A6}
1280	CH	C	R^{A7}	R^{A4}	R^{A6}
1281	CH	C	R^{A7}	R^{A5}	R^{A6}
1282	CH	C	R^{A7}	R^{A6}	R^{A6}
1283	CH	C	R^{A7}	R^{A8}	R^{A6}
1284	CH	C	R^{A8}	H	R^{A6}
1285	CH	C	R^{A8}	R^{A1}	R^{A6}
1286	CH	C	R^{A8}	R^{A2}	R^{A6}
1287	CH	C	R^{A8}	R^{A3}	R^{A6}
1288	CH	C	R^{A8}	R^{A4}	R^{A6}
1289	CH	C	R^{A8}	R^{A5}	R^{A6}
1290	CH	C	R^{A8}	R^{A6}	R^{A6}
1291	CH	C	R^{A8}	R^{A8}	R^{A6}
1292	N	C	R^{A1}	H	R^{A6}
1293	N	C	R^{A1}	R^{A2}	R^{A6}

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m	X^1	X^2	R^1	R^2	R^3
1294	N	C	R^{A1}	R^{A3}	R^{A6}
1295	N	C	R^{A1}	R^{A4}	R^{A6}
1296	N	C	R^{A1}	R^{A5}	R^{A6}
1297	N	C	R^{A1}	R^{A6}	R^{A6}
1298	N	C	R^{A1}	R^{A7}	R^{A6}
1299	N	C	R^{A1}	R^{A8}	R^{A6}
1300	N	C	R^{A2}	H	R^{A6}
1301	N	C	R^{A2}	R^{A1}	R^{A6}
1302	N	C	R^{A2}	R^{A3}	R^{A6}
1303	N	C	R^{A2}	R^{A4}	R^{A6}
1304	N	C	R^{A2}	R^{A5}	R^{A6}
1305	N	C	R^{A2}	R^{A6}	R^{A6}
1306	N	C	R^{A2}	R^{A7}	R^{A6}
1307	N	C	R^{A2}	R^{A8}	R^{A6}
1308	N	C	R^{A3}	H	R^{A6}
1309	N	C	R^{A3}	R^{A1}	R^{A6}
1310	N	C	R^{A3}	R^{A2}	R^{A6}
1311	N	C	R^{A3}	R^{A4}	R^{A6}
1312	N	C	R^{A3}	R^{A5}	R^{A6}
1313	N	C	R^{A3}	R^{A6}	R^{A6}
1314	N	C	R^{A3}	R^{A7}	R^{A6}
1315	N	C	R^{A3}	R^{A8}	R^{A6}
1316	N	C	R^{A4}	H	R^{A6}
1317	N	C	R^{A4}	R^{A1}	R^{A6}
1318	N	C	R^{A4}	R^{A2}	R^{A6}
1319	N	C	R^{A4}	R^{A3}	R^{A6}
1320	N	C	R^{A4}	R^{A5}	R^{A6}
1321	N	C	R^{A4}	R^{A6}	R^{A6}
1322	N	C	R^{A4}	R^{A7}	R^{A6}
1323	N	C	R^{A4}	R^{A8}	R^{A6}
1324	N	C	R^{A5}	H	R^{A6}
1325	N	C	R^{A5}	R^{A1}	R^{A6}
1326	N	C	R^{A5}	R^{A2}	R^{A6}
1327	N	C	R^{A5}	R^{A3}	R^{A6}
1328	N	C	R^{A5}	R^{A4}	R^{A6}
1329	N	C	R^{A5}	R^{A6}	R^{A6}
1330	N	C	R^{A5}	R^{A7}	R^{A6}
1331	N	C	R^{A5}	R^{A8}	R^{A6}
1332	N	C	R^{A6}	H	R^{A6}
1333	N	C	R^{A6}	R^{A1}	R^{A6}
1334	N	C	R^{A6}	R^{A2}	R^{A6}
1335	N	C	R^{A6}	R^{A3}	R^{A6}
1336	N	C	R^{A6}	R^{A4}	R^{A6}
1337	N	C	R^{A6}	R^{A5}	R^{A6}
1338	N	C	R^{A6}	R^{A7}	R^{A6}
1339	N	C	R^{A6}	R^{A8}	R^{A6}
1340	N	C	R^{A7}	H	R^{A6}
1341	N	C	R^{A7}	R^{A1}	R^{A6}
1342	N	C	R^{A7}	R^{A2}	R^{A6}
1343	N	C	R^{A7}	R^{A3}	R^{A6}
1344	N	C	R^{A7}	R^{A4}	R^{A6}
1345	N	C	R^{A7}	R^{A5}	R^{A6}
1346	N	C	R^{A7}	R^{A6}	R^{A6}
1347	N	C	R^{A7}	R^{A8}	R^{A6}
1348	N	C	R^{A8}	H	R^{A6}
1349	N	C	R^{A8}	R^{A1}	R^{A6}
1350	N	C	R^{A8}	R^{A2}	R^{A6}
1351	N	C	R^{A8}	R^{A3}	R^{A6}
1352	N	C	R^{A8}	R^{A4}	R^{A6}
1353	N	C	R^{A8}	R^{A5}	R^{A6}
1354	N	C	R^{A8}	R^{A6}	R^{A6}
1355	N	C	R^{A8}	R^{A8}	R^{A6}
1356	CH	C	R^{A1}	H	R^{A8}
1357	CH	C	R^{A1}	R^{A2}	R^{A8}
1358	CH	C	R^{A1}	R^{A3}	R^{A8}
1359	CH	C	R^{A1}	R^{A4}	R^{A8}
1360	CH	C	R^{A1}	R^{A5}	R^{A8}
1361	CH	C	R^{A1}	R^{A6}	R^{A8}
1362	CH	C	R^{A1}	R^{A7}	R^{A8}
1363	CH	C	R^{A1}	R^{A8}	R^{A8}
1364	CH	C	R^{A2}	H	R^{A8}
1365	CH	C	R^{A2}	R^{A1}	R^{A8}
1366	CH	C	R^{A2}	R^{A3}	R^{A8}
1367	CH	C	R^{A2}	R^{A4}	R^{A8}

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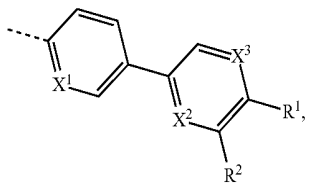
m	X^1	X^2	R^1	R^2	R^3
1368	CH	C	R^{A2}	R^{A5}	R^{A8}
1369	CH	C	R^{A2}	R^{A6}	R^{A8}
1370	CH	C	R^{A2}	R^{A7}	R^{A8}
1371	CH	C	R^{A2}	R^{A8}	R^{A8}
1372	CH	C	R^{A3}	H	R^{A8}
1373	CH	C	R^{A3}	R^{A1}	R^{A8}
1374	CH	C	R^{A3}	R^{A2}	R^{A8}
1375	CH	C	R^{A3}	R^{A4}	R^{A8}
1376	CH	C	R^{A3}	R^{A5}	R^{A8}
1377	CH	C	R^{A3}	R^{A6}	R^{A8}
1378	CH	C	R^{A3}	R^{A7}	R^{A8}
1379	CH	C	R^{A3}	R^{A8}	R^{A8}
1380	CH	C	R^{A4}	H	R^{A8}
1381	CH	C	R^{A4}	R^{A1}	R^{A8}
1382	CH	C	R^{A4}	R^{A2}	R^{A8}
1383	CH	C	R^{A4}	R^{A3}	R^{A8}
1384	CH	C	R^{A4}	R^{A5}	R^{A8}
1385	CH	C	R^{A4}	R^{A6}	R^{A8}
1386	CH	C	R^{A4}	R^{A7}	R^{A8}
1387	CH	C	R^{A4}	R^{A8}	R^{A8}
1388	CH	C	R^{A5}	H	R^{A8}
1389	CH	C	R^{A5}	R^{A1}	R^{A8}
1390	CH	C	R^{A5}	R^{A2}	R^{A8}
1391	CH	C	R^{A5}	R^{A3}	R^{A8}
1392	CH	C	R^{A5}	R^{A4}	R^{A8}
1393	CH	C	R^{A5}	R^{A6}	R^{A8}
1394	CH	C	R^{A5}	R^{A7}	R^{A8}
1395	CH	C	R^{A5}	R^{A8}	R^{A8}
1396	CH	C	R^{A6}	H	R^{A8}
1397	CH	C	R^{A6}	R^{A1}	R^{A8}
1398	CH	C	R^{A6}	R^{A2}	R^{A8}
1399	CH	C	R^{A6}	R^{A3}	R^{A8}
1400	CH	C	R^{A6}	R^{A4}	R^{A8}
1401	CH	C	R^{A6}	R^{A5}	R^{A8}
1402	CH	C	R^{A6}	R^{A7}	R^{A8}
1403	CH	C	R^{A6}	R^{A8}	R^{A8}
1404	CH	C	R^{A7}	H	R^{A8}
1405	CH	C	R^{A7}	R^{A1}	R^{A8}
1406	CH	C	R^{A7}	R^{A2}	R^{A8}
1407	CH	C	R^{A7}	R^{A3}	R^{A8}
1408	CH	C	R^{A7}	R^{A4}	R^{A8}
1409	CH	C	R^{A7}	R^{A5}	R^{A8}
1410	CH	C	R^{A7}	R^{A6}	R^{A8}
1411	CH	C	R^{A7}	R^{A8}	R^{A8}
1412	CH	C	R^{A8}	H	R^{A8}
1413	CH	C	R^{A8}	R^{A1}	R^{A8}
1414	CH	C	R^{A8}	R^{A2}	R^{A8}
1415	CH	C	R^{A8}	R^{A3}	R^{A8}
1416	CH	C	R^{A8}	R^{A4}	R^{A8}
1417	CH	C	R^{A8}	R^{A5}	R^{A8}
1418	CH	C	R^{A8}	R^{A6}	R^{A8}
1419	CH	C	R^{A8}	R^{A8}	R^{A8}

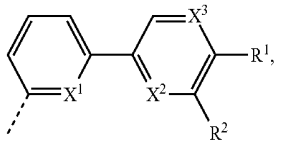
wherein:

ligands L_{A2851} to L_{A2986} are based on a structure of Formula VIII



where i=1632+m;

ligands L_{A2987} to L_{A3122} are based on a structure of Formula IX



where i=1768+m;

wherein m is an integer from 1219 to 1354 and for each m, X^1, X^2, X^3, R^1, and R^2 are defined in formulas VIII, and IX as follows:

m	X^1	X^2	X^3	R^1	R^2
1287	CH	CH	CH	H	H
1288	CH	CH	CH	R^{A1}	H
1289	CH	CH	CH	R^{A2}	H
1290	CH	CH	CH	R^{A3}	H
1291	CH	CH	CH	R^{A4}	H
1292	CH	CH	CH	R^{A5}	H
1293	CH	CH	CH	R^{A6}	H
1294	CH	CH	CH	R^{A7}	H
1295	CH	CH	CH	R^{A8}	H
1296	CH	CH	CH	H	R^{A1}
1297	CH	CH	CH	H	R^{A2}
1298	CH	CH	CH	H	R^{A3}
1299	CH	CH	CH	H	R^{A4}
1300	CH	CH	CH	H	R^{A5}
1301	CH	CH	CH	H	R^{A6}
1302	CH	CH	CH	H	R^{A7}
1303	CH	CH	CH	H	R^{A8}
1304	N	CH	CH	H	H
1305	N	CH	CH	R^{A1}	H
1306	N	CH	CH	R^{A2}	H
1307	N	CH	CH	R^{A3}	H
1308	N	CH	CH	R^{A4}	H
1309	N	CH	CH	R^{A5}	H
1310	N	CH	CH	R^{A6}	H
1311	N	CH	CH	R^{A7}	H
1312	N	CH	CH	R^{A8}	H
1313	N	CH	CH	H	R^{A1}
1314	N	CH	CH	H	R^{A2}
1315	N	CH	CH	H	R^{A3}
1316	N	CH	CH	H	R^{A4}
1317	N	CH	CH	H	R^{A5}
1318	N	CH	CH	H	R^{A6}
1319	N	CH	CH	H	R^{A7}
1320	N	CH	CH	H	R^{A8}
1321	CH	N	CH	H	H
1322	CH	N	CH	R^{A1}	H
1323	CH	N	CH	R^{A2}	H
1324	CH	N	CH	R^{A3}	H
1325	CH	N	CH	R^{A4}	H
1326	CH	N	CH	R^{A5}	H
1327	CH	N	CH	R^{A6}	H
1328	CH	N	CH	R^{A7}	H
1329	CH	N	CH	R^{A8}	H
1330	CH	N	CH	H	R^{A1}
1331	CH	N	CH	H	R^{A2}
1332	CH	N	CH	H	R^{A3}
1333	CH	N	CH	H	R^{A4}
1334	CH	N	CH	H	R^{A5}
1335	CH	N	CH	H	R^{A6}
1336	CH	N	CH	H	R^{A7}
1337	CH	N	CH	H	R^{A8}
1338	CH	N	CH	H	H
1339	CH	N	CH	R^{A1}	H
1340	CH	N	CH	R^{A2}	H
1341	CH	N	CH	R^{A3}	H
1342	CH	N	CH	R^{A4}	H

-continued

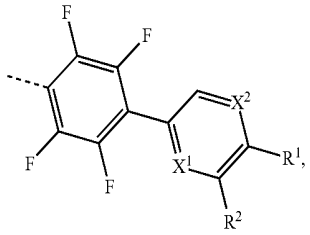
m	X^1	X^2	X^3	R^1	R^2
1343	CH	N	CH	R^{A5}	H
1344	CH	N	CH	R^{A6}	H
1345	CH	N	CH	R^{A7}	H
1346	CH	N	CH	R^{A8}	H
1347	CH	N	CH	H	R^{A1}
1348	CH	N	CH	H	R^{A2}
1349	CH	N	CH	H	R^{A3}
1350	CH	N	CH	H	R^{A4}
1351	CH	N	CH	H	R^{A5}
1352	CH	N	CH	H	R^{A6}
1353	CH	N	CH	H	R^{A7}
1354	CH	N	CH	H	R^{A8}
1355	CH	CH	N	H	H
1356	CH	CH	N	R^{A1}	H
1357	CH	CH	N	R^{A2}	H
1358	CH	CH	N	R^{A3}	H
1359	CH	CH	N	R^{A4}	H
1360	CH	CH	N	R^{A5}	H
1361	CH	CH	N	R^{A6}	H
1362	CH	CH	N	R^{A7}	H
1363	CH	CH	N	R^{A8}	H
1364	CH	CH	N	H	R^{A1}
1365	CH	CH	N	H	R^{A2}
1366	CH	CH	N	H	R^{A3}
1367	CH	CH	N	H	R^{A4}
1368	CH	CH	N	H	R^{A5}
1369	CH	CH	N	H	R^{A6}
1370	CH	CH	N	H	R^{A7}
1371	CH	CH	N	H	R^{A8}
1372	N	CH	N	H	H
1373	N	CH	N	R^{A1}	H
1374	N	CH	N	R^{A2}	H
1375	N	CH	N	R^{A3}	H
1376	N	CH	N	R^{A4}	H
1377	N	CH	N	R^{A5}	H
1378	N	CH	N	R^{A6}	H
1379	N	CH	N	R^{A7}	H
1380	N	CH	N	R^{A8}	H
1381	N	CH	N	H	R^{A1}
1382	N	CH	N	H	R^{A2}
1383	N	CH	N	H	R^{A3}
1384	N	CH	N	H	R^{A4}
1385	N	CH	N	H	R^{A5}
1386	N	CH	N	H	R^{A6}
1387	N	CH	N	H	R^{A7}
1388	N	CH	N	H	R^{A8}
1389	CH	N	N	H	H
1390	CH	N	N	R^{A1}	H
1391	CH	N	N	R^{A2}	H
1392	CH	N	N	R^{A3}	H
1393	CH	N	N	R^{A4}	H
1394	CH	N	N	R^{A5}	H
1395	CH	N	N	R^{A6}	H
1396	CH	N	N	R^{A7}	H
1397	CH	N	N	R^{A8}	H
1398	CH	N	N	H	R^{A1}
1399	CH	N	N	H	R^{A2}
1400	CH	N	N	H	R^{A3}
1401	CH	N	N	H	R^{A4}
1402	CH	N	N	H	R^{A5}
1403	CH	N	N	H	R^{A6}
1404	CH	N	N	H	R^{A7}
1405	CH	N	N	H	R^{A8}
1406	CH	N	N	H	H
1407	CH	N	N	R^{A1}	H
1408	CH	N	N	R^{A2}	H
1409	CH	N	N	R^{A3}	H
1410	CH	N	N	R^{A4}	H
1411	CH	N	N	R^{A5}	H
1412	CH	N	N	R^{A6}	H
1413	CH	N	N	R^{A7}	H
1414	CH	N	N	R^{A8}	H
1415	CH	N	N	H	R^{A1}
1416	CH	N	N	H	R^{A2}

-continued

m	X^1	X^2	X^3	R^1	R^2
1417	CH	N	N	H	R^{A3}
1418	CH	N	N	H	R^{A4}
1419	CH	N	N	H	R^{A5}
1420	CH	N	N	H	R^{A6}
1421	CH	N	N	H	R^{A7}
1422	CH	N	N	H	R^{A8}

wherein:

ligands L_{A3123} to L_{A3382} are based on a structure of Formula X



where i=1768+m;

wherein m is an integer from 1355 to 1614 and for each m, X^1, X^2, R^1, and R^2 are defined in Formula X as follows:

m	X^1	X^2	R^1	R^2
1485	CH	CH	H	H
1486	CH	CH	R^{A1}	H
1487	CH	CH	R^{A1}	R^{A2}
1488	CH	CH	R^{A1}	R^{A3}
1489	CH	CH	R^{A1}	R^{A4}
1490	CH	CH	R^{A1}	R^{A5}
1491	CH	CH	R^{A1}	R^{A6}
1492	CH	CH	R^{A1}	R^{A7}
1493	CH	CH	R^{A1}	R^{A8}
1494	CH	CH	R^{A2}	H
1495	CH	CH	R^{A2}	R^{A1}
1496	CH	CH	R^{A2}	R^{A3}
1497	CH	CH	R^{A2}	R^{A4}
1498	CH	CH	R^{A2}	R^{A5}
1499	CH	CH	R^{A2}	R^{A6}
1500	CH	CH	R^{A2}	R^{A7}
1501	CH	CH	R^{A2}	R^{A8}
1502	CH	CH	R^{A3}	H
1503	CH	CH	R^{A3}	R^{A1}
1504	CH	CH	R^{A3}	R^{A2}
1505	CH	CH	R^{A3}	R^{A4}
1506	CH	CH	R^{A3}	R^{A5}
1507	CH	CH	R^{A3}	R^{A6}
1508	CH	CH	R^{A3}	R^{A7}
1509	CH	CH	R^{A3}	R^{A8}
1510	CH	CH	R^{A4}	H
1511	CH	CH	R^{A4}	R^{A1}
1512	CH	CH	R^{A4}	R^{A2}
1513	CH	CH	R^{A4}	R^{A3}
1514	CH	CH	R^{A4}	R^{A5}
1515	CH	CH	R^{A4}	R^{A6}
1516	CH	CH	R^{A4}	R^{A7}
1517	CH	CH	R^{A4}	R^{A8}
1518	CH	CH	R^{A5}	H
1519	CH	CH	R^{A5}	R^{A1}
1520	CH	CH	R^{A5}	R^{A2}
1521	CH	CH	R^{A5}	R^{A3}
1522	CH	CH	R^{A5}	R^{A4}
1523	CH	CH	R^{A5}	R^{A6}

-continued

m	X^1	X^2	R^1	R^2
1524	CH	CH	R^{A5}	R^{A7}
1525	CH	CH	R^{A5}	R^{A8}
1526	CH	CH	R^{A6}	H
1527	CH	CH	R^{A6}	R^{A1}
1528	CH	CH	R^{A6}	R^{A2}
1529	CH	CH	R^{A6}	R^{A3}
1530	CH	CH	R^{A6}	R^{A4}
1531	CH	CH	R^{A6}	R^{A5}
1532	CH	CH	R^{A6}	R^{A7}
1533	CH	CH	R^{A6}	R^{A8}
1534	CH	CH	R^{A7}	H
1535	CH	CH	R^{A7}	R^{A1}
1536	CH	CH	R^{A7}	R^{A2}
1537	CH	CH	R^{A7}	R^{A3}
1538	CH	CH	R^{A7}	R^{A4}
1539	CH	CH	R^{A7}	R^{A5}
1540	CH	CH	R^{A7}	R^{A6}
1541	CH	CH	R^{A7}	R^{A8}
1542	CH	CH	R^{A8}	H
1543	CH	CH	R^{A8}	R^{A1}
1544	CH	CH	R^{A8}	R^{A2}
1545	CH	CH	R^{A8}	R^{A3}
1546	CH	CH	R^{A8}	R^{A4}
1547	CH	CH	R^{A8}	R^{A5}
1548	CH	CH	R^{A8}	R^{A6}
1549	CH	CH	R^{A8}	R^{A8}
1550	N	CH	H	H
1551	N	CH	R^{A1}	H
1552	N	CH	R^{A1}	R^{A2}
1553	N	CH	R^{A1}	R^{A3}
1554	N	CH	R^{A1}	R^{A4}
1555	N	CH	R^{A1}	R^{A5}
1556	N	CH	R^{A1}	R^{A6}
1557	N	CH	R^{A1}	R^{A7}
1558	N	CH	R^{A1}	R^{A8}
1559	N	CH	R^{A2}	H
1560	N	CH	R^{A2}	R^{A1}
1561	N	CH	R^{A2}	R^{A3}
1562	N	CH	R^{A2}	R^{A4}
1563	N	CH	R^{A2}	R^{A5}
1564	N	CH	R^{A2}	R^{A6}
1565	N	CH	R^{A2}	R^{A7}
1566	N	CH	R^{A2}	R^{A8}
1567	N	CH	R^{A3}	H
1568	N	CH	R^{A3}	R^{A1}
1569	N	CH	R^{A3}	R^{A2}
1570	N	CH	R^{A3}	R^{A4}
1571	N	CH	R^{A3}	R^{A5}
1572	N	CH	R^{A3}	R^{A6}
1573	N	CH	R^{A3}	R^{A7}
1574	N	CH	R^{A3}	R^{A8}
1575	N	CH	R^{A4}	H
1576	N	CH	R^{A4}	R^{A1}
1577	N	CH	R^{A4}	R^{A2}
1578	N	CH	R^{A4}	R^{A3}
1579	N	CH	R^{A4}	R^{A5}
1580	N	CH	R^{A4}	R^{A6}
1581	N	CH	R^{A4}	R^{A7}
1582	N	CH	R^{A4}	R^{A8}
1583	N	CH	R^{A5}	H
1584	N	CH	R^{A5}	R^{A1}
1585	N	CH	R^{A5}	R^{A2}
1586	N	CH	R^{A5}	R^{A3}
1587	N	CH	R^{A5}	R^{A4}
1588	N	CH	R^{A5}	R^{A6}
1589	N	CH	R^{A5}	R^{A7}
1590	N	CH	R^{A5}	R^{A8}
1591	N	CH	R^{A6}	H
1592	N	CH	R^{A6}	R^{A1}
1593	N	CH	R^{A6}	R^{A2}
1594	N	CH	R^{A6}	R^{A3}
1595	N	CH	R^{A6}	R^{A4}
1596	N	CH	R^{A6}	R^{A5}
1597	N	CH	R^{A6}	R^{A7}

-continued

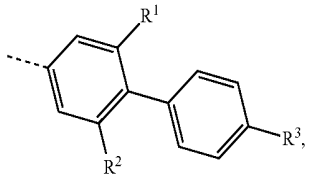
m	X^1	X^2	R^1	R^2
1598	N	CH	R^{A6}	R^{A8}
1599	N	CH	R^{A7}	H
1600	N	CH	R^{A7}	R^{A1}
1601	N	CH	R^{A7}	R^{A2}
1602	N	CH	R^{A7}	R^{A3}
1603	N	CH	R^{A7}	R^{A4}
1604	N	CH	R^{A7}	R^{A5}
1605	N	CH	R^{A7}	R^{A6}
1606	N	CH	R^{A7}	R^{A8}
1607	N	CH	R^{A8}	H
1608	N	CH	R^{A8}	R^{A1}
1609	N	CH	R^{A8}	R^{A2}
1610	N	CH	R^{A8}	R^{A3}
1611	N	CH	R^{A8}	R^{A4}
1612	N	CH	R^{A8}	R^{A5}
1613	N	CH	R^{A8}	R^{A6}
1614	N	CH	R^{A8}	R^{A8}
1615	CH	N	H	H
1616	CH	N	R^{A1}	H
1617	CH	N	R^{A1}	R^{A2}
1618	CH	N	R^{A1}	R^{A3}
1619	CH	N	R^{1A}	R^{A4}
1620	CH	N	R^{A1}	R^{A5}
1621	CH	N	R^{A1}	R^{A6}
1622	CH	N	R^{A1}	R^{A7}
1623	CH	N	R^{A1}	R^{A8}
1624	CH	N	R^{A2}	H
1625	CH	N	R^{A2}	R^{A1}
1626	CH	N	R^{A2}	R^{A3}
1627	CH	N	R^{A2}	R^{A4}
1628	CH	N	R^{A2}	R^{A5}
1629	CH	N	R^{A2}	R^{A6}
1630	CH	N	R^{A2}	R^{A1}
1631	CH	N	R^{A2}	R^{A8}
1632	CH	N	R^{A3}	H
1633	CH	N	R^{A3}	R^{A1}
1634	CH	N	R^{A3}	R^{A2}
1635	CH	N	R^{A3}	R^{A4}
1636	CH	N	R^{A3}	R^{A5}
1637	CH	N	R^{A3}	R^{A6}
1638	CH	N	R^{A3}	R^{A7}
1639	CH	N	R^{A3}	R^{A8}
1640	CH	N	R^{A4}	H
1641	CH	N	R^{A4}	R^{A1}
1642	CH	N	R^{A4}	R^{A2}
1643	CH	N	R^{A4}	R^{A3}
1644	CH	N	R^{A4}	R^{A5}
1645	CH	N	R^{A4}	R^{A6}
1646	CH	N	R^{A4}	R^{A7}
1647	CH	N	R^{A4}	R^{A8}
1648	CH	N	R^{A5}	H
1649	CH	N	R^{A5}	R^{A1}
1650	CH	N	R^{A5}	R^{A2}
1651	CH	N	R^{A5}	R^{A3}
1652	CH	N	R^{A5}	R^{A4}
1653	CH	N	R^{A5}	R^{A6}
1654	CH	N	R^{A5}	R^{A7}
1655	CH	N	R^{A5}	R^{A8}
1656	CH	N	R^{A6}	H
1657	CH	N	R^{A6}	R^{A1}
1658	CH	N	R^{A6}	R^{A2}
1659	CH	N	R^{A6}	R^{A3}
1660	CH	N	R^{A6}	R^{A4}
1661	CH	N	R^{A6}	R^{A5}
1662	CH	N	R^{A6}	R^{A7}
1663	CH	N	R^{A6}	R^{A8}
1664	CH	N	R^{A7}	H
1665	CH	N	R^{A7}	R^{A1}
1666	CH	N	R^{A7}	R^{A2}
1667	CH	N	R^{A7}	R^{A3}
1668	CH	N	R^{A7}	R^{A4}
1669	CH	N	R^{A7}	R^{A5}
1670	CH	N	R^{A7}	R^{A6}
1671	CH	N	R^{A7}	R^{A8}

-continued

m	X^1	X^2	R^1	R^2
1672	CH	N	R^{A8}	H
1673	CH	N	R^{A8}	R^{A1}
1674	CH	N	R^{A8}	R^{A2}
1675	CH	N	R^{A8}	R^{A3}
1676	CH	N	R^{A8}	R^{A4}
1677	CH	N	R^{A8}	R^{A5}
1678	CH	N	R^{A8}	R^{A6}
1679	CH	N	R^{A8}	R^{A8}
1680	N	N	H	H
1681	N	N	R^{A1}	H
1682	N	N	R^{A1}	R^{A2}
1683	N	N	R^{A1}	R^{A3}
1684	N	N	R^{A1}	R^{A4}
1685	N	N	R^{A1}	R^{A5}
1686	N	N	R^{A1}	R^{A6}
1687	N	N	R^{A1}	R^{A7}
1688	N	N	R^{A1}	R^{A8}
1689	N	N	R^{A2}	H
1690	N	N	R^{A2}	R^{A1}
1691	N	N	R^{A2}	R^{A3}
1692	N	N	R^{A2}	R^{A4}
1693	N	N	R^{A2}	R^{A5}
1694	N	N	R^{A2}	R^{A6}
1695	N	N	R^{A2}	R^{A7}
1696	N	N	R^{A2}	R^{A8}
1697	N	N	R^{A3}	H
1698	N	N	R^{A3}	R^{A1}
1699	N	N	R^{A3}	R^{A2}
1700	N	N	R^{A3}	R^{A4}
1701	N	N	R^{A3}	R^{A5}
1702	N	N	R^{A3}	R^{A6}
1703	N	N	R^{A3}	R^{A7}
1704	N	N	R^{A3}	R^{A8}
1705	N	N	R^{A4}	H
1706	N	N	R^{A4}	R^{A1}
1707	N	N	R^{A4}	R^{A2}
1708	N	N	R^{A4}	R^{A3}
1709	N	N	R^{A4}	R^{A5}
1710	N	N	R^{A4}	R^{A6}
1711	N	N	R^{A4}	R^{A7}
1712	N	N	R^{A4}	R^{A8}
1713	N	N	R^{A5}	H
1714	N	N	R^{A5}	R^{A1}
1715	N	N	R^{A5}	R^{A2}
1716	N	N	R^{A5}	R^{A3}
1717	N	N	R^{A5}	R^{A4}
1718	N	N	R^{A5}	R^{A6}
1719	N	N	R^{A5}	R^{A7}
1720	N	N	R^{A5}	R^{A8}
1721	N	N	R^{A6}	H
1722	N	N	R^{A6}	R^{A1}
1723	N	N	R^{A6}	R^{A2}
1724	N	N	R^{A6}	R^{A3}
1725	N	N	R^{A6}	R^{A4}
1726	N	N	R^{A6}	R^{A5}
1727	N	N	R^{A6}	R^{A7}
1728	N	N	R^{A6}	R^{A8}
1729	N	N	R^{A7}	H
1730	N	N	R^{A7}	R^{A1}
1731	N	N	R^{A7}	R^{A2}
1732	N	N	R^{A7}	R^{A3}
1733	N	N	R^{A7}	R^{A4}
1734	N	N	R^{A7}	R^{A5}
1735	N	N	R^{A7}	R^{A6}
1736	N	N	R^{A7}	R^{A8}
1737	N	N	R^{A8}	H
1738	N	N	R^{A8}	R^{A1}
1739	N	N	R^{A8}	R^{A2}
1740	N	N	R^{A8}	R^{A3}
1741	N	N	R^{A8}	R^{A4}
1742	N	N	R^{A8}	R^{A5}
1743	N	N	R^{A8}	R^{A6}
1744	N	N	R^{A8}	R^{A8}

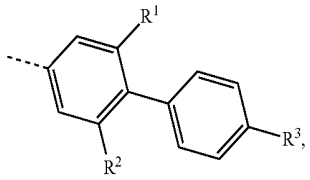
wherein:

ligands L_{A3382} to L_{A3446} are based on a structure of Formula XI



where i=1768+m;

ligands L_{A3447} to L_{A3510} are based on a structure of Formula XII



where i=1832+m;

wherein m is an integer from 1615 to 1678 and for each m, R^1, R^2, and R^3 are defined in formulas XI and XII as follows:

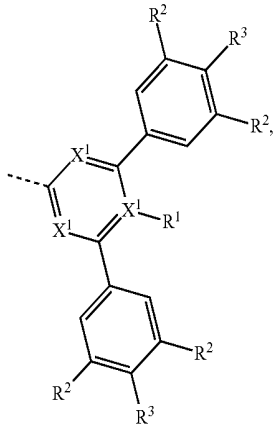
M	R^1	R^2	R^3
1647	R^{A1}	R^{A1}	H
1648	R^{A2}	R^{A2}	H
1649	R^{A3}	R^{A3}	H
1650	R^{A4}	R^{A4}	H
1651	R^{A5}	R^{A5}	H
1652	R^{A6}	R^{A6}	H
1653	R^{A7}	R^{A7}	H
1654	R^{A8}	R^{A8}	H
1655	R^{A1}	R^{A1}	R^{A1}
1656	R^{A2}	R^{A2}	R^{A1}
1657	R^{A3}	R^{A3}	R^{A1}
1658	R^{A4}	R^{A4}	R^{A1}
1659	R^{A5}	R^{A5}	R^{A1}
1660	R^{A6}	R^{A6}	R^{A1}
1661	R^{A7}	R^{A7}	R^{A1}
1662	R^{A8}	R^{A8}	R^{A1}
1663	R^{A1}	R^{A1}	R^{A2}
1664	R^{A2}	R^{A2}	R^{A2}
1665	R^{A3}	R^{A3}	R^{A2}
1666	R^{A4}	R^{A4}	R^{A2}
1667	R^{A5}	R^{A5}	R^{A2}
1668	R^{A6}	R^{A6}	R^{A2}
1669	R^{A7}	R^{A7}	R^{A2}
1670	R^{A8}	R^{A8}	R^{A2}
1671	R^{A1}	R^{A1}	R^{A2}
1672	R^{A2}	R^{A2}	R^{A2}
1673	R^{A3}	R^{A3}	R^{A2}
1674	R^{A4}	R^{A4}	R^{A2}
1675	R^{A5}	R^{A5}	R^{A2}
1676	R^{A6}	R^{A6}	R^{A2}
1677	R^{A7}	R^{A7}	R^{A2}
1678	R^{A8}	R^{A8}	R^{A2}
1679	R^{A1}	R^{A1}	R^{A5}
1680	R^{A2}	R^{A2}	R^{A5}
1681	R^{A3}	R^{A3}	R^{A5}
1682	R^{A4}	R^{A4}	R^{A5}
1683	R^{A5}	R^{A5}	R^{A5}
1684	R^{A6}	R^{A6}	R^{A5}

-continued

M	R^1	R^2	R^3
1685	R^{A7}	R^{A7}	R^{A5}
1686	R^{A8}	R^{A8}	R^{A5}
1687	R^{A1}	R^{A1}	R^{A6}
1688	R^{A2}	R^{A2}	R^{A6}
1689	R^{A3}	R^{A3}	R^{A6}
1690	R^{A4}	R^{A4}	R^{A6}
1691	R^{A5}	R^{A5}	R^{A6}
1692	R^{A6}	R^{A6}	R^{A6}
1693	R^{A7}	R^{A7}	R^{A6}
1694	R^{A8}	R^{A8}	R^{A6}
1695	R^{A1}	R^{A1}	R^{A7}
1696	R^{A2}	R^{A2}	R^{A7}
1697	R^{A3}	R^{A3}	R^{A7}
1698	R^{A4}	R^{A4}	R^{A7}
1699	R^{A5}	R^{A5}	R^{A7}
1700	R^{A6}	R^{A6}	R^{A7}
1701	R^{A7}	R^{A7}	R^{A7}
1702	R^{A8}	R^{A8}	R^{A7}
1703	R^{A1}	R^{A1}	R^{A8}
1704	R^{A2}	R^{A2}	R^{A8}
1705	R^{A3}	R^{A3}	R^{A8}
1706	R^{A4}	R^{A4}	R^{A8}
1707	R^{A5}	R^{A5}	R^{A8}
1708	R^{A6}	R^{A6}	R^{A8}
1709	R^{A7}	R^{A7}	R^{A8}
1710	R^{A8}	R^{A8}	R^{A8}

wherein:

ligands L_{A3511} to L_{A3663} are based on a structure of Formula XIII



where i=1832+m;

wherein m is an integer from 1679 to 1831 and for each m, R^1, R^2, R^3, and X^1 are defined in formula XIII as follows:

m	R^1	R^2	R^3	X^1
1756	H	H	H	CH
1757	H	R^{A1}	H	CH
1758	H	R^{A2}	H	CH
1759	H	R^{A3}	H	CH
1760	H	R^{A4}	H	CH
1761	H	R^{A5}	H	CH
1762	H	R^{A6}	H	CH
1763	H	R^{A7}	H	CH
1764	H	R^{A8}	H	CH
1765	H	H	R^{A1}	CH

-continued

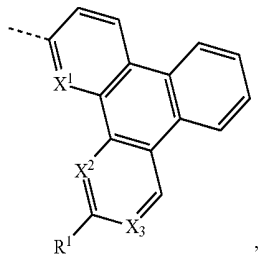
m	R^1	R^2	R^3	X^1
1766	H	H	R^{A2}	CH
1767	H	H	R^{A3}	CH
1768	H	H	R^{A4}	CH
1769	H	H	R^{A5}	CH
1770	H	H	R^{A6}	CH
1771	H	H	R^{A7}	CH
1772	H	H	R^{A8}	CH
1773	R^{A1}	H	H	CH
1774	R^{A1}	R^{A1}	H	CH
1775	R^{A1}	R^{A2}	H	CH
1776	R^{A1}	R^{A3}	H	CH
1777	R^{A1}	R^{A4}	H	CH
1778	R^{A1}	R^{A5}	H	CH
1779	R^{A1}	R^{A6}	H	CH
1780	R^{A1}	R^{A7}	H	CH
1781	R^{A1}	R^{A8}	H	CH
1782	R^{A1}	H	R^{A1}	CH
1783	R^{A1}	H	R^{A2}	CH
1784	R^{A1}	H	R^{A3}	CH
1785	R^{A1}	H	R^{A4}	CH
1786	R^{A1}	H	R^{A5}	CH
1787	R^{A1}	H	R^{A6}	CH
1788	R^{A1}	H	R^{A7}	CH
1789	R^{A1}	H	R^{A8}	CH
1790	R^{A2}	H	H	CH
1791	R^{A2}	R^{A1}	H	CH
1792	R^{A2}	R^{A2}	H	CH
1793	R^{A2}	R^{A3}	H	CH
1794	R^{A2}	R^{A4}	H	CH
1795	R^{A2}	R^{A5}	H	CH
1796	R^{A2}	R^{A6}	H	CH
1797	R^{A2}	R^{A7}	H	CH
1798	R^{A2}	R^{A8}	H	CH
1799	R^{A2}	H	R^{A1}	CH
1800	R^{A2}	H	R^{A2}	CH
1801	R^{A2}	H	R^{A3}	CH
1802	R^{A2}	H	R^{A4}	CH
1803	R^{A2}	H	R^{A5}	CH
1804	R^{A2}	H	R^{A6}	CH
1805	R^{A2}	H	R^{A7}	CH
1806	R^{A2}	H	R^{A8}	CH
1807	R^{A3}	H	H	CH
1808	R^{A3}	R^{A1}	H	CH
1809	R^{A3}	R^{A2}	H	CH
1810	R^{A3}	R^{A3}	H	CH
1811	R^{A3}	R^{A4}	H	CH
1812	R^{A3}	R^{A5}	H	CH
1813	R^{A3}	R^{A6}	H	CH
1814	R^{A3}	R^{A7}	H	CH
1815	R^{A3}	R^{A8}	H	CH
1816	R^{A3}	H	R^{A1}	CH
1817	R^{A3}	H	R^{A2}	CH
1818	R^{A3}	H	R^{A3}	CH
1819	R^{A3}	H	R^{A4}	CH
1820	R^{A3}	H	R^{A5}	CH
1821	R^{A3}	H	R^{A6}	CH
1822	R^{A3}	H	R^{A7}	CH
1823	R^{A3}	H	R^{A8}	CH
1824	R^{A4}	H	H	CH
1825	R^{A4}	R^{A1}	H	CH
1826	R^{A4}	R^{A2}	H	CH
1827	R^{A4}	R^{A3}	H	CH
1828	R^{A4}	R^{A4}	H	CH
1829	R^{A4}	R^{A5}	H	CH
1830	R^{A4}	R^{A6}	H	CH
1831	R^{A4}	R^{A7}	H	CH
1832	R^{A4}	R^{A8}	H	CH
1832	R^{A4}	H	R^{A1}	CH
1833	R^{A4}	H	R^{A2}	CH
1834	R^{A4}	H	R^{A3}	CH
1835	R^{A4}	H	R^{A4}	CH
1836	R^{A4}	H	R^{A5}	CH
1837	R^{A4}	H	R^{A6}	CH
1838	R^{A4}	H	R^{A7}	CH

-continued

m	R^1	R^2	R^3	X^1
1839	R^{A4}	H	R^{A8}	CH
1840	R^{A5}	H	H	CH
1841	R^{A5}	R^{A1}	H	CH
1842	R^{A5}	R^{A2}	H	CH
1843	R^{A5}	R^{A3}	H	CH
1844	R^{A5}	R^{A4}	H	CH
1845	R^{A5}	R^{A5}	H	CH
1846	R^{A5}	R^{A6}	H	CH
1847	R^{A5}	R^{A7}	H	CH
1848	R^{A5}	R^{A8}	H	CH
1849	R^{A5}	H	R^{A1}	CH
1850	R^{A5}	H	R^{A2}	CH
1851	R^{A5}	H	R^{A3}	CH
1852	R^{A5}	H	R^{A4}	CH
1853	R^{A5}	H	R^{A5}	CH
1854	R^{A5}	H	R^{A6}	CH
1855	R^{A5}	H	R^{A7}	CH
1856	R^{A5}	H	R^{A8}	CH
1857	R^{A7}	H	H	CH
1858	R^{A7}	R^{A1}	H	CH
1859	R^{A7}	R^{A2}	H	CH
1860	R^{A7}	R^{A3}	H	CH
1861	R^{A7}	R^{A4}	H	CH
1862	R^{A7}	R^{A5}	H	CH
1863	R^{A7}	R^{A6}	H	CH
1864	R^{A7}	R^{A7}	H	CH
1865	R^{A7}	R^{A8}	H	CH
1866	R^{A7}	H	R^{A1}	CH
1867	R^{A7}	H	R^{A2}	CH
1868	R^{A7}	H	R^{A3}	CH
1869	R^{A7}	H	R^{A4}	CH
1870	R^{A7}	H	R^{A5}	CH
1871	R^{A7}	H	R^{A6}	CH
1872	R^{A7}	H	R^{A7}	CH
1873	R^{A7}	H	R^{A8}	CH
1874	R^{A8}	H	H	CH
1875	R^{A8}	R^{A1}	H	CH
1876	R^{A8}	R^{A2}	H	CH
1877	R^{A8}	R^{A3}	H	CH
1878	R^{A8}	R^{A4}	H	CH
1879	R^{A8}	R^{A5}	H	CH
1880	R^{A8}	R^{A6}	H	CH
1881	R^{A8}	R^{A7}	H	CH
1882	R^{A8}	R^{A8}	H	CH
1883	R^{A8}	H	R^{A1}	CH
1884	R^{A8}	H	R^{A2}	CH
1885	R^{A8}	H	R^{A3}	CH
1886	R^{A8}	H	R^{A4}	CH
1887	R^{A8}	H	R^{A5}	CH
1888	R^{A8}	H	R^{A6}	CH
1889	R^{A8}	H	R^{A7}	CH
1890	R^{A8}	H	R^{A8}	CH
1891	—	H	H	N
1892	—	R^{A1}	H	N
1893	—	R^{A2}	H	N
1894	—	R^{A3}	H	N
1895	—	R^{A4}	H	N
1896	—	R^{A5}	H	N
1897	—	R^{A6}	H	N
1898	—	R^{A7}	H	N
1899	—	R^{A8}	H	N
1900	—	H	R^{A1}	N
1901	—	H	R^{A2}	N
1902	—	H	R^{A3}	N
1903	—	H	R^{A4}	N
1904	—	H	R^{A5}	N
1905	—	H	R^{A6}	N
1906	—	H	R^{A7}	N
1907	—	H	R^{A8}	N

wherein:

ligands L_{A3664} to L_{A3735} are based on a structure of Formula XIV

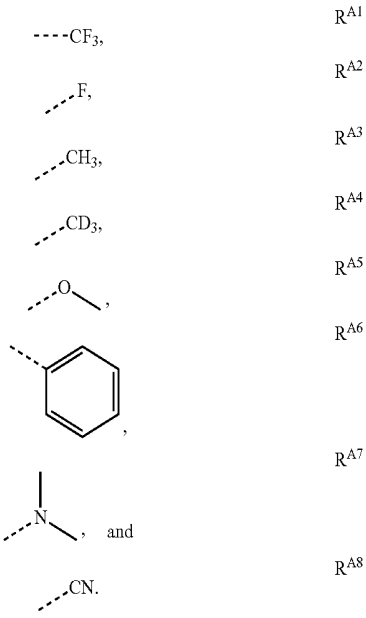


where i=1832+m;

wherein m is an integer from 1832 to 1903 and for each m, X^1, X^2, X^3, and R^1 are defined in formula XIV as follows:

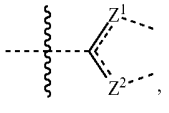
m	X^1	X^2	X^3	R^1
1868	CH	CH	CH	H
1869	CH	CH	CH	R^{A1}
1870	CH	CH	CH	R^{A2}
1871	CH	CH	CH	R^{A3}
1872	CH	CH	CH	R^{A4}
1873	CH	CH	CH	R^{A5}
1874	CH	CH	CH	R^{A6}
1875	CH	CH	CH	R^{A7}
1876	CH	CH	CH	R^{A8}
1877	N	CH	CH	H
1878	N	CH	CH	R^{A1}
1879	N	CH	CH	R^{A2}
1880	N	CH	CH	R^{A3}
1881	N	CH	CH	R^{A4}
1882	N	CH	CH	R^{A5}
1883	N	CH	CH	R^{A6}
1884	N	CH	CH	R^{A7}
1885	N	CH	CH	R^{A8}
1886	CH	N	CH	H
1887	CH	N	CH	R^{A1}
1888	CH	N	CH	R^{A2}
1889	CH	N	CH	R^{A3}
1890	CH	N	CH	R^{A4}
1891	CH	N	CH	R^{A5}
1892	CH	N	CH	R^{A6}
1893	CH	N	CH	R^{A7}
1894	CH	N	CH	R^{A8}
1895	N	N	CH	H
1896	N	N	CH	R^{A1}
1897	N	N	CH	R^{A2}
1898	N	N	CH	R^{A3}
1899	N	N	CH	R^{A4}
1900	N	N	CH	R^{A5}
1901	N	N	CH	R^{A6}
1902	N	N	CH	R^{A7}
1903	N	N	CH	R^{A8}
1904	CH	CH	N	H
1905	CH	CH	N	R^{A1}
1906	CH	CH	N	R^{A2}
1907	CH	CH	N	R^{A3}
1908	CH	CH	N	R^{A4}
1909	CH	CH	N	R^{A5}
1910	CH	CH	N	R^{A6}
1911	CH	CH	N	R^{A7}
1912	CH	CH	N	R^{A8}
1913	N	CH	N	H
1914	N	CH	N	R^{A1}
1915	N	CH	N	R^{A2}
1916	N	CH	N	R^{A3}
1917	N	CH	N	R^{A4}
1918	N	CH	N	R^{A5}
1919	N	CH	N	R^{A6}
1920	N	CH	N	R^{A7}
1921	N	CH	N	R^{A8}
1922	CH	N	N	H
1923	CH	N	N	R^{A1}
1924	CH	N	N	R^{A2}
1925	CH	N	N	R^{A3}
1926	CH	N	N	R^{A4}
1927	CH	N	N	R^{A5}
1928	CH	N	N	R^{A6}
1929	CH	N	N	R^{A7}
1930	CH	N	N	R^{A8}
1931	N	N	N	H
1932	N	N	N	R^{A1}
1933	N	N	N	R^{A2}
1934	N	N	N	R^{A3}
1935	N	N	N	R^{A4}
1936	N	N	N	R^{A5}
1937	N	N	N	R^{A6}
1938	N	N	N	R^{A7}
1939	N	N	N	R^{A8}

wherein R^{A1} to R^{A8} have the following structures



9. The compound of claim **8**, wherein L is selected from the group consisting of L_x having the formula of $(R_L)_n$-L_{Ai}-L_{Bj};

wherein x is an integer defined by x=3735(f−1)+i; wherein i is an integer from 1 to 3735, and j is an integer from 1 to 380; and wherein L_{Bj} has the following structures:



wherein the wave line represents the bond to L_{Ai} and L_{Bj}, Z^1, and Z^2 are defined as follows:

L_{Bj}	Z^1	Z^2
L_{B1}	O	O
L_{B2}	S	S
L_{B3}	O	S
L_{B4}	O	N-R^{B1}
L_{B5}	O	N-R^{B2}
L_{B6}	O	N-R^{B3}
L_{B7}	O	N-R^{B4}
L_{B8}	O	N-R^{B5}
L_{B9}	O	N-R^{B6}
L_{B10}	O	N-R^{B7}
L_{B11}	O	N-R^{B8}
L_{B12}	O	N-R^{B9}
L_{B13}	O	N-R^{B10}
L_{B14}	O	N-R^{B11}
L_{B15}	O	N-R^{B12}
L_{B16}	O	N-R^{B13}
L_{B17}	O	N-R^{B14}
L_{B18}	O	N-R^{B15}
L_{B19}	O	N-R^{B16}
L_{B20}	O	N-R^{B17}
L_{B21}	O	N-R^{B18}
L_{B22}	O	N-R^{B19}
L_{B23}	O	N-R^{B20}
L_{B24}	O	N-R^{B21}
L_{B25}	O	N-R^{B22}
L_{B26}	O	N-R^{B23}
L_{B27}	O	N-R^{B24}
L_{B28}	O	N-R^{B25}
L_{B29}	O	N-R^{B26}
L_{B30}	N-R^{B1}	N-R^{B1}
L_{B31}	N-R^{B2}	N-R^{B2}
L_{B32}	N-R^{B3}	N-R^{B3}
L_{B33}	N-R^{B4}	N-R^{B4}
L_{B34}	N-R^{B5}	N-R^{B5}
L_{B35}	N-R^{B6}	N-R^{B6}
L_{B36}	N-R^{B7}	N-R^{B7}
L_{B37}	N-R^{B8}	N-R^{B8}
L_{B38}	N-R^{B9}	N-R^{B9}
L_{B39}	N-R^{B10}	N-R^{B10}
L_{B40}	N-R^{B11}	N-R^{B11}
L_{B41}	N-R^{B12}	N-R^{B12}
L_{B42}	N-R^{B13}	N-R^{B13}
L_{B43}	N-R^{B14}	N-R^{B14}
L_{B44}	N-R^{B15}	N-R^{B15}
L_{B45}	N-R^{B16}	N-R^{B16}
L_{B46}	N-R^{B17}	N-R^{B17}
L_{B47}	N-R^{B18}	N-R^{B18}
L_{B48}	N-R^{B19}	N-R^{B19}
L_{B49}	N-R^{B20}	N-R^{B20}
L_{B50}	N-R^{B21}	N-R^{B21}
L_{B51}	N-R^{B22}	N-R^{B22}
L_{B52}	N-R^{B23}	N-R^{B23}
L_{B53}	N-R^{B24}	N-R^{B24}
L_{B54}	N-R^{B25}	N-R^{B25}
L_{B55}	N-R^{B26}	N-R^{B26}
L_{B56}	N-R^{B1}	N-R^{B2}
L_{B57}	N-R^{B1}	N-R^{B3}
L_{B58}	N-R^{B1}	N-R^{B4}
L_{B59}	N-R^{B1}	N-R^{B5}
L_{B60}	N-R^{B1}	N-R^{B6}
L_{B61}	N-R^{B1}	N-R^{B7}
L_{B62}	N-R^{B1}	N-R^{B8}
L_{B63}	N-R^{B1}	N-R^{B9}
L_{B64}	N-R^{B1}	N-R^{B10}
L_{B65}	N-R^{B1}	N-R^{B11}
L_{B66}	N-R^{B1}	N-R^{B12}
L_{B67}	N-R^{B1}	N-R^{B13}
L_{B68}	N-R^{B1}	N-R^{B14}
L_{B69}	N-R^{B1}	N-R^{B15}
L_{B70}	N-R^{B1}	N-R^{B16}
L_{B71}	N-R^{B1}	N-R^{B17}
L_{B72}	N-R^{B1}	N-R^{B18}

-continued

L_{Bj}	Z^1	Z^2
L_{B73}	N-R^{B1}	N-R^{B19}
L_{B74}	N-R^{B1}	N-R^{B20}
L_{B75}	N-R^{B1}	N-R^{B21}
L_{B76}	N-R^{B1}	N-R^{B22}
L_{B77}	N-R^{B1}	N-R^{B23}
L_{B78}	N-R^{B1}	N-R^{B24}
L_{B79}	N-R^{B1}	N-R^{B25}
L_{B80}	N-R^{B1}	N-R^{B26}
L_{B81}	N-R^{B1}	N-R^{B3}
L_{B82}	N-R^{B2}	N-R^{B4}
L_{B83}	N-R^{B2}	N-R^{B5}
L_{B84}	N-R^{B2}	N-R^{B6}
L_{B85}	N-R^{B2}	N-R^{B7}
L_{B86}	N-R^{B2}	N-R^{B8}
L_{B87}	N-R^{B2}	N-R^{B9}
L_{B88}	N-R^{B2}	N-R^{B10}
L_{B89}	N-R^{B2}	N-R^{B11}
L_{B90}	N-R^{B2}	N-R^{B12}
L_{B91}	N-R^{B2}	N-R^{B13}
L_{B92}	N-R^{B2}	N-R^{B14}
L_{B93}	N-R^{B2}	N-R^{B15}
L_{B94}	N-R^{B2}	N-R^{B16}
L_{B95}	N-R^{B2}	N-R^{B17}
L_{B96}	N-R^{B2}	N-R^{B18}
L_{B97}	N-R^{B2}	N-R^{B19}
L_{B98}	N-R^{B2}	N-R^{B20}
L_{B99}	N-R^{B2}	N-R^{B21}
L_{B100}	N-R^{B2}	N-R^{B22}
L_{B101}	N-R^{B2}	N-R^{B23}
L_{B102}	N-R^{B2}	N-R^{B24}
L_{B103}	N-R^{B2}	N-R^{B25}
L_{B104}	N-R^{B2}	N-R^{B26}
L_{B105}	N-R^{B3}	N-R^{B4}
L_{B106}	N-R^{B3}	N-R^{B5}
L_{B107}	N-R^{B3}	N-R^{B6}
L_{B108}	N-R^{B3}	N-R^{B7}
L_{B109}	N-R^{B3}	N-R^{B8}
L_{B110}	N-R^{B3}	N-R^{B9}
L_{B111}	N-R^{B3}	N-R^{B10}
L_{B112}	N-R^{B3}	N-R^{B11}
L_{B113}	N-R^{B3}	N-R^{B12}
L_{B114}	N-R^{B3}	N-R^{B13}
L_{B115}	N-R^{B3}	N-R^{B14}
L_{B116}	N-R^{B3}	N-R^{B15}
L_{B117}	N-R^{B3}	N-R^{B16}
L_{B118}	N-R^{B3}	N-R^{B17}
L_{B119}	N-R^{B3}	N-R^{B18}
L_{B120}	N-R^{B3}	N-R^{B19}
L_{B121}	N-R^{B3}	N-R^{B20}
L_{B122}	N-R^{B3}	N-R^{B21}
L_{B123}	N-R^{B3}	N-R^{B22}
L_{B124}	N-R^{B3}	N-R^{B23}
L_{B125}	N-R^{B3}	N-R^{B24}
L_{B126}	N-R^{B3}	N-R^{B25}
L_{B127}	N-R^{B3}	N-R^{B26}
L_{B128}	N-R^{B4}	N-R^{B5}
L_{B129}	N-R^{B4}	N-R^{B6}
L_{B130}	N-R^{B4}	N-R^{B7}
L_{B131}	N-R^{B4}	N-R^{B8}
L_{B132}	N-R^{B4}	N-R^{B9}
L_{B133}	N-R^{B4}	N-R^{B10}
L_{B134}	N-R^{B4}	N-R^{B11}
L_{B135}	N-R^{B4}	N-R^{B12}
L_{B136}	N-R^{B4}	N-R^{B13}
L_{B137}	N-R^{B4}	N-R^{B14}
L_{B138}	N-R^{B4}	N-R^{B15}
L_{B139}	N-R^{B4}	N-R^{B16}
L_{B140}	N-R^{B4}	N-R^{B17}
L_{B141}	N-R^{B4}	N-R^{B18}
L_{B142}	N-R^{B4}	N-R^{B19}
L_{B143}	N-R^{B4}	N-R^{B20}
L_{B144}	N-R^{B4}	N-R^{B21}
L_{B145}	N-R^{B4}	N-R^{B22}
L_{B146}	N-R^{B4}	N-R^{B23}

-continued

L_{Bj}	Z^1	Z^2
L_{B147}	N-R^{B4}	N-R^{B24}
L_{B148}	N-R^{B4}	N-R^{B25}
L_{B149}	N-R^{B4}	N-R^{B26}
L_{B150}	N-R^{B5}	N-R^{B6}
L_{B151}	N-R^{B5}	N-R^{B7}
L_{B152}	N-R^{B5}	N-R^{B8}
L_{B153}	N-R^{B5}	N-R^{B9}
L_{B154}	N-R^{B5}	N-R^{B10}
L_{B155}	N-R^{B5}	N-R^{B11}
L_{B156}	N-R^{B5}	N-R^{B12}
L_{B157}	N-R^{B5}	N-R^{B13}
L_{B158}	N-R^{B5}	N-R^{B14}
L_{B159}	N-R^{B5}	N-R^{B15}
L_{B160}	N-R^{B5}	N-R^{B16}
L_{B161}	N-R^{B5}	N-R^{B17}
L_{B162}	N-R^{B5}	N-R^{B18}
L_{B163}	N-R^{B5}	N-R^{B19}
L_{B164}	N-R^{B5}	N-R^{B20}
L_{B165}	N-R^{B5}	N-R^{B21}
L_{B166}	N-R^{B5}	N-R^{B22}
L_{B167}	N-R^{B5}	N-R^{B23}
L_{B168}	N-R^{B5}	N-R^{B24}
L_{B169}	N-R^{B5}	N-R^{B25}
L_{B170}	N-R^{B5}	N-R^{B26}
L_{B171}	N-R^{B6}	N-R^{B7}
L_{B172}	N-R^{B6}	N-R^{B8}
L_{B173}	N-R^{B6}	N-R^{B9}
L_{B174}	N-R^{B6}	N-R^{B10}
L_{B175}	N-R^{B6}	N-R^{B11}
L_{B176}	N-R^{B6}	N-R^{B12}
L_{B177}	N-R^{B6}	N-R^{B13}
L_{B178}	N-R^{B6}	N-R^{B14}
L_{B179}	N-R^{B6}	N-R^{B15}
L_{B180}	N-R^{B6}	N-R^{B16}
L_{B181}	N-R^{B6}	N-R^{B17}
L_{B182}	N-R^{B6}	N-R^{B18}
L_{B183}	N-R^{B6}	N-R^{B19}
L_{B184}	N-R^{B6}	N-R^{B20}
L_{B185}	N-R^{B6}	N-R^{B21}
L_{B186}	N-R^{B6}	N-R^{B22}
L_{B187}	N-R^{B6}	N-R^{B23}
L_{B188}	N-R^{B6}	N-R^{B24}
L_{B189}	N-R^{B6}	N-R^{B25}
L_{B190}	N-R^{B6}	N-R^{B26}
L_{B191}	N-R^{B7}	N-R^{B8}
L_{B192}	N-R^{B7}	N-R^{B9}
L_{B193}	N-R^{B7}	N-R^{B10}
L_{B194}	N-R^{B7}	N-R^{B11}
L_{B195}	N-R^{B7}	N-R^{B12}
L_{B196}	N-R^{B7}	N-R^{B13}
L_{B197}	N-R^{B7}	N-R^{B14}
L_{B198}	N-R^{B7}	N-R^{B15}
L_{B199}	N-R^{B7}	N-R^{B16}
L_{B200}	N-R^{B7}	N-R^{B17}
L_{B201}	N-R^{B7}	N-R^{B18}
L_{B202}	N-R^{B7}	N-R^{B19}
L_{B203}	N-R^{B7}	N-R^{B20}
L_{B204}	N-R^{B7}	N-R^{B21}
L_{B205}	N-R^{B7}	N-R^{B22}
L_{B206}	N-R^{B7}	N-R^{B23}
L_{B207}	N-R^{B7}	N-R^{B24}
L_{B208}	N-R^{B7}	N-R^{B25}
L_{B209}	N-R^{B7}	N-R^{B26}
L_{B210}	N-R^{B8}	N-R^{B9}
L_{B211}	N-R^{B8}	N-R^{B10}
L_{B212}	N-R^{B8}	N-R^{B11}
L_{B213}	N-R^{B8}	N-R^{B12}
L_{B214}	N-R^{B8}	N-R^{B13}
L_{B215}	N-R^{B8}	N-R^{B14}
L_{B216}	N-R^{B8}	N-R^{B15}
L_{B217}	N-R^{B8}	N-R^{B16}
L_{B218}	N-R^{B8}	N-R^{B17}
L_{B219}	N-R^{B8}	N-R^{B18}
L_{B220}	N-R^{B8}	N-R^{B19}

-continued

L_{Bj}	Z^1	Z^2
L_{B221}	N-R^{B8}	N-R^{B20}
L_{B222}	N-R^{B8}	N-R^{B21}
L_{B223}	N-R^{B8}	N-R^{B22}
L_{B224}	N-R^{B8}	N-R^{B23}
L_{B225}	N-R^{B8}	N-R^{B24}
L_{B226}	N-R^{B8}	N-R^{B25}
L_{B227}	N-R^{B8}	N-R^{B26}
L_{B228}	N-R^{B9}	N-R^{B10}
L_{B229}	N-R^{B9}	N-R^{B11}
L_{B230}	N-R^{B9}	N-R^{B12}
L_{B231}	N-R^{B9}	N-R^{B13}
L_{B232}	N-R^{B9}	N-R^{B14}
L_{B233}	N-R^{B9}	N-R^{B15}
L_{B234}	N-R^{B9}	N-R^{B16}
L_{B235}	N-R^{B9}	N-R^{B17}
L_{B236}	N-R^{B9}	N-R^{B18}
L_{B237}	N-R^{B9}	N-R^{B19}
L_{B238}	N-R^{B9}	N-R^{B20}
L_{B239}	N-R^{B9}	N-R^{B21}
L_{B240}	N-R^{B9}	N-R^{B22}
L_{B241}	N-R^{B9}	N-R^{B23}
L_{B242}	N-R^{B9}	N-R^{B24}
L_{B243}	N-R^{B9}	N-R^{B25}
L_{B244}	N-R^{B9}	N-R^{B26}
L_{B245}	N-R^{B10}	N-R^{B11}
L_{B246}	N-R^{B10}	N-R^{B12}
L_{B247}	N-R^{B10}	N-R^{B13}
L_{B248}	N-R^{B10}	N-R^{B14}
L_{B249}	N-R^{B10}	N-R^{B15}
L_{B250}	N-R^{B10}	N-R^{B16}
L_{B251}	N-R^{B10}	N-R^{B17}
L_{B252}	N-R^{B10}	N-R^{B18}
L_{B253}	N-R^{B10}	N-R^{B19}
L_{B254}	N-R^{B10}	N-R^{B20}
L_{B255}	N-R^{B10}	N-R^{B21}
L_{B256}	N-R^{B10}	N-R^{B22}
L_{B257}	N-R^{B10}	N-R^{B23}
L_{B258}	N-R^{B10}	N-R^{B24}
L_{B259}	N-R^{B10}	N-R^{B25}
L_{B260}	N-R^{B10}	N-R^{B26}
L_{B261}	N-R^{B11}	N-R^{B12}
L_{B262}	N-R^{B11}	N-R^{B13}
L_{B263}	N-R^{B11}	N-R^{B14}
L_{B264}	N-R^{B11}	N-R^{B15}
L_{B265}	N-R^{B11}	N-R^{B16}
L_{B266}	N-R^{B11}	N-R^{B17}
L_{B267}	N-R^{B11}	N-R^{B18}
L_{B268}	N-R^{B11}	N-R^{B19}
L_{B269}	N-R^{B11}	N-R^{B20}
L_{B270}	N-R^{B11}	N-R^{B21}
L_{B271}	N-R^{B11}	N-R^{B22}
L_{B272}	N-R^{B11}	N-R^{B23}
L_{B273}	N-R^{B11}	N-R^{B24}
L_{B274}	N-R^{B11}	N-R^{B25}
L_{B275}	N-R^{B11}	N-R^{B26}
L_{B276}	N-R^{B12}	N-R^{B13}
L_{B277}	N-R^{B12}	N-R^{B14}
L_{B278}	N-R^{B12}	N-R^{B15}
L_{B279}	N-R^{B12}	N-R^{B16}
L_{B280}	N-R^{B12}	N-R^{B17}
L_{B281}	N-R^{B12}	N-R^{B18}
L_{B282}	N-R^{B12}	N-R^{B19}
L_{B283}	N-R^{B12}	N-R^{B20}
L_{B284}	N-R^{B12}	N-R^{B21}
L_{B285}	N-R^{B12}	N-R^{B22}
L_{B286}	N-R^{B12}	N-R^{B23}
L_{B287}	N-R^{B12}	N-R^{B24}
L_{B288}	N-R^{B12}	N-R^{B25}
L_{B289}	N-R^{B12}	N-R^{B26}
L_{B290}	N-R^{B13}	N-R^{B14}
L_{B291}	N-R^{B13}	N-R^{B15}
L_{B292}	N-R^{B13}	N-R^{B16}
L_{B293}	N-R^{B13}	N-R^{B17}
L_{B294}	N-R^{B13}	N-R^{B18}

-continued

L_{B_j}	Z^1	Z^2
L_{B295}	N-R^{B13}	N-R^{B19}
L_{B296}	N-R^{B13}	N-R^{B20}
L_{B297}	N-R^{B13}	N-R^{B21}
L_{B298}	N-R^{B13}	N-R^{B22}
L_{B299}	N-R^{B13}	N-R^{B23}
L_{B300}	N-R^{B13}	N-R^{B24}
L_{B301}	N-R^{B13}	N-R^{B25}
L_{B302}	N-R^{B13}	N-R^{B26}
L_{B303}	N-R^{B14}	N-R^{B15}
L_{B304}	N-R^{B14}	N-R^{B16}
L_{B305}	N-R^{B14}	N-R^{B17}
L_{B306}	N-R^{B14}	N-R^{B18}
L_{B307}	N-R^{B14}	N-R^{B19}
L_{B308}	N-R^{B14}	N-R^{B20}
L_{B309}	N-R^{B14}	N-R^{B21}
L_{B310}	N-R^{B14}	N-R^{B22}
L_{B311}	N-R^{B14}	N-R^{B23}
L_{B312}	N-R^{B14}	N-R^{B24}
L_{B313}	N-R^{B14}	N-R^{B25}
L_{B314}	N-R^{B14}	N-R^{B26}
L_{B315}	N-R^{B15}	N-R^{B16}
L_{B316}	N-R^{B15}	N-R^{B17}
L_{B317}	N-R^{B15}	N-R^{B18}
L_{B318}	N-R^{B15}	N-R^{B19}
L_{B319}	N-R^{B15}	N-R^{B20}
L_{B320}	N-R^{B15}	N-R^{B21}
L_{B321}	N-R^{B15}	N-R^{B22}
L_{B322}	N-R^{B15}	N-R^{B23}
L_{B323}	N-R^{B15}	N-R^{B24}
L_{B324}	N-R^{B15}	N-R^{B25}
L_{B325}	N-R^{B15}	N-R^{B26}
L_{B326}	N-R^{B16}	N-R^{B17}
L_{B327}	N-R^{B16}	N-R^{B18}
L_{B328}	N-R^{B16}	N-R^{B19}
L_{B329}	N-R^{B16}	N-R^{B20}
L_{B330}	N-R^{B16}	N-R^{B21}
L_{B331}	N-R^{B16}	N-R^{B22}
L_{B332}	N-R^{B16}	N-R^{B23}
L_{B333}	N-R^{B16}	N-R^{B24}
L_{B334}	N-R^{B16}	N-R^{B25}
L_{B335}	N-R^{B16}	N-R^{B26}
L_{B336}	N-R^{B17}	N-R^{B18}
L_{B337}	N-R^{B17}	N-R^{B19}
L_{B338}	N-R^{B17}	N-R^{B20}
L_{B339}	N-R^{B17}	N-R^{B21}
L_{B340}	N-R^{B17}	N-R^{B22}
L_{B341}	N-R^{B17}	N-R^{B23}
L_{B342}	N-R^{B17}	N-R^{B24}
L_{B343}	N-R^{B17}	N-R^{B25}
L_{B344}	N-R^{B17}	N-R^{B26}
L_{B345}	N-R^{B18}	N-R^{B19}
L_{B346}	N-R^{B18}	N-R^{B20}
L_{B347}	N-R^{B18}	N-R^{B21}
L_{B348}	N-R^{B18}	N-R^{B22}
L_{B349}	N-R^{B18}	N-R^{B23}
L_{B350}	N-R^{B18}	N-R^{B24}
L_{B351}	N-R^{B18}	N-R^{B25}
L_{B352}	N-R^{B18}	N-R^{B26}
L_{B353}	N-R^{B19}	N-R^{B20}
L_{B354}	N-R^{B19}	N-R^{B21}
L_{B355}	N-R^{B19}	N-R^{B22}
L_{B356}	N-R^{B19}	N-R^{B23}
L_{B357}	N-R^{B19}	N-R^{B24}
L_{B358}	N-R^{B19}	N-R^{B25}
L_{B359}	N-R^{B19}	N-R^{B26}
L_{B360}	N-R^{B20}	N-R^{B21}
L_{B361}	N-R^{B20}	N-R^{B22}
L_{B362}	N-R^{B20}	N-R^{B23}
L_{B363}	N-R^{B20}	N-R^{B24}
L_{B364}	N-R^{B20}	N-R^{B25}
L_{B365}	N-R^{B20}	N-R^{B26}
L_{B366}	N-R^{B21}	N-R^{B22}
L_{B367}	N-R^{B21}	N-R^{B23}
L_{B368}	N-R^{B21}	N-R^{B24}

-continued

L_{B_j}	Z^1	Z^2
L_{B369}	N-R^{B21}	N-R^{B25}
L_{B370}	N-R^{B21}	N-R^{B26}
L_{B371}	N-R^{B22}	N-R^{B23}
L_{B372}	N-R^{B22}	N-R^{B24}
L_{B373}	N-R^{B22}	N-R^{B25}
L_{B374}	N-R^{B22}	N-R^{B26}
L_{B375}	N-R^{B23}	N-R^{B24}
L_{B376}	N-R^{B23}	N-R^{B25}
L_{B377}	N-R^{B23}	N-R^{B26}
L_{B378}	N-R^{B24}	N-R^{B25}
L_{B379}	N-R^{B24}	N-R^{B26}
L_{B380}	N-R^{B25}	N-R^{B26}

wherein R^{B1} to R^{B26} have the following structures

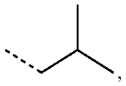
R^{B1} ----H,

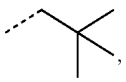
R^{B2} D,

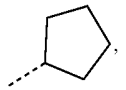
R^{B3} CH_3,

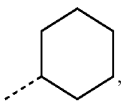
R^{B4} CD_3,

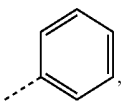
R^{B5}  ,

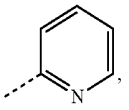
R^{B6}  ,

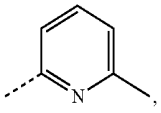
R^{B7}  ,

R^{B8}  ,

R^{B9}  ,

R^{B10}  ,

R^{B11}  ,

R^{B12}  ,

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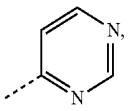

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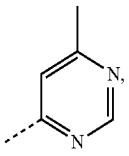

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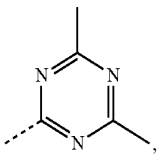

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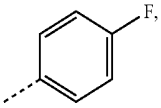

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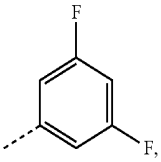

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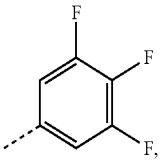

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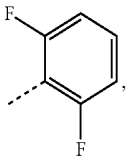
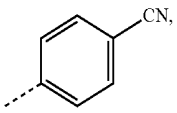


R^{B20}



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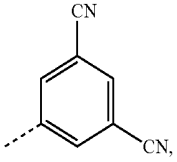

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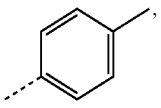

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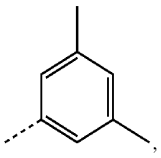
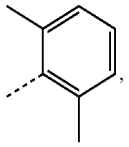
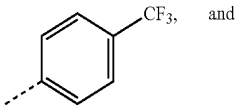


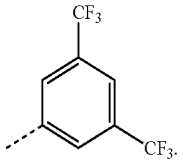
R^{B24}



R^{B25}



R^{B26}



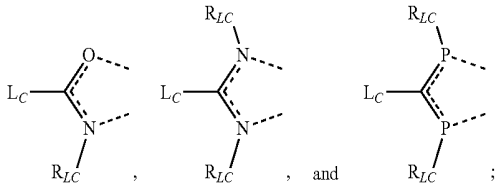
10. The compound of claim **9**, wherein the compound is selected from the group consisting of Compound A-x having the formula $Bi(L_x)_3$; or Compound B-x having the formula $Bi_2(L_x)_6$; wherein x is an integer from 1 to 1,419,300.

11. A compound having a stoichiometry formula of BiL_3;

wherein Bi is Bi (III), L is mono-anionic bidentate ligand;

wherein each L can be same or different;

wherein L is selected from the group consisting of:



wherein each R in the same formula can be same or different;

wherein O, N, or P coordinate to Bi atom by the single dashed line;

wherein each L_C and R_{LC} is independently hydrogen or a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, and combinations thereof.

12. An organic light emitting device (OLED) comprising:

an anode;

a cathode; and

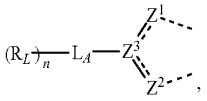
an organic layer, disposed between the anode and the cathode, comprising a compound having a stoichiometry formula of BiL_3;

wherein Bi is Bi (III), L is mono-anionic bidentate ligand;

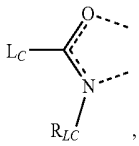
wherein each L can be same or different;

wherein L has a formula selected from the group consisting of

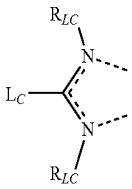
Formula (i)



Formula (ii)

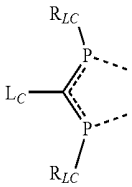


Formula (iii)



, and

Formula (iv)



;

wherein each Z^1 and Z^2 is independently selected from the group consisting of O, S, NR, and PR;

wherein Z^3 is C;

wherein Z^1, Z^2, O, N, and P coordinate to Bi atom by the single dashed line;

wherein L_A is aryl or heteroaryl, which can be further substituted by one or more substituent R_L;

wherein each R is independently hydrogen or a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, heteroaryl, and combinations thereof;

wherein each R_L is independently a substituent selected from the group consisting of deuterium, fluorine, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, heteroaryl, nitrile, and combinations thereof;

wherein each L_C and R_{LC} is independently hydrogen or a substituent selected from the group consisting of deuterium, alkyl, cycloalkyl, heteroalkyl, heterocycloalkyl, arylalkyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, and combinations thereof.

wherein n is an integer from 0 to the maximum allowable substitutions;

wherein, for Formula (i) at least one of the following conditions is true:

(1) L_A comprises at least one 5-membered ring;

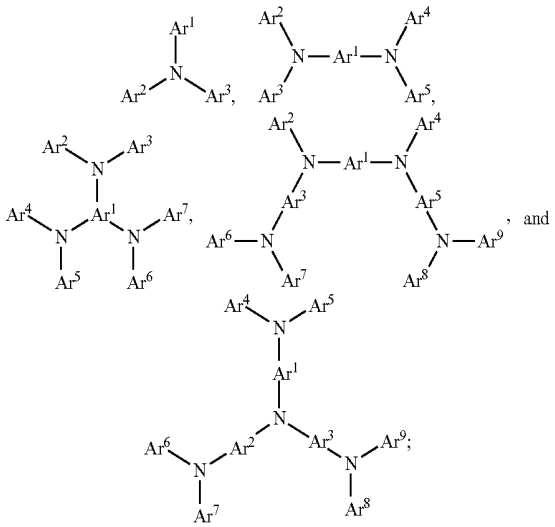
(2) L_A comprises a condensed ring system having at least three rings fused together;

(3) n is at least 1 and at least one R_L is a non-fused aryl or heteroaryl moiety; or

(4) n is at least 2 with two different R_L and the L_A-(R_L)n moiety is not symmetrical along the axis of Z^3 and the atom from L_A attaching to Z^3.

13. The OLED of claim **12**, wherein the organic layer is a hole injecting layer and the compound is a p-type dopant in the hole injecting layer.

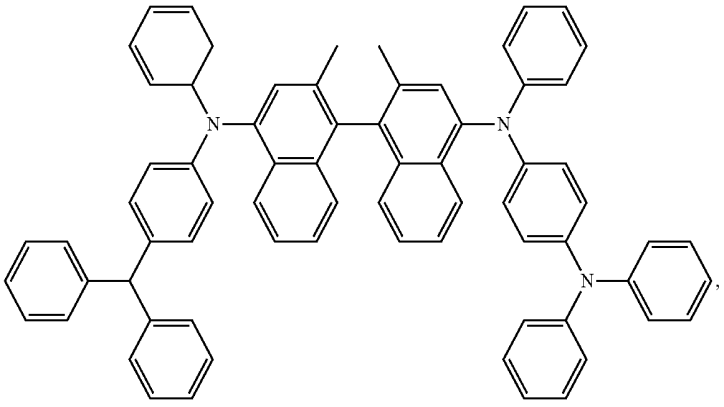
14. The OLED of claim **13**, wherein the hole injecting layer further comprises a compound selected from the group consisting of:



, and

wherein each Ar^1 to Ar^9 is independently selected from the group consisting of aryl, substituted aryl, heteroaryl, substituted heteroaryl, and combination thereof.

15. The OLED of claim **13**, wherein the hole injecting layer further comprises a compound selected from the group consisting of:



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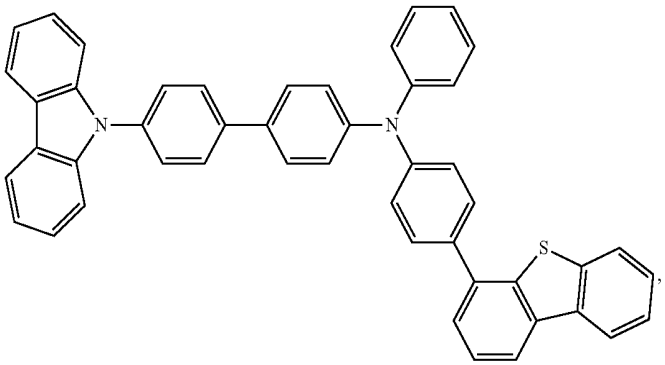

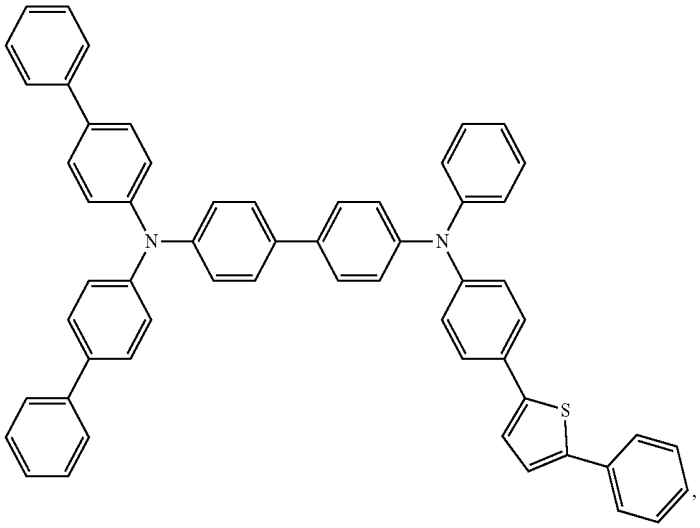

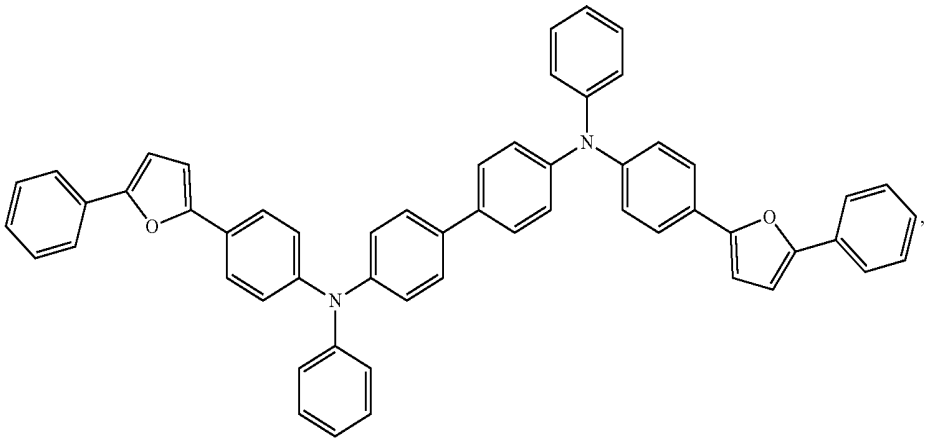

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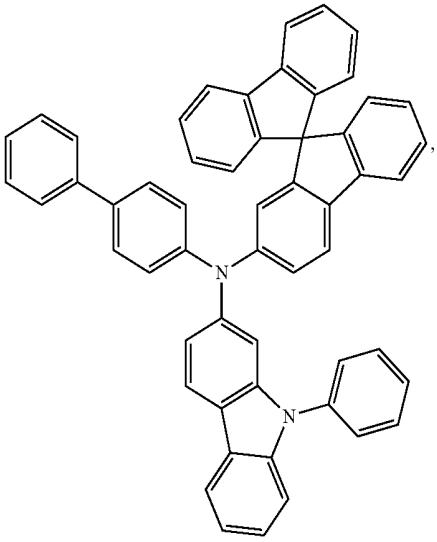

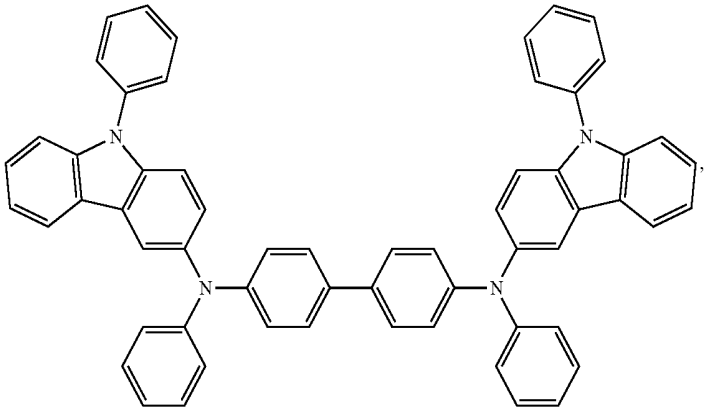

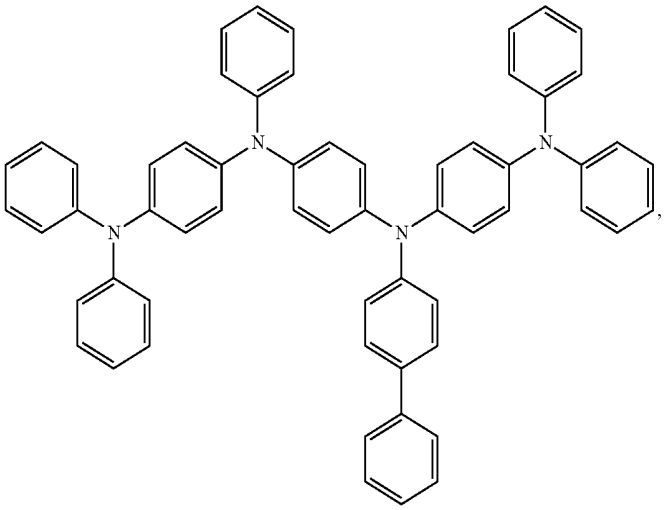

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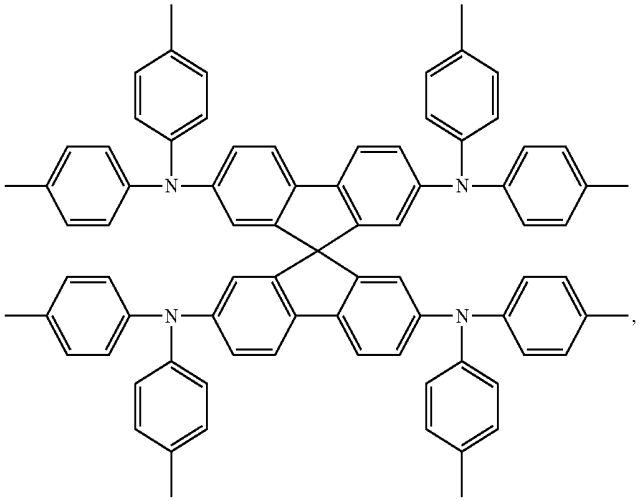

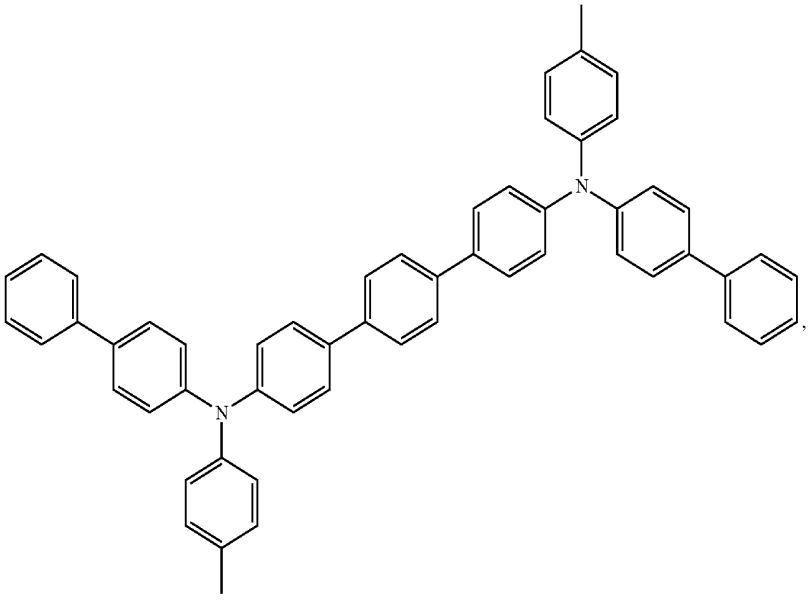

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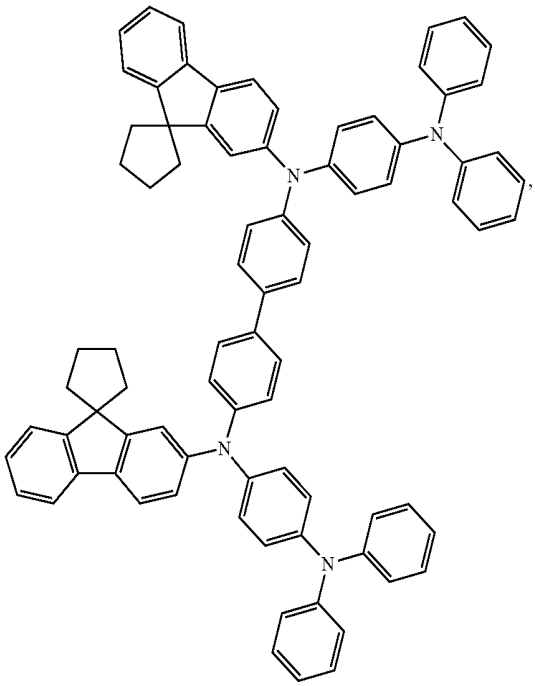

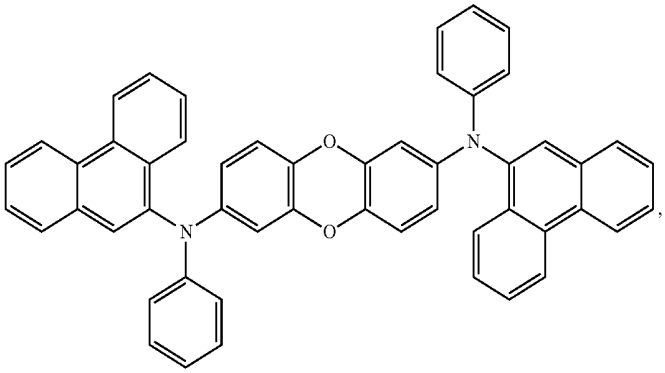

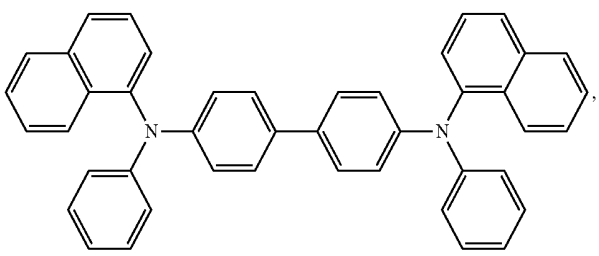

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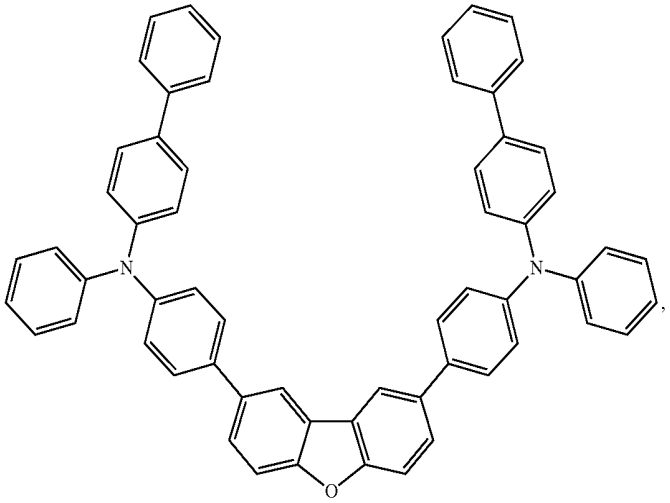

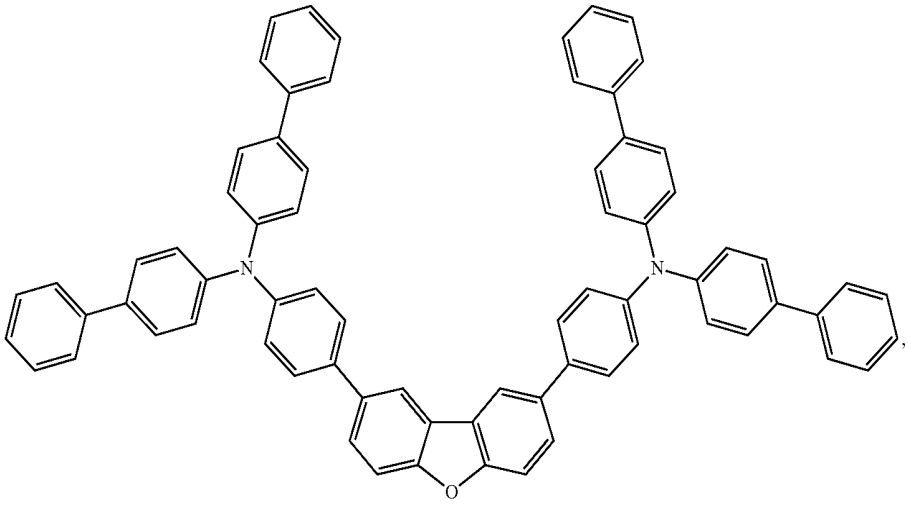

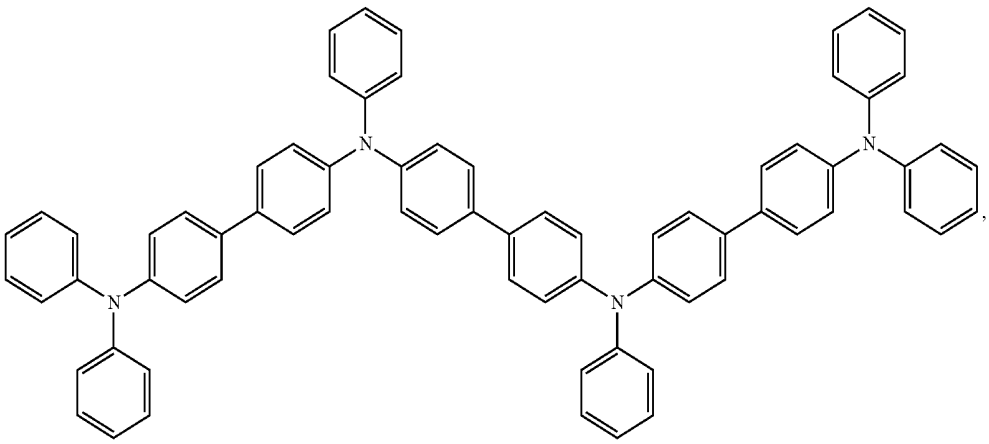

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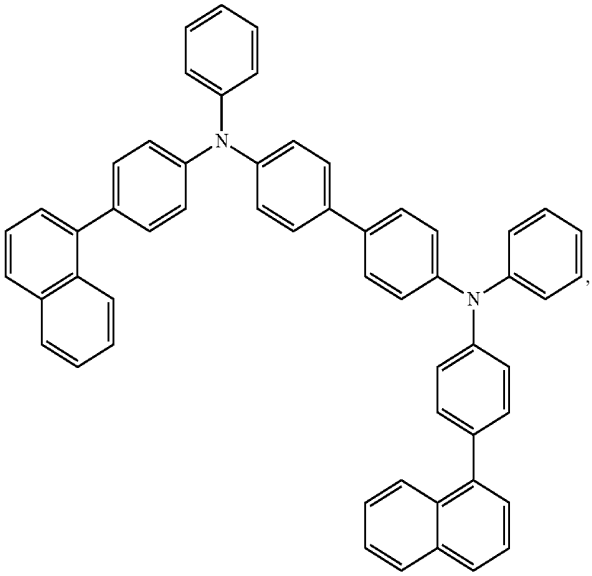

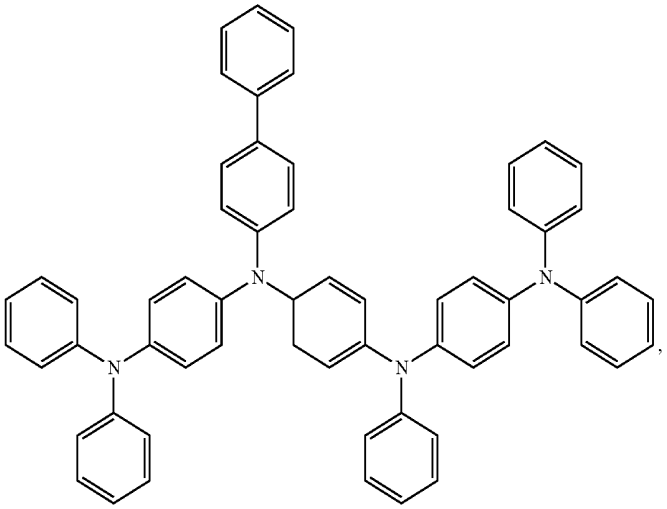

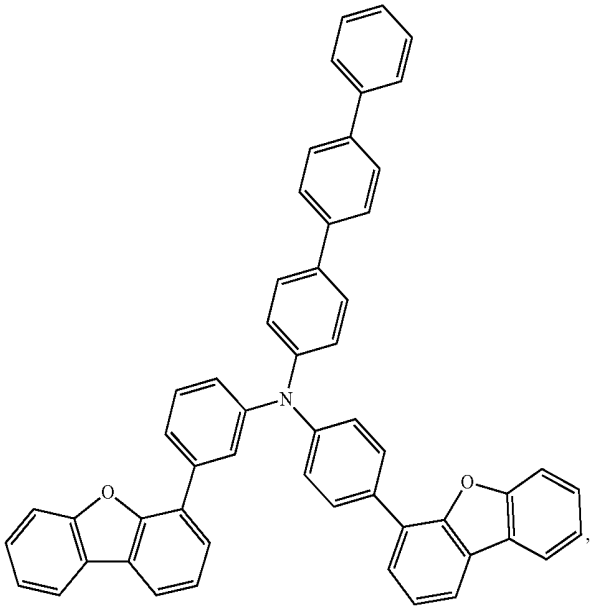

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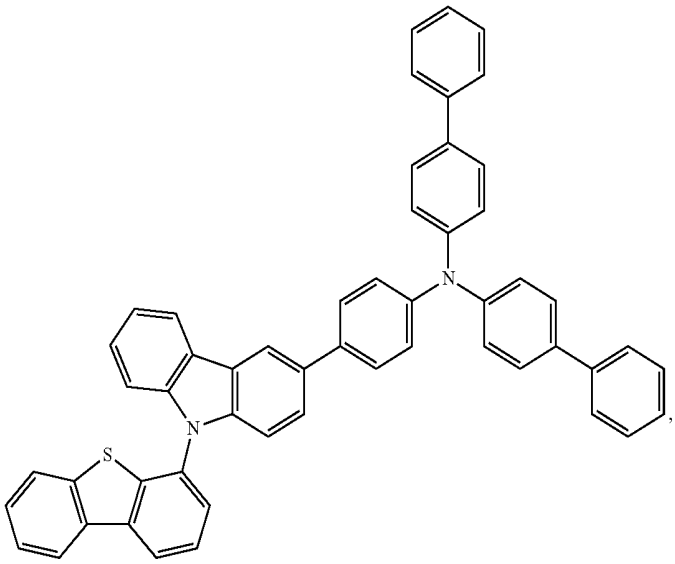

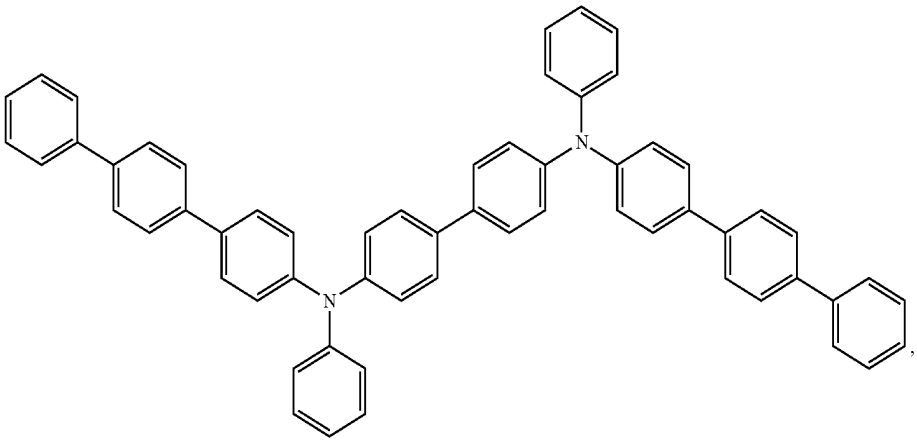

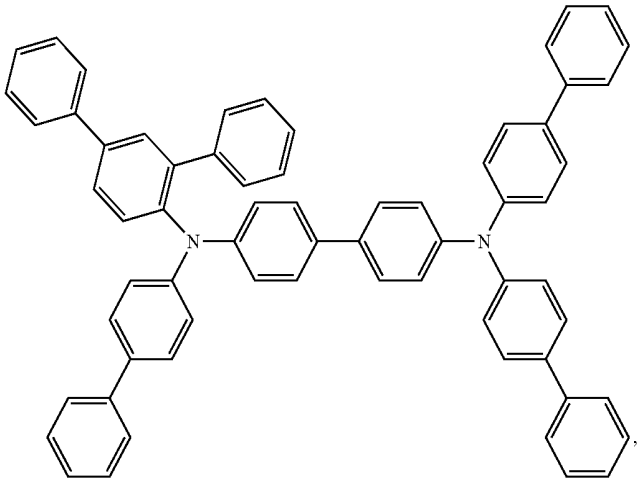

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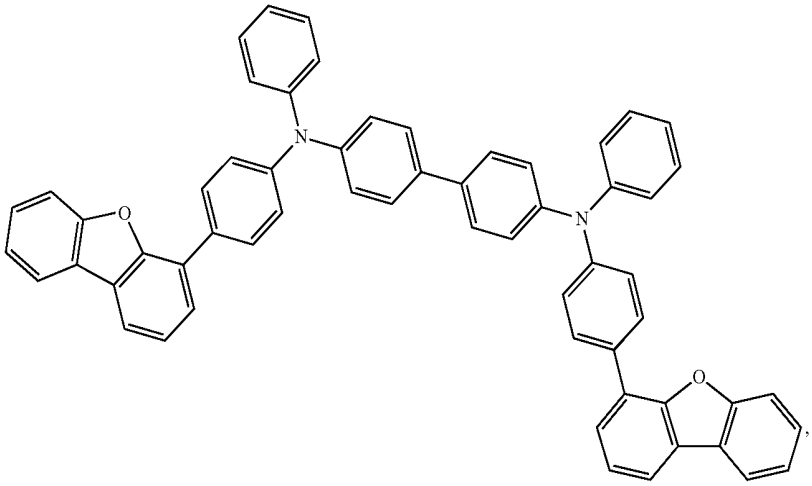

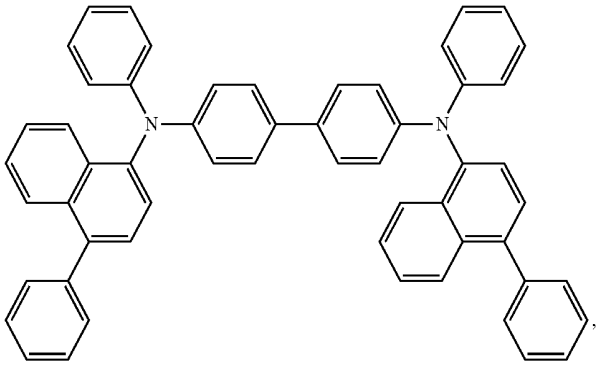

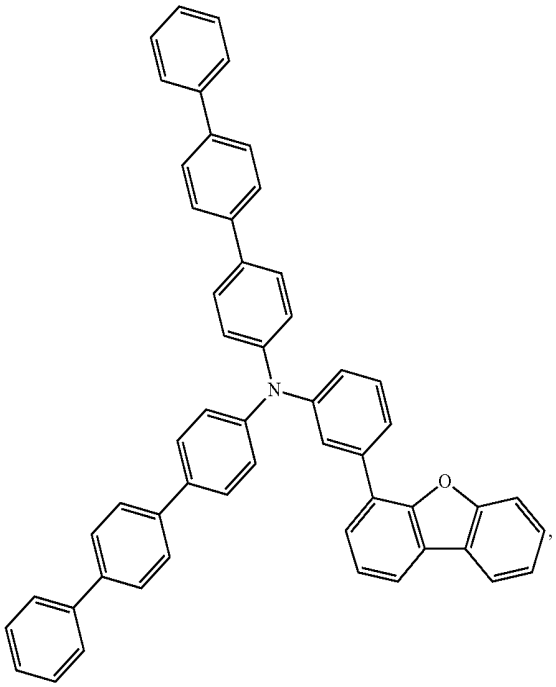

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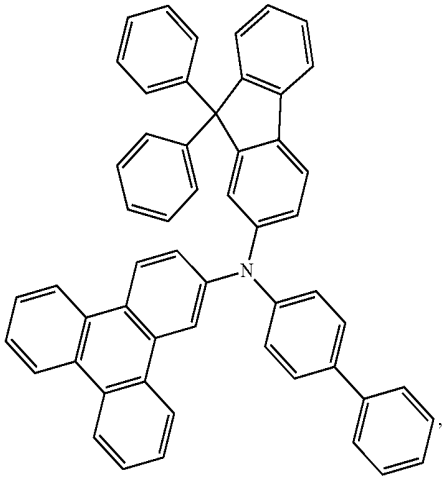

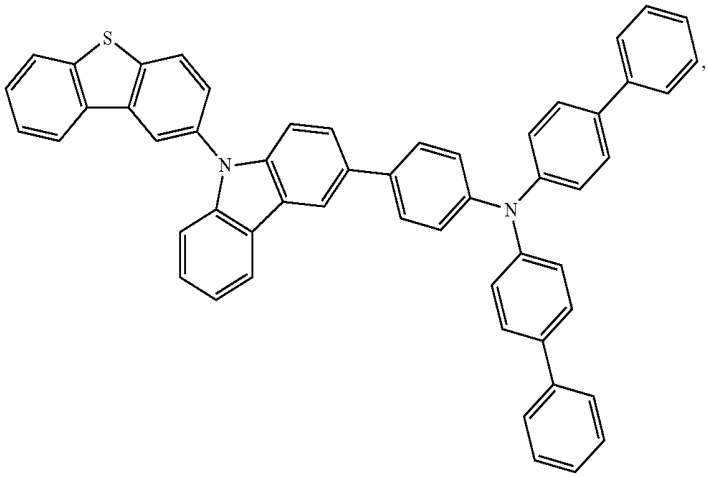

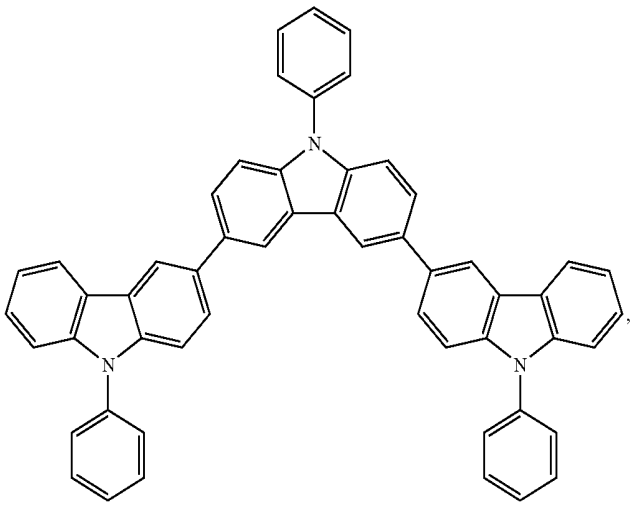

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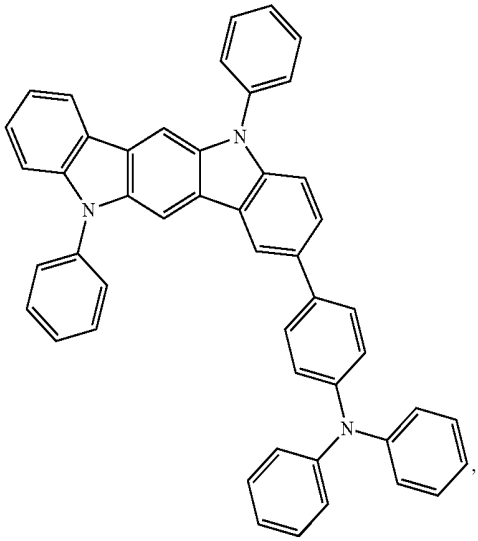

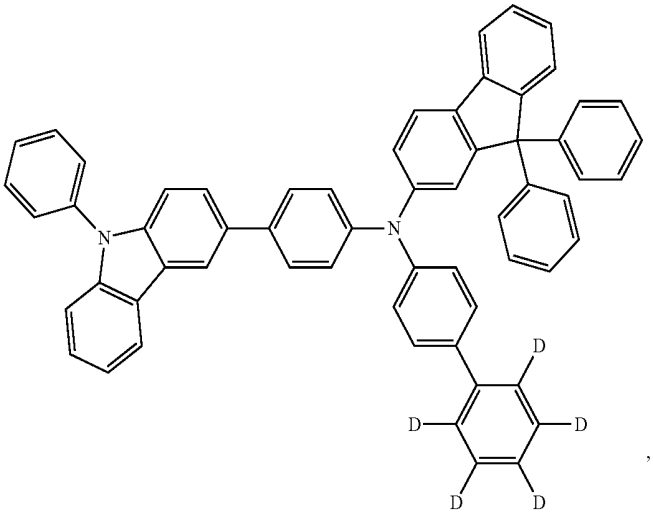

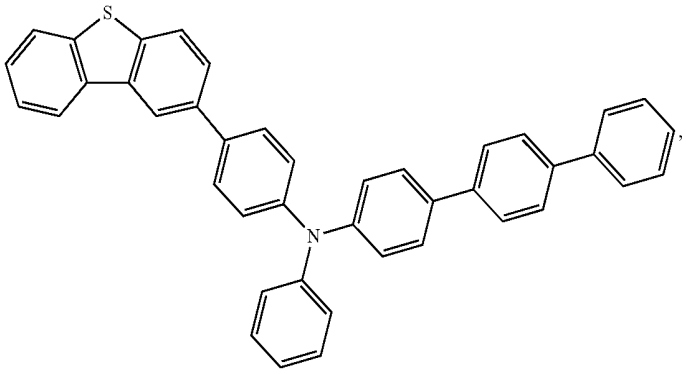

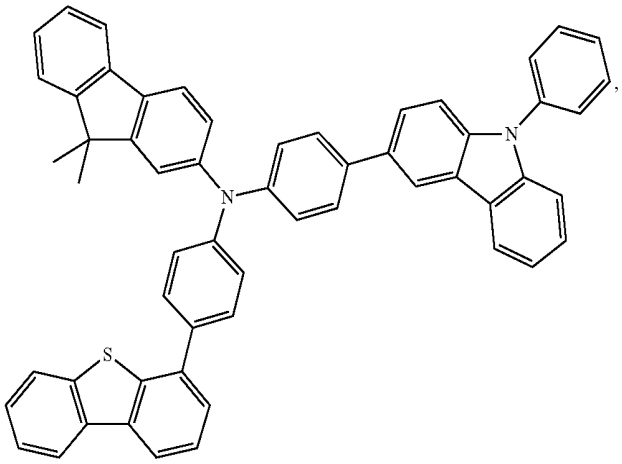

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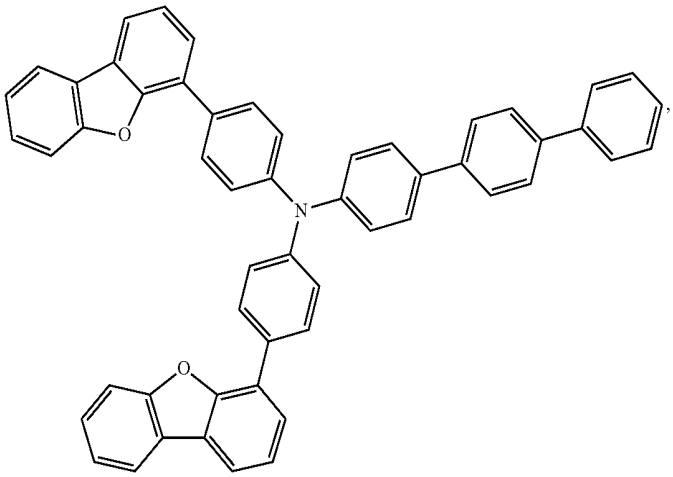

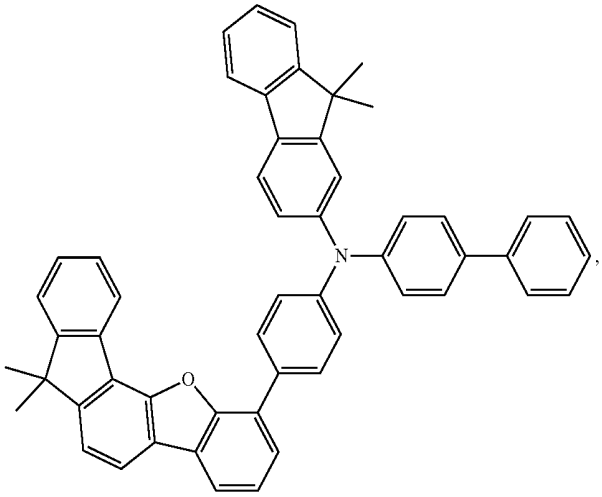

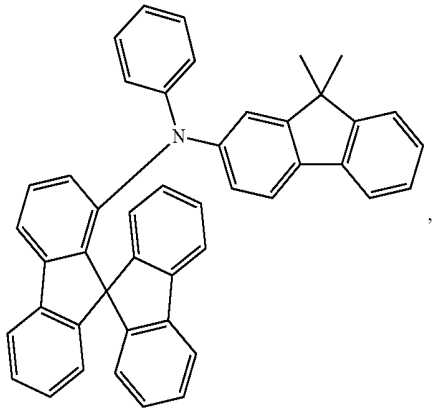

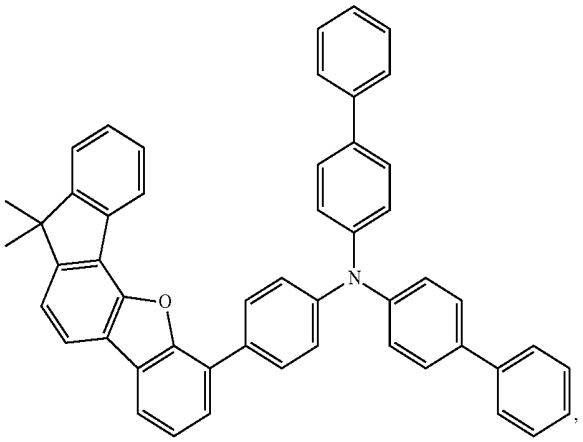

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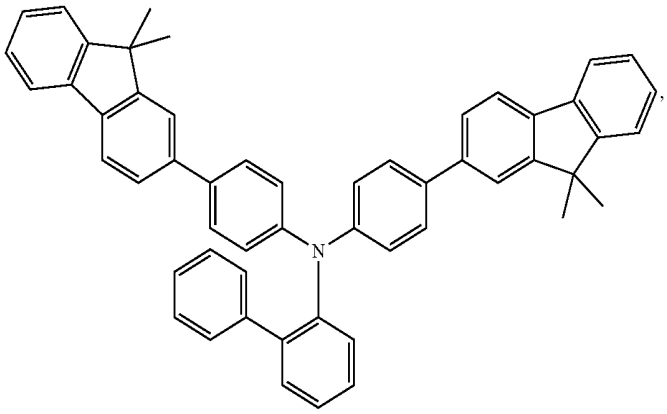

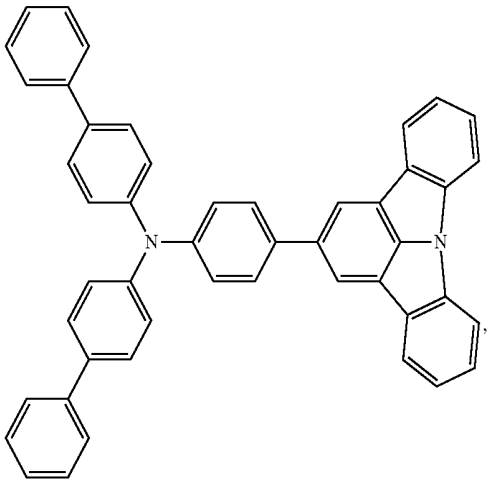

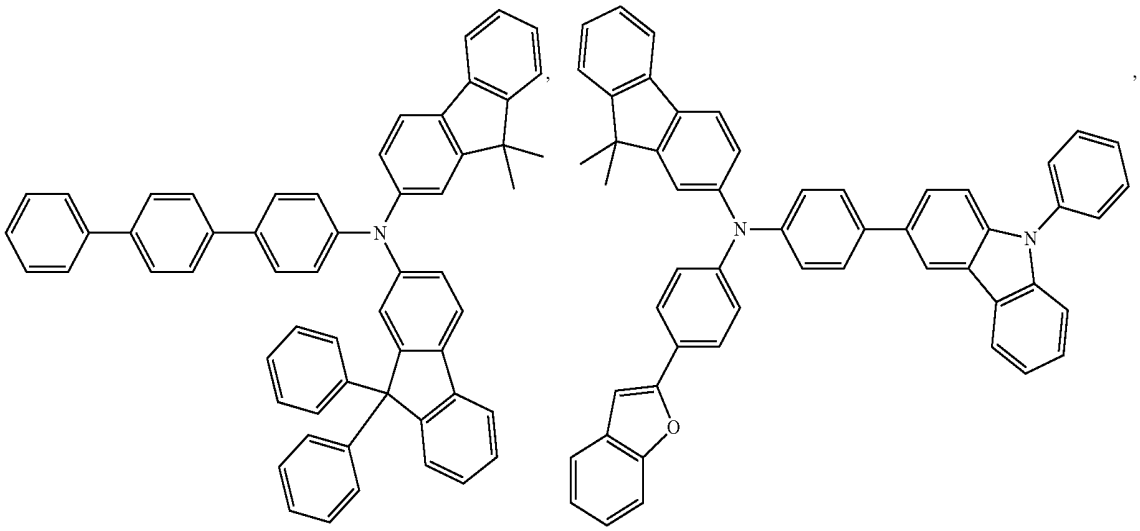

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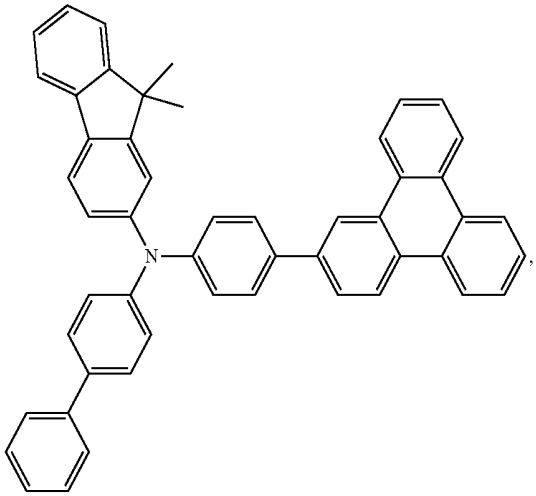

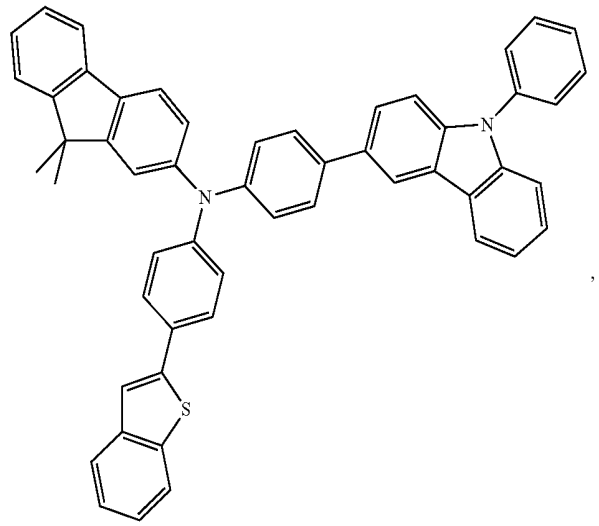

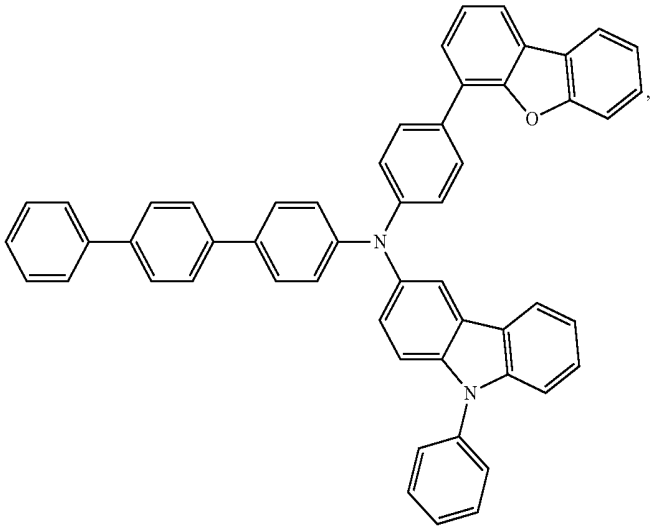

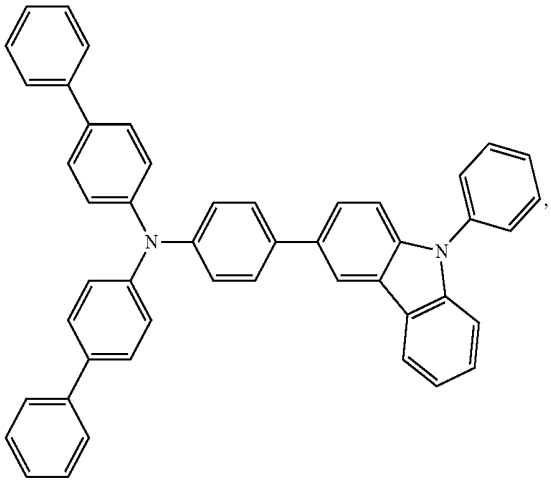

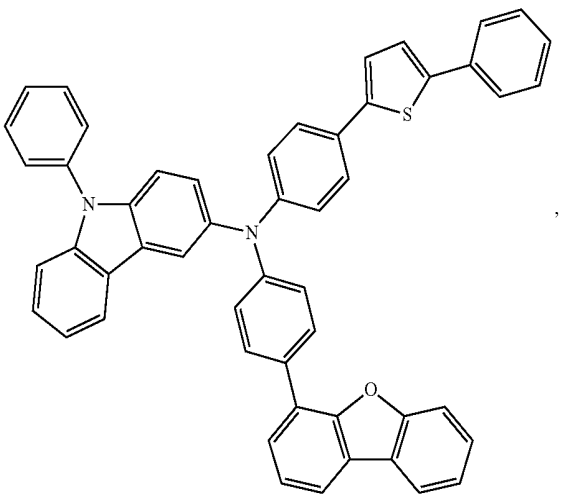

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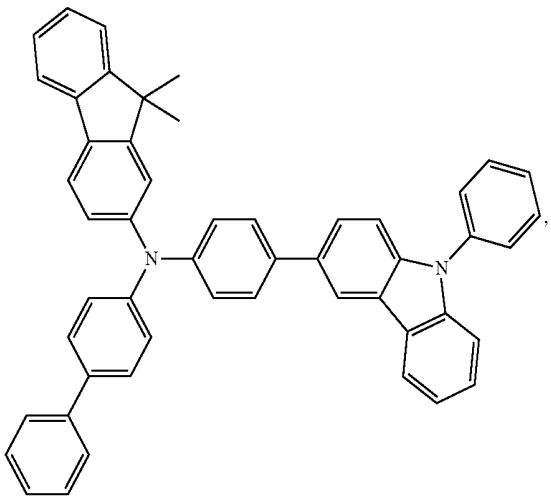

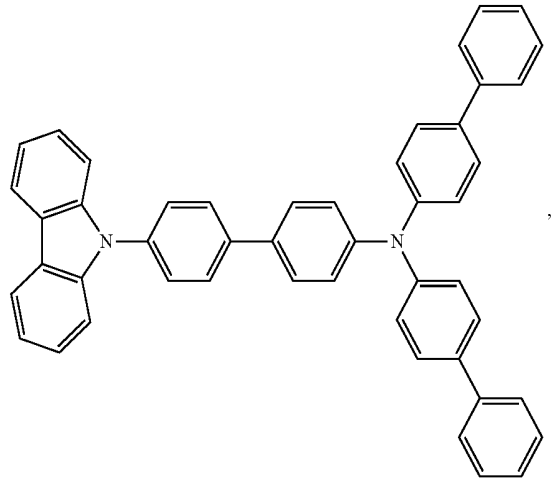

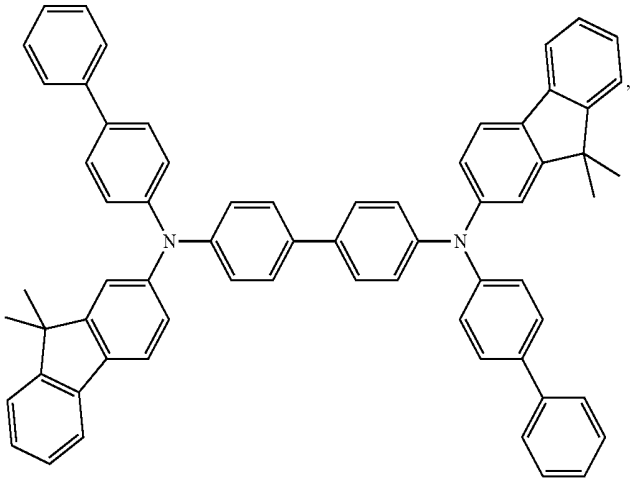

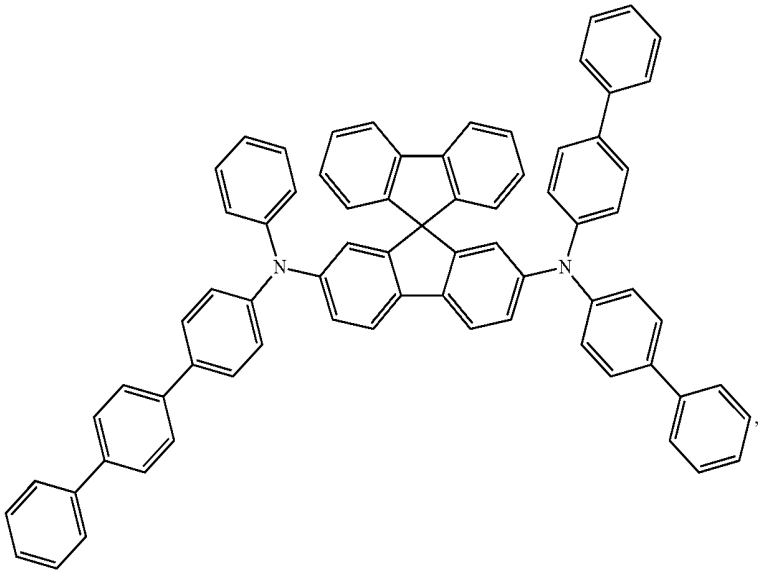

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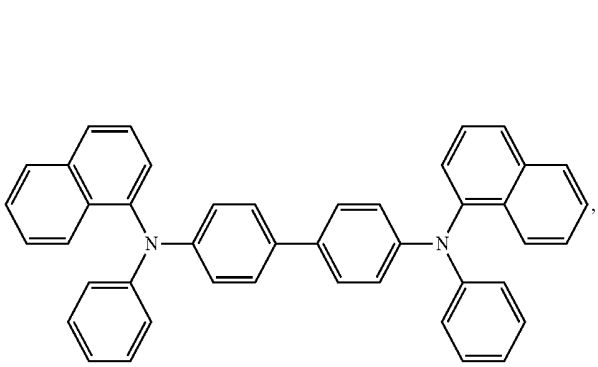

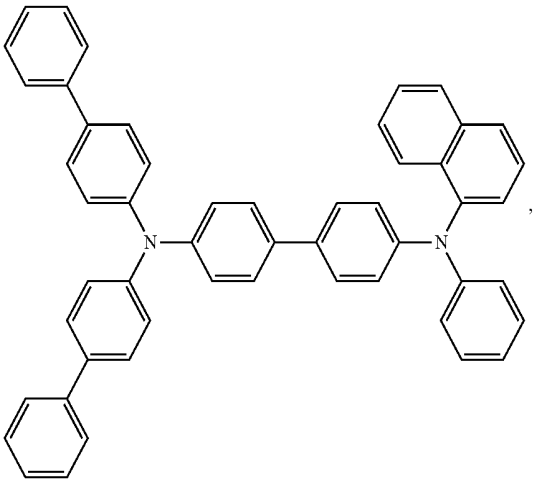

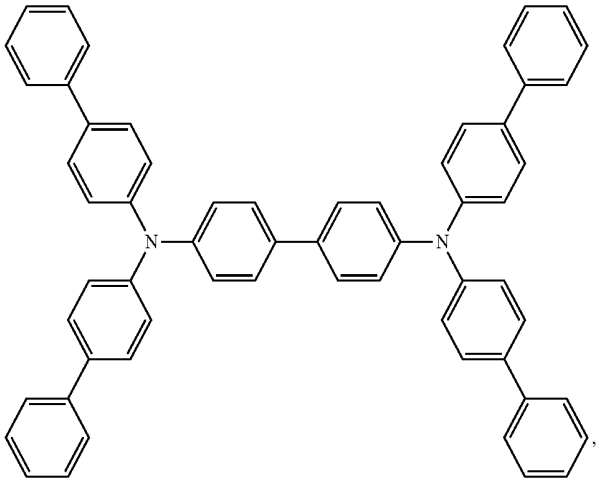

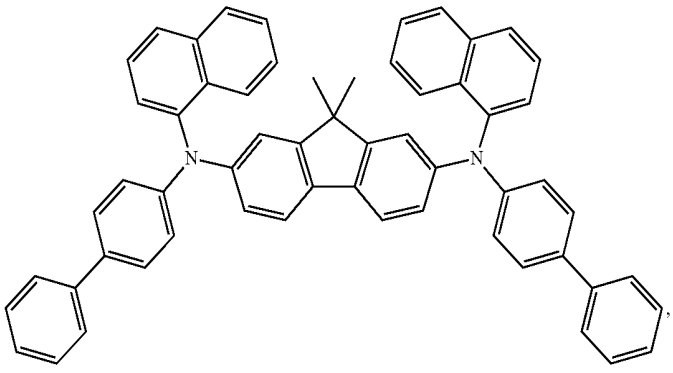

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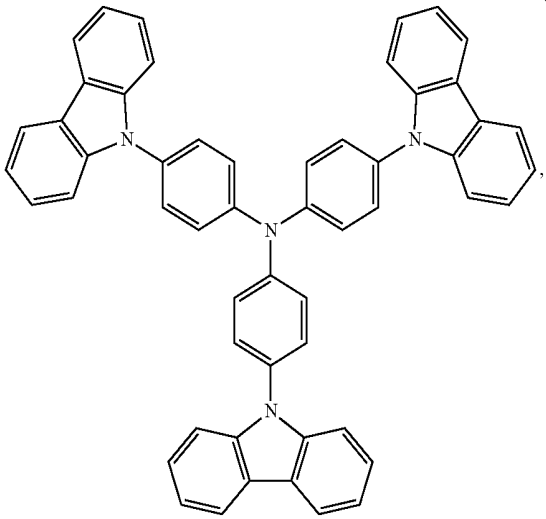

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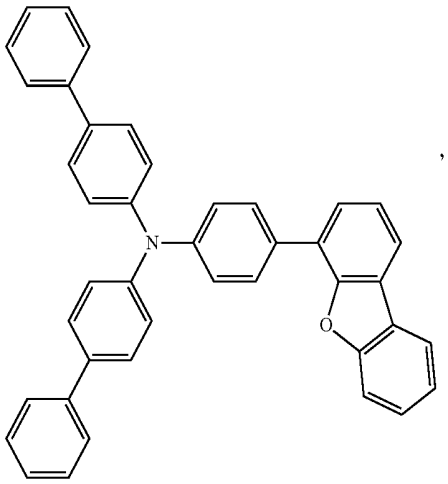

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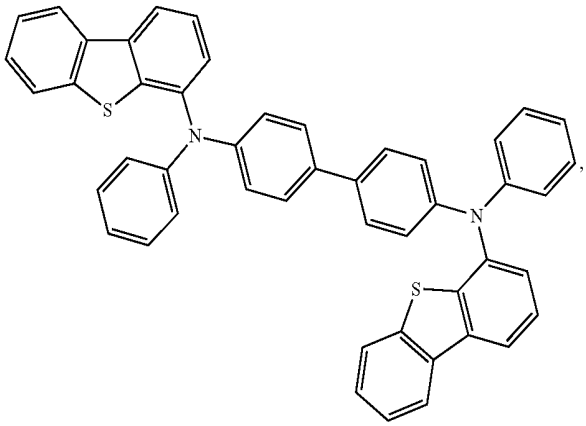

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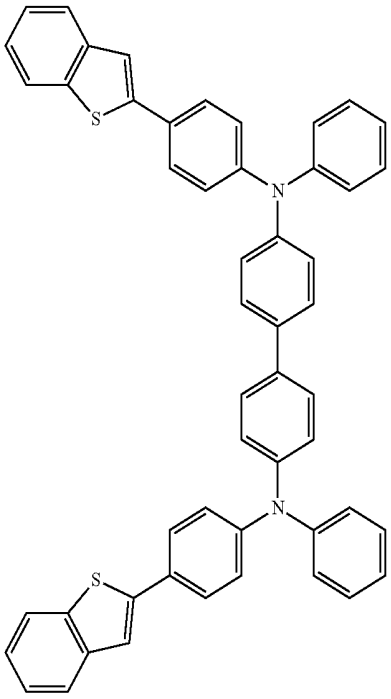

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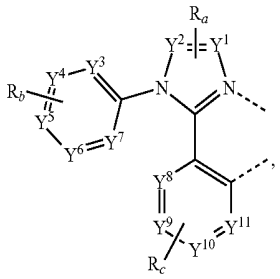
16. The OLED of claim **12**, wherein the organic layer is a hole injecting layer and the compound is the only compound in the hole injecting layer.

17. The OLED of claim **12**, wherein the OLED further comprises an emitting layer; wherein the emitting layer comprises a phosphorescent emissive dopant; wherein the emissive dopant is a transition metal complex having at least one ligand or part of the ligand if the ligand is more than bidentate selected from the group consisting of:



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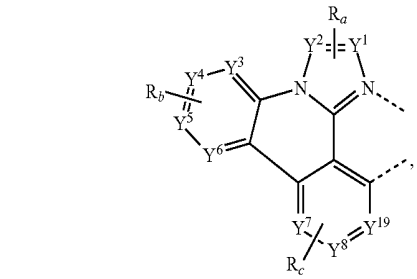

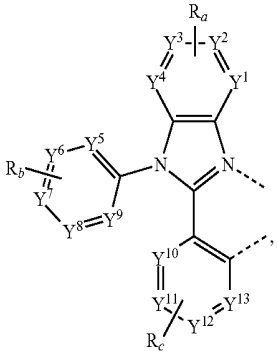

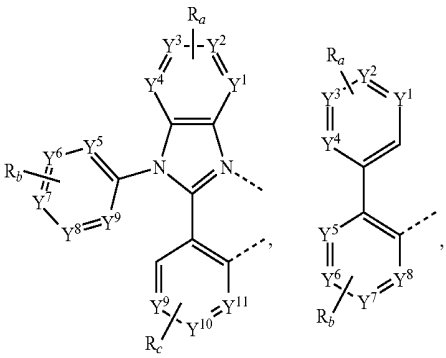

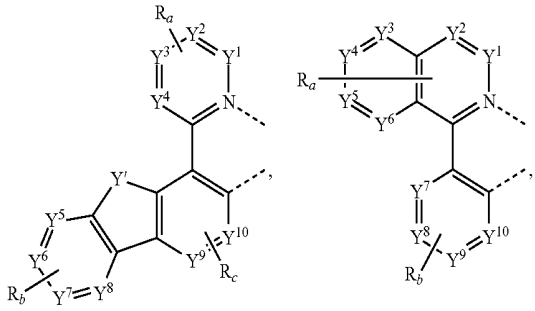

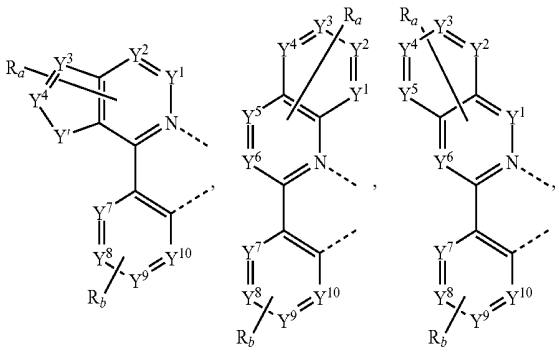

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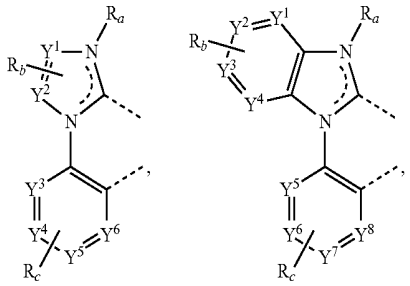

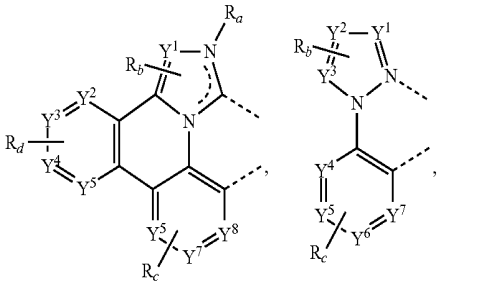

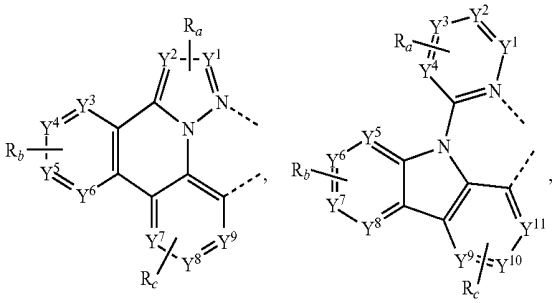

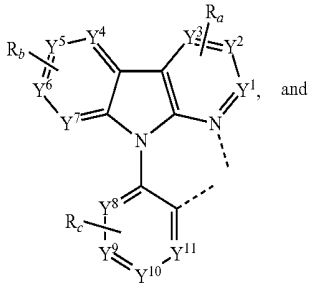

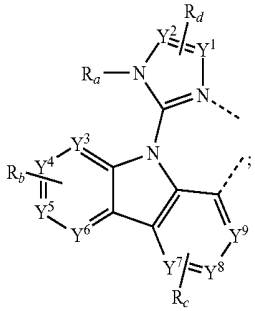

wherein each Y^1 to Y^{13} are independently selected from the group consisting of carbon and nitrogen;

wherein Y' is selected from the group consisting of BR_e, NR_e, PR_e, O, S, Se, C═O, S═O, SO_2, CR_eR_f, SiR_eR_f, and GeR_eR_f;

wherein each R_e, and R_f is independently selected from the group consisting of hydrogen, deuterium, halide, alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy,

amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, and combinations thereof;

wherein R_e and R_f are optionally fused or joined to form a ring;

wherein each R_a, R_b, R_c, and R_d may independently represent from mono substitution to the maximum possible number of substitution, or no substitution;

wherein each R_a, R_b, R_c, and R_d is independently hydrogen or a substituent selected from the group consisting of deuterium, halide, alkyl, cycloalkyl, heteroalkyl, alkoxy, aryloxy, amino, silyl, alkenyl, cycloalkenyl, heteroalkenyl, aryl, heteroaryl, nitrile, isonitrile, sulfanyl, and combinations thereof; and

wherein any two adjacent substituents of R_a, R_b, R_c, and R_d are optionally fused or joined to form a ring or form a multidentate ligand.

18. The OLED of claim **12**, wherein the organic layer is a blocking layer and the compound is a blocking material in the organic layer; or the organic layer is a transporting layer and the compound is a transporting material in the organic layer.

19. A consumer product comprising a first device comprising a first organic light emitting device (OLED) according to claim **12**.

20. A formulation comprising a first compound of claim **1**.

* * * * *

专利名称(译)	电致发光器件的主体材料		
公开(公告)号	US20190372010A1	公开(公告)日	2019-12-05
申请号	US16/410615	申请日	2019-05-13
[标]申请(专利权)人(译)	环球展览公司		
申请(专利权)人(译)	通用显示器公司		
当前申请(专利权)人(译)	通用显示器公司		
[标]发明人	LIN CHUN BOUDREAULT PIERRE LUC T		
发明人	LIN, CHUN BOUDREAULT, PIERRE-LUC T.		
IPC分类号	H01L51/00 H01L51/50		
CPC分类号	H01L51/0074 H01L51/5064 H01L51/0059 H01L51/0073 H01L51/508 H01L51/0068 H01L51/0072 H01L51/5016 H01L51/0077 H01L51/5088		
优先权	62/677911 2018-05-30 US		
外部链接	Espacenet USPTO		

摘要(译)

化学计量比为BiL3的化合物，其中每个L的化学式为 其中Z1 和Z2 分别为O，S，NR或PR; Z3 是C; Z1，Z2，单点虚线表示与Bi的键； n是整数。 在这些结构中，L一种可以是可以被取代的芳基或杂芳基。 取代基R 大号，R，L C和R LC可以选自各种取代基。 在第一式中，至少以下一个为真：（1）L 一种包括5元环；（2）L 一种包括至少三个环的稠环系统；（3）至少一个R 大号是非稠合的芳基或杂芳基部分；或（4）n为至少2，且具有两个不同的R 大号，并且L 一种-（R 大号 ）n不对称。 还公开了包含该化合物的有机发光器件，消费产品，制剂和化学结构。