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(54) **Title:** ARYL AMINE DERIVATIVE AND ORGANIC ELECTROLUMINESCENCE DEVICE USING THE SAME

(57) **Abstract:** Disclosed are a novel aryl amine derivative and an organic electroluminescent device using the same. More specially, the aryl amine derivative is a compound comprising a tetrahydropyrene core, amine groups (-NAr1Ar2 and -NAr3Ar4) each independently substituted at 2 and 7 positions of the tetrahydropyrene, and aromatic ring groups (X1 and X2) each independently substituted or unsubstituted between the tetrahydropyrene core and the amine groups (-NAr1Ar2 and -NAr3Ar4). Further, provided is an organic electroluminescent device comprising (i) an anode, (ii) a cathode, and (iii) one or more organic layers between the anode and the cathode, at least one of the one or more organic layers comprising the aryl amine derivative. Preferably, the organic layer comprising the aryl amine derivative is a hole transport layer.

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ARYL AMINE DERIVATIVE AND ORGANIC ELECTROLUMINESCENCE DEVICE USING THE SAME

Technical Field

The present invention relates to a novel aryl amine derivative and an organic electroluminescent device using the same.

Background Art

As generally know in the art, organic electroluminescence refers to the phenomenon in which electric energy is converted into light energy by means of an organic substance. That is, if a voltage is applied between an anode and a cathode when an organic layer is disposed between both the electrodes, holes are injected from the anode into the organic layer, and electrons are injected from the cathode into the organic layer. Then, the injected holes and electrons are recombined to form excitons, and light is emitted when the excitons drop to the ground state.

As a way to provide a more efficient organic electroluminescent device (OELD), research has been actively pursued to form an organic layer in the device in a multilayer structure instead of a monolayer structure. In most organic electroluminescent devices in use, which have a structure in which an organic layer and electrodes are deposited, the organic layer generally has a multilayer structure including a hole injection layer, a hole transport layer, a light emitting layer, an electron transport layer, and an electron injection layer

The reason why an organic layer in an organic electroluminescent device is formed in a multilayer structure in this way is that interfaces between electrodes and an organic material are stabilized, or holes and electrons having a large difference in mobility in an organic material can be effectively transported to a light emitting layer by using suitable hole

transport and electron transport materials, and luminous efficiency can be improved by balancing the densities of holes and electrons in the light emitting layer. Accordingly, it can be said that hole injection, hole transport, electron injection, and electron transport layers play important roles in an organic electroluminescent device.

Organic electroluminescent devices comprising an organic material have been extensively studied since C. W. Tang et al. of the Eastman Kodak Co. developed an organic electroluminescent device by a vacuum deposition method in 1987.

An organic photoconductive material that has been developed as a hole transport material has many advantages, such as low cost, flexible processability, and pollution-free, and various compounds have been proposed as the organic photoconductive material. Examples of such compounds include an oxadiazole derivative, an oxazole derivative, a hydrazone derivative, a triarylpyrazoline derivative, an aryl amine derivative, a stylbene derivatives, etc. Among others, the aryl amine derivative, such as 4,4',4"-tris[N,N-(1-naphthyl)phenylamino]triphenylamine (1-TNATA), 4,4',4"-tris[N,N-(m-tolyl)phenylamino]triphenylamine (MTDATA), 4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl (α-NPD), or 4,4'-bis[N-(m-tolyl)-N-phenylamino]biphenyl (TPD), is widely used as a hole transport material or a hole injection material.

However, the conventional hole transport material is disadvantageous in that its stability and durability are insufficient. For example, in the case of an α-NPD film formed by a vacuum deposition method, the film is whitened due to crystallization or agglomeration when left for about two weeks because α-NPD is originally a crystalline compound. Also, 2,7-bis(dinaphthylamino)-9,9-dimethylfluorene that is a fluorene derivative having a dimethyl group at 9,9-position, 2,7-bis(N,N-diphenylamino)-9,9-diphenylfluorene that is a fluorene derivative

having diphenyl group at 9,9-position, and the like are highly crystalline materials, and thus have the same problem as mentioned above. Consequently, when they are applied to an organic film device, such as an organic electroluminescent device, there is a problem in that short-circuiting and dark-spot formation are highly probable. Therefore, there is a need to develop a hole transport material that is excellent in hole transport capability and film stability, and has high glass transition temperature (T_g).

Disclosure

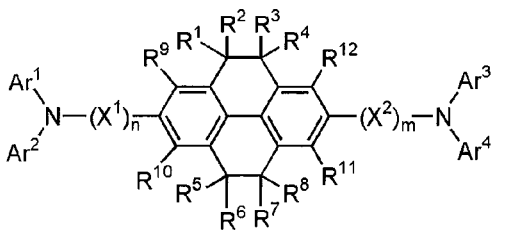
Technical Problem

Therefore, the present invention has been made in view of the above-mentioned problems, and the present invention provides an organic electroluminescent device having improved luminous efficiency, luminance, power efficiency, and thermal stability (i.e. heat resistance) by developing a novel synthesized aryl amine derivative comprising a tetrahydropyrene core and applying the developed aryl amine derivative to the organic electroluminescent device.

Technical Solution

In accordance with an aspect of the present invention, there is provided an aryl amine derivative represented by the following Formula 1:

[Formula 1]



In Formula 1, Ar^1 to Ar^4, X^1, and X^2 are each independently a C_5~C_{30} aromatic ring group that is an aromatic ring group substituted or unsubstituted by at least one kind selected from

the group consisting of a C_1~C_{30} alkyl group, a C_2~C_{30} alkenyl group, a C_2~C_{30} alkynyl group, a C_5~C_{30} aryl group, a C_5~C_{30} heteroaryl group, a C_5~C_{30} aryloxy group, a C_1~C_{30} alkyloxy group, a C_5~C_{30} arylamino group, a C_5~C_{30} diarylamino group, a C_6~C_{30} arylalkyl group, a C_3~C_{30} cycloalkyl group, a C_3~C_{30} heterocycloalkyl group, and a halogen atom;

R^1 to R^{11} are each independently selected from the group consisting of a hydrogen atom, a C_1~C_{30} alkyl group, a C_2~C_{30} alkenyl group, a C_2~C_{30} alkynyl group, a C_5~C_{30} aryl group, a C_5~C_{30} heteroaryl group, a C_5~C_{30} aryloxy group, a C_1~C_{30} alkyloxy group, a C_5~C_{30} arylamino group, a C_5~C_{30} diarylamino group, a C_6~C_{30} arylalkyl group, a C_3~C_{30} cycloalkyl group, a C_3~C_{30} heterocycloalkyl group, and a halogen atom; and

n and m are each independently an integer of 0 to 2.

Here, the C_1~C_{30} alkyl group, the C_2~C_{30} alkenyl group, the C_2~C_{30} alkynyl group, the C_5~C_{30} aryl group, the C_5~C_{30} heteroaryl group, the C_5~C_{30} aryloxy group, the C_1~C_{30} alkyloxy group, the C_5~C_{30} arylamino group, the C_5~C_{30} diarylamino group, the C_6~C_{30} arylalkyl group, the C_3~C_{30} cycloalkyl group, and the C_3~C_{30} heterocycloalkyl group in Ar^1 to Ar^4, X^1, X^2, and R^1 to R^{11} may be each independently further substituted or unsubstituted by at least one kind of substituent selected from the group consisting of halogen, an amino group, a nitrile group, a nitro group, a C_1~C_{40} alkyl group, a C_2~C_{40} alkenyl group, a C_1~C_{40} alkoxy group, a C_3~C_{40} cycloalkyl group, a C_2~C_{40} heterocycloalkyl group, a C_5~C_{40} aryl group, and a C_4~C_{40} heteroaryl group.

In accordance with another aspect of the present invention, there is an organic electroluminescent device (OELD) comprising (i) an anode; (ii) a cathode; and (iii) one or more organic layers between the anode and the cathode, at least one of the one or more organic layers comprising the above aryl amine derivative represented by Formula 1.

Preferably, in the above organic electroluminescent device,

the organic layer comprising the above aryl amine derivative represented by Formula 1 comprises a hole transport layer.

Advantageous Effects

The aryl amine derivative represented by Formula 1 according to the present invention can ensure the stability of a material by an increased glass transition temperature (T_g). Thus, when the aryl amine derivative according to the present invention is employed as a hole transport material, the stability, luminous efficiency, luminance, and power efficiency of an organic electroluminescent device can be improved. In the long run, the aryl amine derivative according to the present invention can significantly contribute to an improvement in the hole transport capability of an organic electroluminescent device, and particularly such an improved hole transport capability is very effective to maximize the performance of a full-color organic EL panel.

Best Mode

The aryl amine derivative represented by Formula 1 according to the present invention is a compound comprising a tetrahydropyrene core, amine groups ($-NAr^1Ar^2$ and $-NAr^3Ar^4$) each independently substituted at 2 and 7 positions of the tetrahydropyrene, and aromatic ring groups (X^1 and X^2) each independently substituted or unsubstituted between the tetrahydropyrene core and the amine groups ($-NAr^1Ar^2$ and $-NAr^3Ar^4$).

In Formula 1, Ar^1 to Ar^4, X^1, and X^2 are each independently a C_5~C_{30} aromatic ring group that is preferably, but not limited to, a monovalent or divalent group selected from the group consisting of benzene, biphenyl, terphenyl, naphthalene, anthracene, triphenylamine, phenanthrene, pyrene, fluorene, and xanthene.

More specially, the aryl amine derivative represented by Formula 1 may be expressed by compounds presented below in Tables

1 to 3. However, the following compounds in Tables 1 to 3 are illustrative merely, and the aryl amine derivative represented by Formula 1 according to the present invention is not limited thereto.

Table 1

Compound	Ar^1	Ar^2	Ar^3	Ar^4
HT-1	1-naphthyl	1-naphthyl	1-naphthyl	1-naphthyl
HT-2	1-naphthyl	1-naphthyl	2-naphthyl	2-naphthyl
HT-3	1-naphthyl	1-naphthyl	9-phenanthryl	2-naphthyl
HT-4	1-naphthyl	1-naphthyl	1-pyrenyl	2-naphthyl
HT-5	1-naphthyl	1-naphthyl	phenyl	2-biphenyl
HT-6	1-naphthyl	1-naphthyl	2-biphenyl	2-biphenyl
HT-7	1-naphthyl	1-naphthyl	3-biphenyl	2-biphenyl
HT-8	1-naphthyl	1-naphthyl	4-biphenyl	2-biphenyl
HT-9	1-naphthyl	1-naphthyl	2-p-terphenyl	4-biphenyl
HT-10	2-naphthyl	2-naphthyl	1-naphthyl	4-biphenyl
HT-11	2-naphthyl	2-naphthyl	2-naphthyl	4-biphenyl
HT-12	2-naphthyl	2-naphthyl	9-phenanthryl	4-biphenyl
HT-13	2-naphthyl	2-naphthyl	1-pyrenyl	4-biphenyl
HT-14	2-naphthyl	2-naphthyl	phenyl	3-biphenyl
HT-15	2-naphthyl	2-naphthyl	2-biphenyl	3-biphenyl
HT-16	2-naphthyl	2-naphthyl	3-biphenyl	3-biphenyl
HT-17	2-naphthyl	2-naphthyl	4-biphenyl	3-biphenyl
HT-18	2-naphthyl	2-naphthyl	2-p-terphenyl	3-biphenyl
HT-19	9-phenanthryl	9-phenanthryl	1-naphthyl	9-phenanthryl
HT-20	9-phenanthryl	9-phenanthryl	2-naphthyl	9-phenanthryl
HT-21	9-phenanthryl	9-phenanthryl	9-phenanthryl	1-pyrenyl
HT-22	9-phenanthryl	9-phenanthryl	1-pyrenyl	9-phenanthryl
HT-23	9-phenanthryl	9-phenanthryl	phenyl	9-phenanthryl
HT-24	9-phenanthryl	9-phenanthryl	2-biphenyl	1-pyrenyl
HT-25	9-phenanthryl	9-phenanthryl	3-biphenyl	1-pyrenyl
HT-26	9-phenanthryl	9-phenanthryl	4-biphenyl	1-pyrenyl
HT-27	9-phenanthryl	9-phenanthryl	2-p-terphenyl	1-pyrenyl

HT-28	1-pyrenyl	1-pyrenyl	1-naphthyl	9-phenanthryl
HT-29	1-pyrenyl	1-pyrenyl	2-naphthyl	9-phenanthryl
HT-30	1-pyrenyl	1-pyrenyl	9-phenanthryl	9-phenanthryl
HT-31	1-pyrenyl	1-pyrenyl	1-pyrenyl	1-pyrenyl
HT-32	1-pyrenyl	1-pyrenyl	phenyl	1-pyrenyl
HT-33	1-pyrenyl	1-pyrenyl	2-biphenyl	1-pyrenyl
HT-34	1-pyrenyl	1-pyrenyl	3-biphenyl	1-pyrenyl
HT-35	1-pyrenyl	1-pyrenyl	4-biphenyl	phenyl
HT-36	1-pyrenyl	1-pyrenyl	2-p-terphenyl	phenyl
HT-37	phenyl	phenyl	1-naphthyl	phenyl
HT-38	phenyl	phenyl	2-naphthyl	phenyl
HT-39	phenyl	phenyl	9-phenanthryl	phenyl
HT-40	phenyl	phenyl	1-pyrenyl	4-biphenyl
HT-41	phenyl	phenyl	phenyl	4-biphenyl
HT-42	phenyl	phenyl	2-biphenyl	4-biphenyl
HT-43	phenyl	phenyl	3-biphenyl	4-biphenyl
HT-44	phenyl	phenyl	4-biphenyl	4-biphenyl
HT-45	phenyl	phenyl	2-p-terphenyl	3-biphenyl
HT-46	2-biphenyl	2-biphenyl	1-naphthyl	3-biphenyl
HT-47	2-biphenyl	2-biphenyl	2-naphthyl	3-biphenyl
HT-48	2-biphenyl	2-biphenyl	9-phenanthryl	3-biphenyl
HT-49	2-biphenyl	2-biphenyl	1-pyrenyl	3-biphenyl
HT-50	2-biphenyl	2-biphenyl	phenyl	3-biphenyl
HT-51	4-biphenyl	2-biphenyl	2-biphenyl	2-biphenyl
HT-52	4-biphenyl	2-biphenyl	3-biphenyl	3-biphenyl
HT-53	4-biphenyl	2-biphenyl	4-biphenyl	3-biphenyl
HT-54	4-biphenyl	2-biphenyl	2-p-terphenyl	3-biphenyl
HT-55	4-biphenyl	3-biphenyl	1-naphthyl	3-biphenyl
HT-56	4-biphenyl	3-biphenyl	2-naphthyl	3-biphenyl
HT-57	4-biphenyl	3-biphenyl	9-phenanthryl	9-phenanthryl
HT-58	4-biphenyl	3-biphenyl	1-pyrenyl	1-pyrenyl
HT-59	4-biphenyl	3-biphenyl	phenyl	phenyl
HT-60	3-biphenyl	3-biphenyl	2-biphenyl	2-biphenyl

HT-61	3-biphenyl	3-biphenyl	3-biphenyl	3-biphenyl
HT-62	3-biphenyl	3-biphenyl	4-biphenyl	3-biphenyl
HT-63	3-biphenyl	3-biphenyl	2-p-terpheny	3-biphenyll
HT-64	4-biphenyl	4-biphenyl	1-naphthyl	2-biphenyl
HT-65	4-biphenyl	4-biphenyl	2-naphthyl	2-biphenyl
HT-66	4-biphenyl	4-biphenyl	9-phenanthryl	4-biphenyl
HT-67	4-biphenyl	4-biphenyl	1-pyrenyl	4-biphenyl
HT-68	4-biphenyl	4-biphenyl	phenyl	9-phenanthryl
HT-69	4-biphenyl	4-biphenyl	2-biphenyl	9-phenanthryl
HT-70	4-biphenyl	4-biphenyl	3-biphenyl	1-pyrenyl
HT-71	4-biphenyl	4-biphenyl	4-biphenyl	1-pyrenyl
HT-72	4-biphenyl	4-biphenyl	2-p-terphenyl	phenyl
HT-73	1-naphthyl	1-naphthyl	1-naphthyl	phenyl
HT-74	1-naphthyl	1-naphthyl	2-naphthyl	2-naphthyl
HT-75	1-naphthyl	1-naphthyl	9-phenanthryl	2-naphthyl
HT-76	1-naphthyl	1-naphthyl	1-pyrenyl	1-naphthyl
HT-77	1-naphthyl	1-naphthyl	phenyl	1-naphthyl
HT-78	1-naphthyl	1-naphthyl	2-biphenyl	1-naphthyl
HT-79	1-naphthyl	1-naphthyl	3-biphenyl	3-biphenyl
HT-80	1-naphthyl	1-naphthyl	4-biphenyl	2-biphenyl
HT-81	1-naphthyl	1-naphthyl	2-p-terphenyl	4-biphenyl
HT-82	2-naphthyl	2-naphthyl	1-naphthyl	9-phenanthryl
HT-83	2-naphthyl	2-naphthyl	2-naphthyl	phenyl
HT-84	2-naphthyl	2-naphthyl	9-phenanthryl	2-naphthyl
HT-85	2-naphthyl	2-naphthyl	1-pyrenyl	1-naphthyl

Table2

Compound	X^1	Ar^1,Ar^2	Ar^3,Ar^4
HT-86	2,4-biphenyl	2-biphenyl	2-biphenyl
HT-87	2,4-biphenyl	2-biphenyl	3-biphenyl
HT-88	2,4-biphenyl	2-biphenyl	4-biphenyl
HT-89	2,4-biphenyl	2-biphenyl	2-p-terphenyl
HT-90	3,4-biphenyl	3-biphenyl	1-naphthyl
HT-91	3,4-biphenyl	3-biphenyl	2-naphthyl

HT-92	3,4-biphenyl	3-biphenyl	9-phenanthryl
HT-93	3,4-biphenyl	3-biphenyl	1-pyrenyl
HT-94	3,4-biphenyl	3-biphenyl	phenyl
HT-95	3,4-biphenyl	3-biphenyl	2-biphenyl
HT-96	3,4-biphenyl	3-biphenyl	3-biphenyl
HT-97	3,4-biphenyl	3-biphenyl	4-biphenyl
HT-98	3,4-biphenyl	3-biphenyl	2-p-terphenyl
HT-99	4,4-biphenyl	4-biphenyl	1-naphthyl
HT-100	4,4-biphenyl	4-biphenyl	2-naphthyl
HT-101	4,4-biphenyl	4-biphenyl	9-phenanthryl
HT-102	4,4-biphenyl	4-biphenyl	1-pyrenyl
HT-103	4,4-biphenyl	4-biphenyl	phenyl
HT-104	4,4-biphenyl	4-biphenyl	2-biphenyl
HT-105	4,4-biphenyl	4-biphenyl	3-biphenyl
HT-106	4,4-biphenyl	4-biphenyl	4-biphenyl
HT-107	4,4-biphenyl	4-biphenyl	2-p-terphenyl
HT-108	1,5-naphthyl	1-naphthyl	1-naphthyl
HT-109	1,5-naphthyl	1-naphthyl	2-naphthyl
HT-110	1,5-naphthyl	1-naphthyl	9-phenanthryl
HT-111	1,5-naphthyl	1-naphthyl	1-pyrenyl
HT-112	1,5-naphthyl	1-naphthyl	phenyl
HT-113	1,5-naphthyl	1-naphthyl	2-biphenyl
HT-114	1,5-naphthyl	1-naphthyl	3-biphenyl
HT-115	1,5-naphthyl	1-naphthyl	4-biphenyl
HT-116	1,5-naphthyl	1-naphthyl	2-p-terphenyl
HT-117	2,6-naphthyl	2-naphthyl	1-naphthyl
HT-118	2,6-naphthyl	2-naphthyl	2-naphthyl
HT-119	2,6-naphthyl	2-naphthyl	9-phenanthryl
HT-120	2,6-naphthyl	2-naphthyl	1-pyrenyl
HT-121	2,6-naphthyl	2-naphthyl	phenyl
HT-122	2,6-naphthyl	2-naphthyl	2-biphenyl
HT-123	2,6-naphthyl	2-naphthyl	3-biphenyl
HT-124	2,6-naphthyl	2-naphthyl	4-biphenyl

HT-125	2,6-naphthyl	2-naphthyl	2-p-terphenyl
HT-126	4,4-biphenyl	1-naphthyl	4-biphenyl
HT-127	4,4-biphenyl	2-naphthyl	4-biphenyl
HT-128	4,4-biphenyl	9-phenanthryl	9-phenanthryl
HT-129	4,4-biphenyl	9-phenanthryl	1-pyrenyl
HT-130	4,4-biphenyl	9-phenanthryl	phenyl
HT-131	4,4-biphenyl	9-phenanthryl	2-biphenyl
HT-132	4,4-biphenyl	9-phenanthryl	3-biphenyl
HT-133	4,4-biphenyl	9-phenanthryl	4-biphenyl
HT-134	4,4-biphenyl	9-phenanthryl	2-p-terphenyl
HT-135	4,4-biphenyl	1-pyrenyl	1-naphthyl

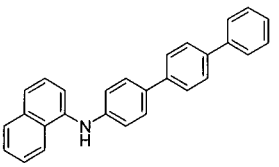
Table 3

Compound	X^1, X^2	Ar^1, Ar^2	Ar^3, Ar^4
HT-136	2,4-biphenyl	2-biphenyl	2-biphenyl
HT-137	2,4-biphenyl	2-biphenyl	3-biphenyl
HT-138	2,4-biphenyl	2-biphenyl	4-biphenyl
HT-139	2,4-biphenyl	2-biphenyl	2-p-terphenyl
HT-140	3,4-biphenyl	3-biphenyl	1-naphthyl
HT-141	3,4-biphenyl	3-biphenyl	2-naphthyl
HT-142	3,4-biphenyl	3-biphenyl	9-phenanthryl
HT-143	3,4-biphenyl	3-biphenyl	1-pyrenyl
HT-144	3,4-biphenyl	3-biphenyl	phenyl
HT-145	3,4-biphenyl	3-biphenyl	2-biphenyl
HT-146	3,4-biphenyl	3-biphenyl	3-biphenyl
HT-147	3,4-biphenyl	3-biphenyl	4-biphenyl
HT-148	3,4-biphenyl	3-biphenyl	2-p-terphenyl
HT-149	4,4-biphenyl	4-biphenyl	1-naphthyl
HT-150	4,4-biphenyl	4-biphenyl	2-naphthyl
HT-151	4,4-biphenyl	4-biphenyl	9-phenanthryl
HT-152	4,4-biphenyl	4-biphenyl	1-pyrenyl
HT-153	4,4-biphenyl	4-biphenyl	phenyl
HT-154	4,4-biphenyl	4-biphenyl	2-biphenyl
HT-155	4,4-biphenyl	4-biphenyl	3-biphenyl

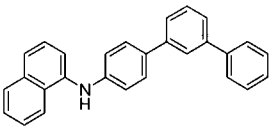
HT-156	4,4-biphenyl	4-biphenyl	4-biphenyl
HT-157	4,4-biphenyl	4-biphenyl	2-p-terphenyl
HT-158	1,5-naphthyl	1-naphthyl	1-naphthyl
HT-159	1,5-naphthyl	1-naphthyl	2-naphthyl
HT-160	1,5-naphthyl	1-naphthyl	9-phenanthryl
HT-161	1,5-naphthyl	1-naphthyl	1-pyrenyl
HT-162	1,5-naphthyl	1-naphthyl	phenyl
HT-163	1,5-naphthyl	1-naphthyl	2-biphenyl
HT-164	1,5-naphthyl	1-naphthyl	3-biphenyl
HT-165	1,5-naphthyl	1-naphthyl	4-biphenyl
HT-166	1,5-naphthyl	1-naphthyl	2-p-terphenyl
HT-167	2,6-naphthyl	2-naphthyl	1-naphthyl
HT-168	2,6-naphthyl	2-naphthyl	2-naphthyl
HT-169	2,6-naphthyl	2-naphthyl	9-phenanthryl
HT-170	2,6-naphthyl	2-naphthyl	1-pyrenyl
HT-171	2,6-naphthyl	2-naphthyl	phenyl
HT-172	2,6-naphthyl	2-naphthyl	2-biphenyl
HT-173	2,6-naphthyl	2-naphthyl	3-biphenyl
HT-174	2,6-naphthyl	2-naphthyl	4-biphenyl
HT-175	2,6-naphthyl	2-naphthyl	2-p-terphenyl
HT-176	4,4-biphenyl	1-naphthyl	4-biphenyl
HT-177	4,4-biphenyl	2-naphthyl	4-biphenyl
HT-178	4,4-biphenyl	9-phenanthryl	9-phenanthryl
HT-179	4,4-biphenyl	9-phenanthryl	1-pyrenyl
HT-180	4,4-biphenyl	9-phenanthryl	phenyl
HT-181	4,4-biphenyl	9-phenanthryl	2-biphenyl
HT-182	4,4-biphenyl	9-phenanthryl	3-biphenyl
HT-183	4,4-biphenyl	9-phenanthryl	4-biphenyl
HT-184	4,4-biphenyl	9-phenanthryl	2-p-terphenyl
HT-185	4,4-biphenyl	1-pyrenyl	1-naphthyl

The following S-group, that is S-1 to S-47, corresponds to non-limitative examples of amine substituents ($-NAr^1Ar^2$ and -

NAr^3Ar^4) in Formula 1. Thus, $-NAr^1Ar^2$ and $-NAr^3Ar^4$ may be each independently selected from, but not limited to, the following S-group, that is, S-1 to S-47.



S-1



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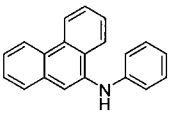

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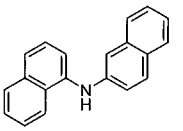

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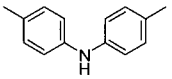

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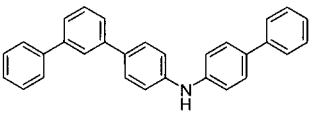

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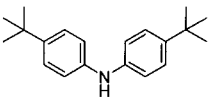

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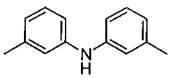

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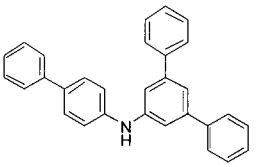

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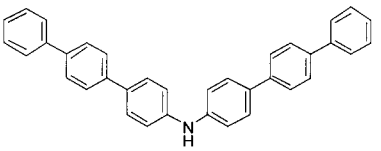

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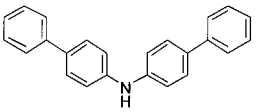

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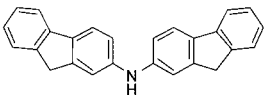

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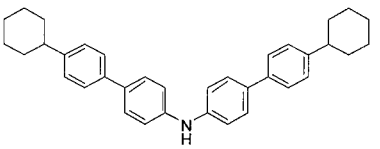

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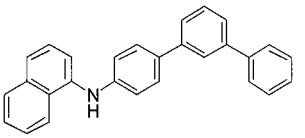

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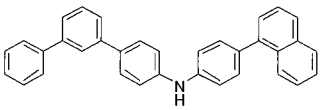

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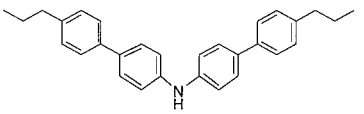

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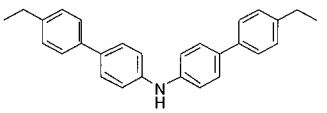

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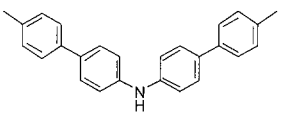

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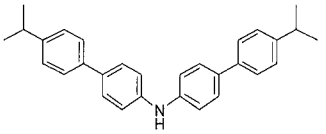

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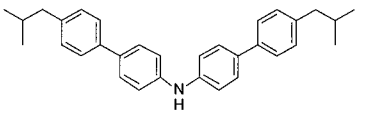

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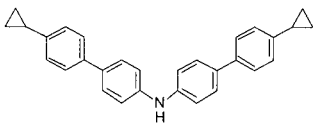

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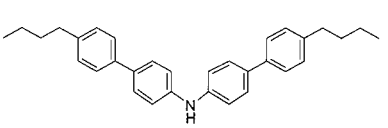

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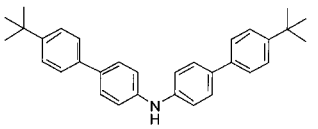

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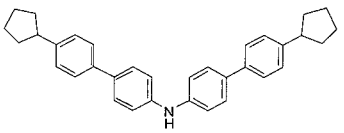

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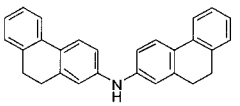

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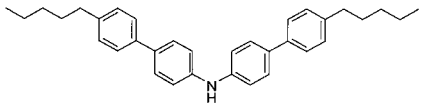

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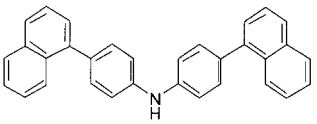

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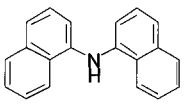

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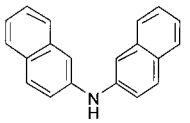

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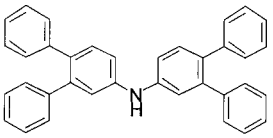

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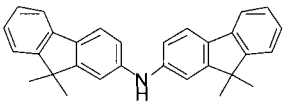

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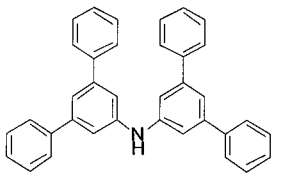

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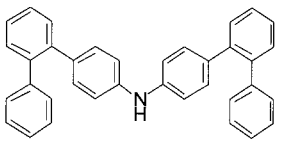

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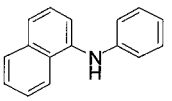

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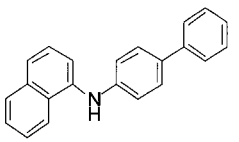

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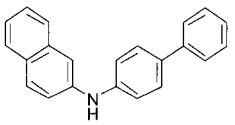

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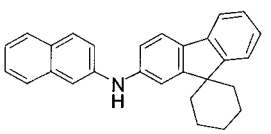

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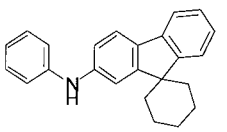

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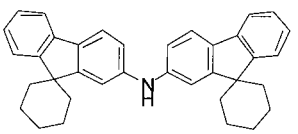

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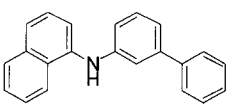

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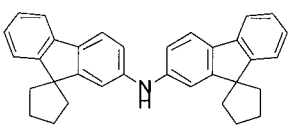

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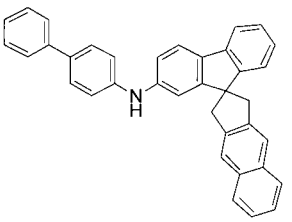

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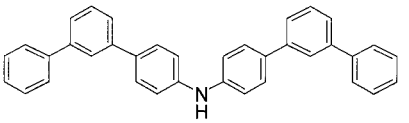
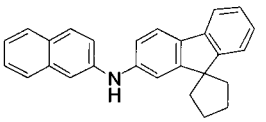


S-43



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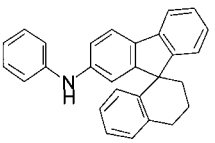

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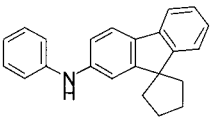

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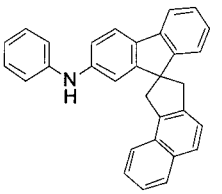
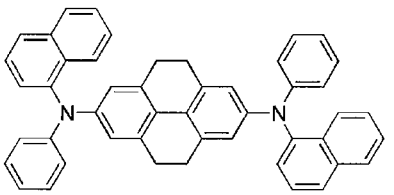


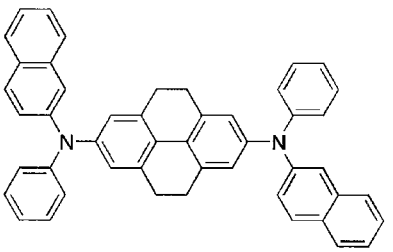
S-47

Also, typical examples of the aryl amine derivative represented by Formula 1 according to the present invention are as follows but not limited to:

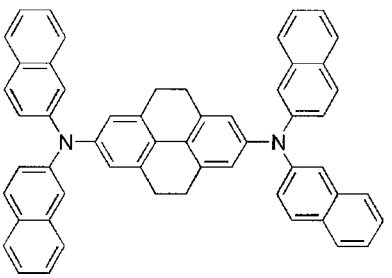
[Formula 1-1]



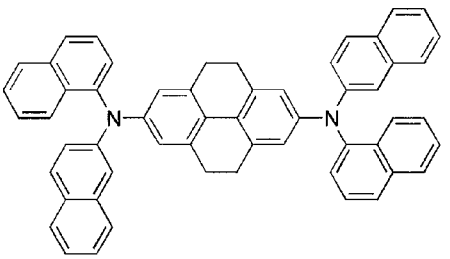
[Formula 1-2]



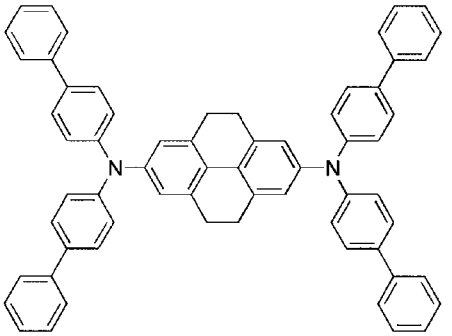
[Formula 1-3]



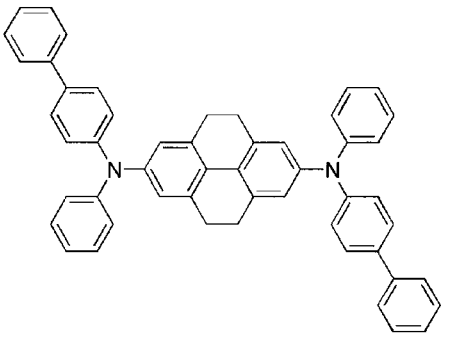
[Formula 1-4]



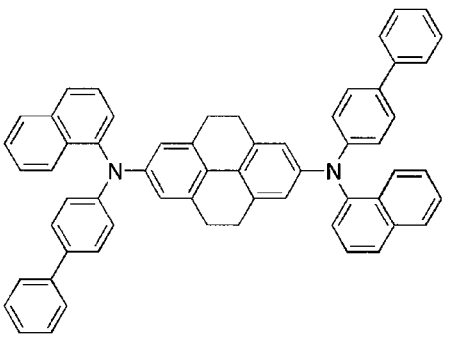
[Formula 1-5]



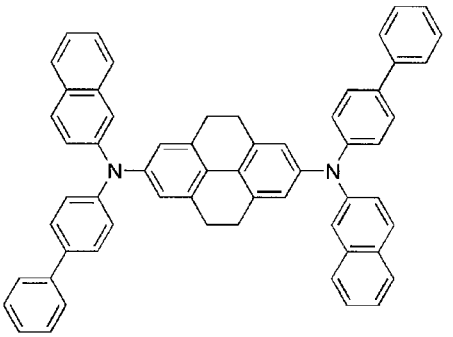
[Formula 1-6]



[Formula 1-7]



[Formula 1-8]



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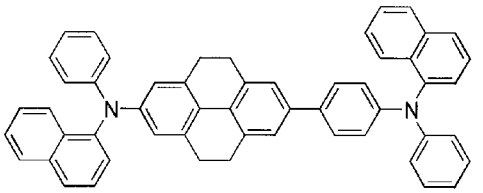

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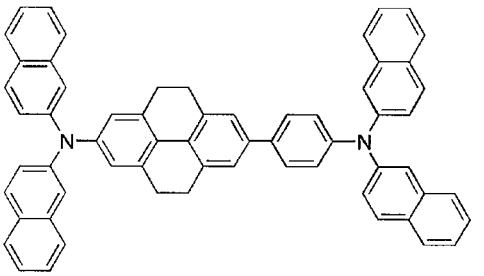
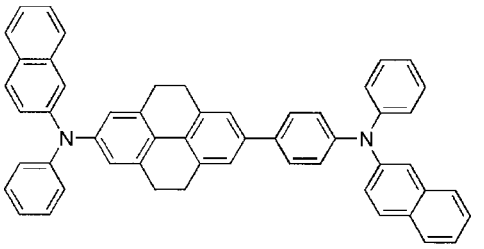


[Formula 1-11]



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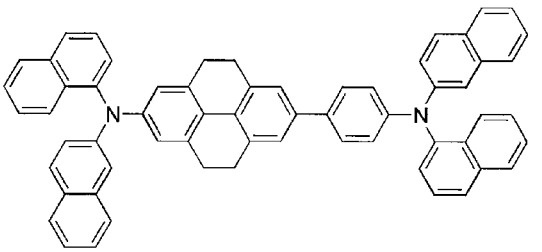

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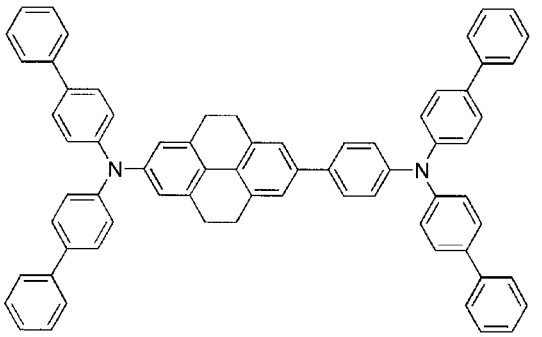
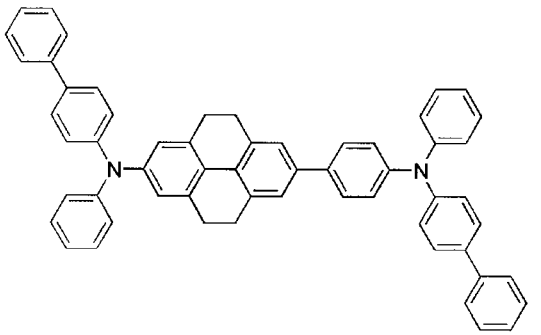


[Formula 1-14]



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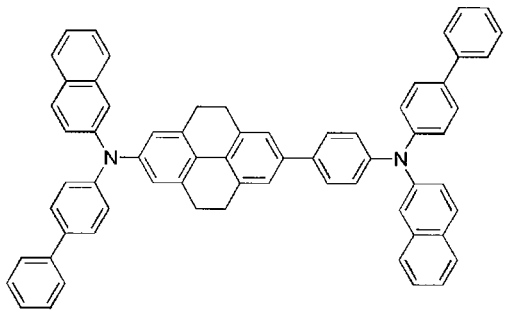

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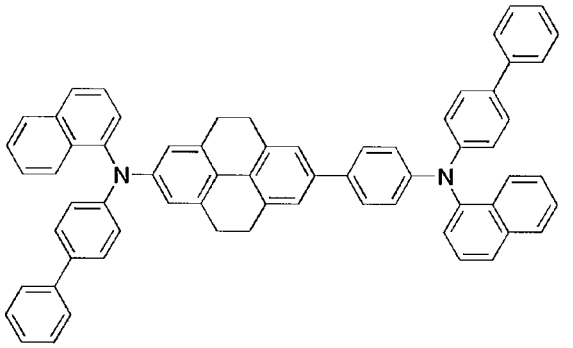

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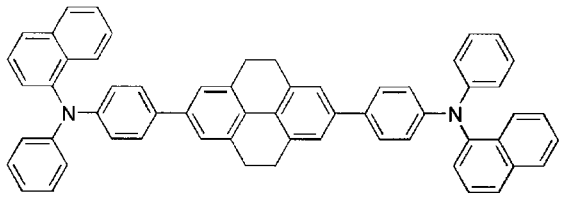

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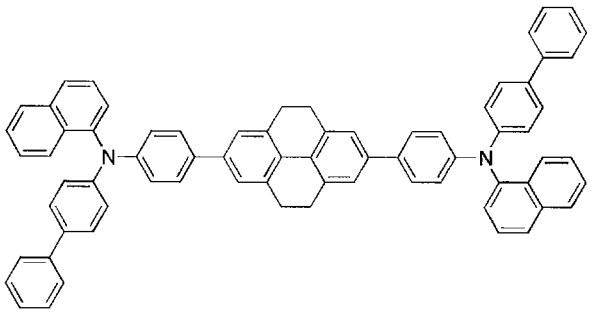

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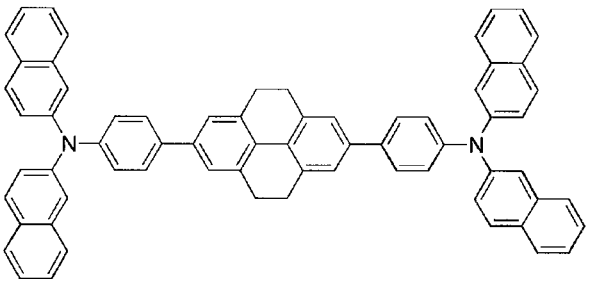

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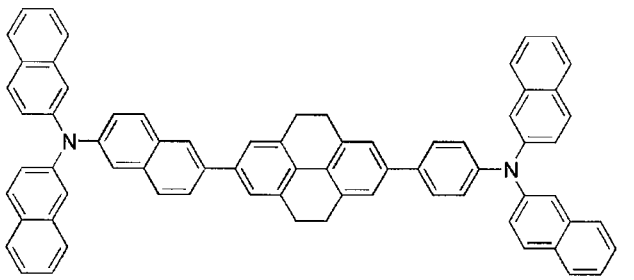

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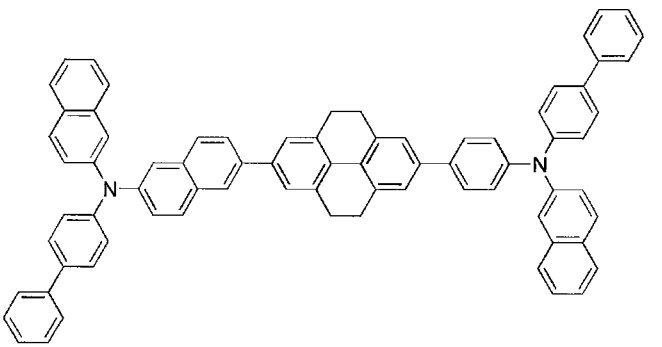

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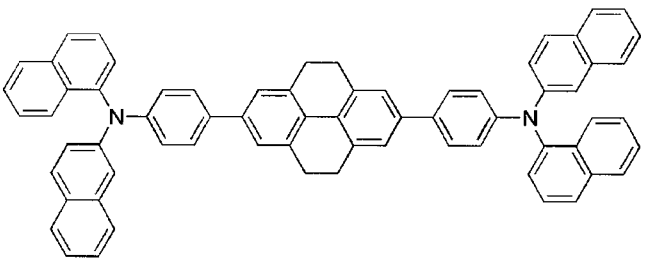
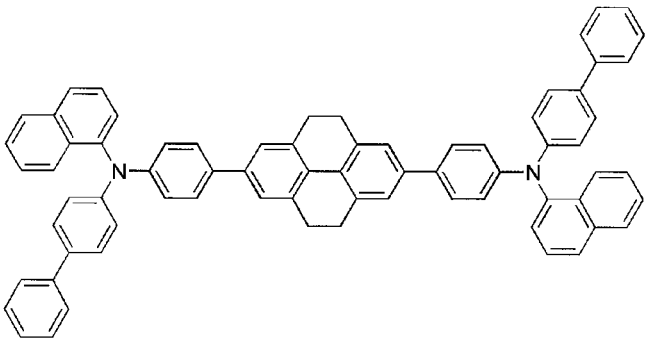
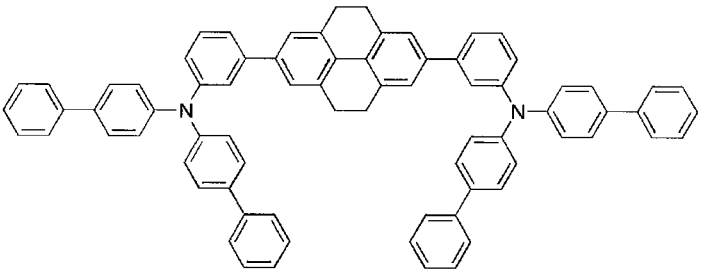


[Formula 1-23]



[Formula 1-24]



Further, the organic electroluminescent device according to the present invention comprises (i) an anode, (ii) a cathode, and (iii) one or more organic layers between the anode and the cathode, and is characterized in that at least one of the one or more organic layers comprises the above aryl amine derivative represented by Formula 1.

Here, the aryl amine derivative represented by Formula 1 may be a mixture of at least two kinds of aryl amine derivatives represented by Formula 1.

Also, the aryl amine derivative represented by Formula 1 may be included as a hole transport material in the organic electroluminescent device to thereby improve the luminous efficiency, luminance, power efficiency, and thermal stability of

the organic electroluminescent device.

Hole injection and transport materials may suffer from a lack of electrons while holes are created in a molecule, and thus the stability of the molecule may be reduced. However, the aryl amine derivative represented by Formula 1 is rich in electrons due to non-covalent electron pairs of amine existing in a molecule. Thus, when the aryl amine derivative represented by Formula 1 is used as a hole transport material, the non-covalent electron pairs of amine in the aryl amine derivative can reduce the instability of a molecule, which is caused by the creation of holes in the molecule, so that the overall molecular stability does not deteriorate. Thus, the organic layer comprising the aryl amine derivative represented by Formula 1 is preferably a hole transport layer.

Further, in the organic electroluminescent device according to the present invention, the organic layers other than the organic layer comprising the aryl amine derivative of the present invention may be a hole injection layer, a hole transport layer, a light emitting layer, and/or an electron transport layer.

More specially, a non-limitative example of the organic electroluminescent device according to the present invention may have a structure in which, for example, a substrate, an anode, a hole injection layer, a hole transport layer, a light emitting layer, an electron transport layer, and a cathode are laminated in sequence, and the hole transport layer of them comprises the aryl amine derivative represented by Formula 1. An electron injection layer may be disposed on the electron transport layer.

In addition to the structure in which an anode, one or more organic layers, and a cathode are laminated in sequence, the organic electroluminescent device according to the present invention may further comprise an insulating layer or adhesive layer that is inserted at the interfaces of the electrodes and the organic layers respectively.

In the organic electroluminescent device according to the present invention, the organic layer comprising the aryl amine derivative represented by Formula 1 may be formed by a vacuum deposition method or solution coating method. Examples of the solution coating method include, but are not limited to, spin coating, dip coating, doctor blading, inkjet printing, thermal transfer, and the like.

The organic electroluminescent device according to the present invention may be manufactured by forming the organic layers and the electrodes by use of materials and methods well known in the art, except that at least one of the organic layers is formed in such a manner as to comprise the aryl amine derivative of the present invention.

For example, a silicon wafer, a quartz or glass plate, a metal plate, a plastic film or sheet, etc. may be used as a substrate.

Examples of an anode material include, but are not limited to, metal, such as vanadium, chrome, copper, zinc, and gold, or alloy thereof; metal oxide, such as zinc oxide, indium oxide, indium tin oxide (ITO), and indium zinc oxide (IZO); ZnO; Al or SnO_2; a combination of metal, such as Sb, and oxide; conductive polymer, such as polythiophene, poly(3-methylthiophene), poly[3,4-(ethylene-1,2-dioxy)thiophene] (PEDT), polypyrrole, and polyaniline; and carbon black.

Examples of a cathode material include, but are not limited to, metal, such as magnesium, calcium, sodium, potassium, titanium, indium, yttrium, lithium, gadolinium, aluminum, silver, tin, and lead, or alloy thereof; and a material having a multilayer structure, such as LiF/Al or LiO_2/Al.

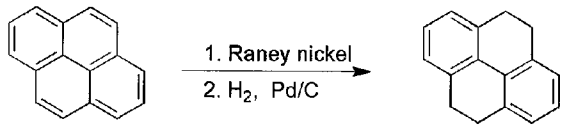
Further, there is no particular limitation on the materials of the hole injection, light emitting, electron transport, and electron injection layers, and they may be formed using conventional materials.

Reference will now be made in detail to exemplary embodiments of the present invention. However, the following examples are illustrative merely, and the scope of the present invention is not limited thereto.

[Preparation Example 1] Preparation of Aryl Amine Derivative Represented by Formula 1-5 (HT-1)

Preparation Example 1-1: Preparation of 4,5,9,10-tetrahydropyrene

[Reaction Scheme 1]

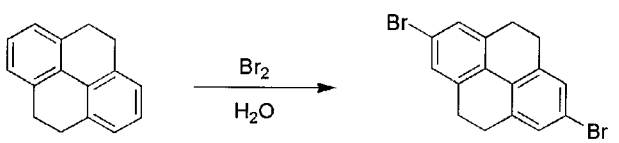


10g of pyrene was put into a flask, 500ml of ethyl acetate and 5g of Raney nickel were added thereto, and then the mixture solution was stirred under N_2 at room temperature for 3 days. The reaction solution was filtered, the solvent was removed from the filtrate, and then the residual solid was dried. The dried solid was put into a flask, 250ml of ethanol and 0.15g of Pd/C were added thereto, and then the mixture solution was reacted at a pressure of 45psi H_2 for 6 days. The reaction solution was filtered, the solvent was removed from the filtrate, and then the residual solid was dried to obtain 8g of tetrahydropyrene.

GC-Mass (theoretical value: 206.11g/mol, measured value: 206g/mol)

Preparation Example 1-2: Preparation of 2,7-dibromo-4,5,9,10-tetrahydropyrene

[Reaction Scheme 2]



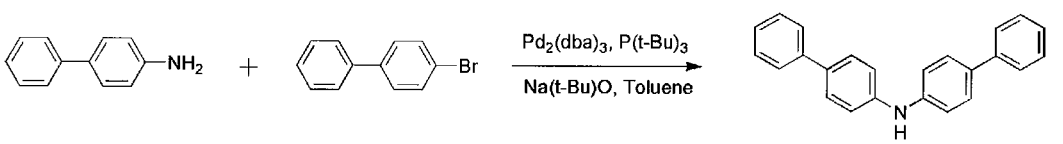
5g of tetrahydropyrene obtained in Preparation Example 1-1 was put into a flask, 100ml of distilled water was added thereto, to which 3.5ml of Br_2(2.1eq, 0.05mol) was further added slowly,

and then the mixture solution was stirred at room temperature for 2 days. After completion of the reaction, the reaction solution was filtered, and then the filtrate was washed several times with distilled water. The washed filtrate was purified using a sublimator to obtain 5.7g of dibromo-tetrahydropyrene (yield 65%).

GC-Mass (theoretical value: 364.07g/mol, measured value: 364g/mol)

Preparation Example 1-3: Preparation of bis(biphenyl)amine

[Reaction Scheme 3]

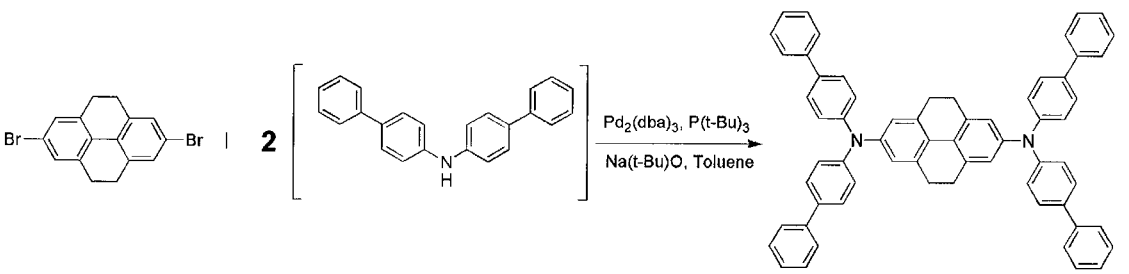


5g of 4-aminobiphenyl (1eq, 0.029mol) and 7.4g of 4-bromobiphenyl (1.1eq, 0.0319mol) were dissolved in 200ml of toluene in a flask. 0.06g of $Pd_2(dba)_3$ (0.03eq, 0.87mmol), 3.7g of Na(t-Bu)O (1.1eq, 0.0319mol), and 0.2g of $P(t\text{-}Bu)_3$ (0.06eq, 1.74mmol) were added to the mixture solution respectively, and then the resultant mixture solution was heated and stirred for 12 hours. After completion of the reaction, the reaction solution was filtered through celite, and then 7.5g of 4,4'-bis(biphenyl)amine was obtained from the filtrate through column chromatography (yield 81%).

GC-Mass (theoretical value: 321.15g/mol, measured value: 320g/mol)

Preparation Example 1-4: Preparation of Aryl Amine Derivative represented by Formula 1-5

[Reaction Scheme 4]



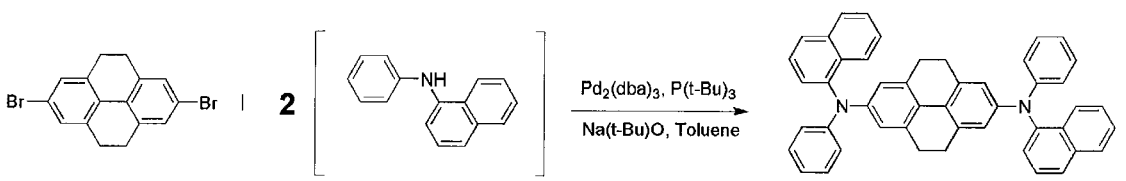
5g of dibromo-tetrahydropyrene (1eq, 0.0137mol) obtained in Preparation Example 1-2 and 9.64g of 4,4'-bis(biphenyl)amine (2.2eq, 0.03mol) obtained in Preparation Example 1-3 were dissolved in 200ml of toluene in a flask. 0.37g of $Pd_2(dba)_3$ (0.03eq, 0.4mol), 3.8g of Na(t-Bu)O (2.2eq, 0.03mol), and 0.1g of $P(t\text{-}Bu)_3$ (0.06eq, 0.8mmol) were added to the mixture solution respectively, and then the resultant mixture solution was heated and stirred for 12 hours. After completion of the reaction, the reaction solution was filtered through celite, and then 8.3g of aryl amine derivative represented by Formula 1-5 (HT-1) was obtained from the filtrate through column chromatography (yield 72%).

Tg: 209°C

^{1}H-NMR: 7.75 (t, 1H), 7.46 (t, 1H), 7.48 (d, 1H), 6.52(t, 1H), 6.2(m, 1H), 2.95 (d, 2H).

[Preparation Example 2] Preparation of Aryl Amine Derivative Represented by Formula 1-1 (HT-2)

[Reaction Scheme 5]



5g of dibromo-tetrahydropyrene (1eq, 0.0137mol) obtained in Preparation Example 1-2 and 6.6g of N-phenylnaphthalene-1-amine (2.2eq, 0.03mol) were dissolved in 200ml of toluene in a flask. 0.37g of $Pd_2(dba)_3$ (0.03eq, 0.4mol), 3.8g of Na(t-Bu)O (2.2eq, 0.03mol), and 0.1g of $P(t\text{-}Bu)_3$ (0.06eq, 0.8mmol) were added to the mixture solution respectively, and then the resultant mixture solution was heated and stirred for 12 hours. After completion of the reaction, the reaction solution was filtered through celite, and then 6.6g of aryl amine derivative represented by Formula 1-1 (HT-2) was obtained from the filtrate through column chromatography (yield 76%).

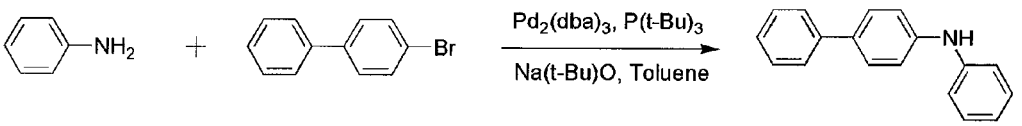
Tg: 184°C

^{1}H-NMR: 7.61 (t, 1H), 7.48 (t, 1H), 7.44 (t, 1H), 7.16(m, 2H), 7.01(t, 2H), 6.55(t, 1H), 6.2(t, 1H), 2.98(d, 2H).

[Preparation Example 3] Preparation of Aryl Amine Derivative Represented by Formula 1-14 (HT-3)

Preparation Example 3-1: Preparation of N-phenylbiphenylamine

[Reaction Scheme 6]

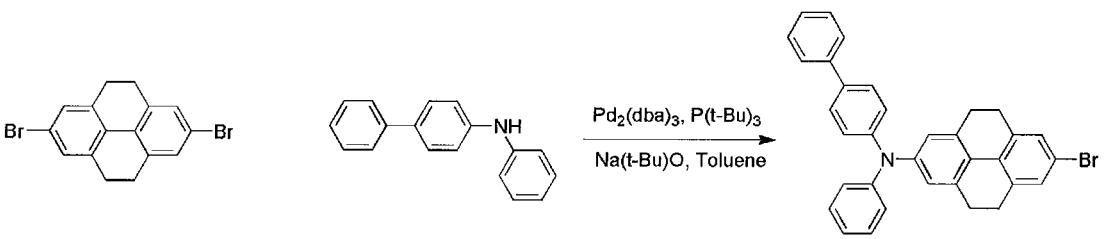


10g of aniline (1eq, 0.1mol) 27.5g of 4-bromobiphenyl (1.1eq, 0.11mol) were dissolved in 150ml of toluene in a flask. 0.27g of $Pd_2(dba)_3$ (0.03eq, 3mmol), 10.5g of Na(t-Bu)O (1.1eq, 0.11mol), and 0.1g of $P(t\text{-}Bu)_3$ (0.06eq, 0.6mmol) were added to the mixture solution respectively, and then the resultant mixture solution was heated and stirred for 12 hours. After completion of the reaction, the reaction solution was filtered through celite, and then 22.1g of N-phenylbiphenyl-4-amine was obtained from the filtrate through column chromatography (yield 84%).

GC-Mass (theoretical value: 245.12g/mol, measured value: 245g/mol)

Preparation Example 3-2: Preparation of N-(biphenyl-4-yl)-7-bromo-N-phenyl-4,5,9,10-tetrahydropyrene-2-amine

[Reaction Scheme 7]

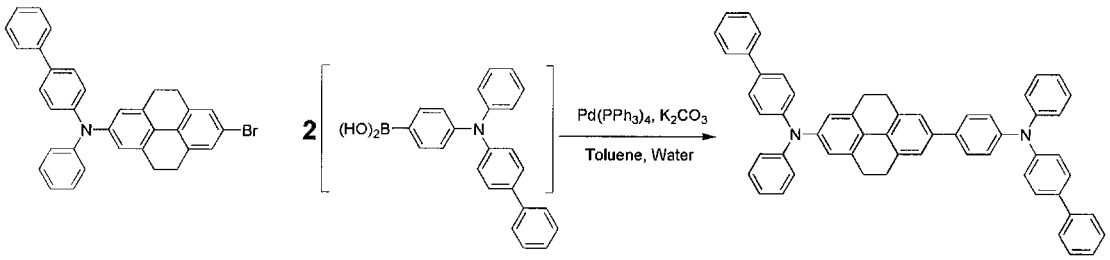


5g of dibromo-tetrahydropyrene (1eq, 0.0137mol) obtained in Preparation Example 1-2 and 3.36g of N-phenylbiphenyl-4-amine (1.1eq, 0.014mol) obtained in Preparation Example 3-1 were

dissolved in 150ml of toluene in a flask. 0.37g of $Pd_2(dba)_3$ (0.03eq, 4mmol), 1.4g of Na(t-Bu)O (1.1eq, 0.014mol), and 0.16g of $P(t\text{-}Bu)_3$ (0.06eq, 0.8mmol) were added to the mixture solution respectively, and then the resultant mixture solution was heated and stirred for 12 hours. After completion of the reaction, the reaction solution was filtered through celite, and then 7.24g of N-(biphenyl-4-yl)-7-bromo-N-phenyl-4,5,9,10-tetrahydropyrene-2-amine was obtained from the filtrate through column chromatography (yield 82%).

Preparation Example 3-3: Preparation of Aryl Amine Derivative Represented by Formula 1-14

[Reaction Scheme 8]



7g of N-(biphenyl-4-yl)-7-bromo-N-phenyl-4,5,9,10-tetrahydropyrene-2-amine (1eq, 0.013mol) obtained in Preparation Example 3-2 and 5.2g of 4-(biphenyl-4-yl(phenyl)amino)phenylboronic acid (1.1eq, 0.014mol) were dissolved in 150ml of toluene in a flask. 0.3g of $Pd(PPh_3)_4$ (0.02eq, 0.4mmol) and 60ml of 2M K_2CO_3 solution were added to the mixture solution respectively, and then the resultant mixture solution was heated and stirred for 12 hours. After completion of the reaction, the reaction solution was filtered through celite, the filtrate was extracted with MC, and then 8.8g of aryl amine derivative represented by Formula 1-14 (HT-3) was obtained from the filtrate through column chromatography (yield 88.4%).

Tg: 192°C

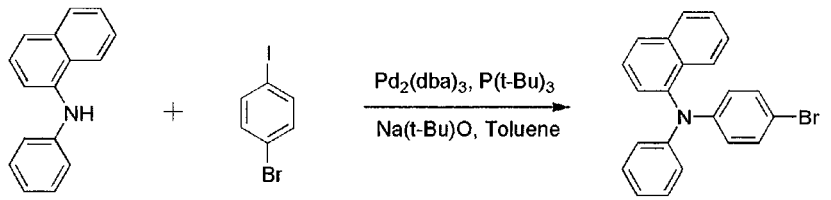
^{1}H-NMR: 7.75 (t, 1H), 7.46 (t, 1H), 7.48 (d, 1H), 6.52(t, 1H), 6.2(m, 1H), 2.95 (d, 2H), 7.61 (t, 1H), 7.48 (t, 1H), 7.44 (t, 1H), 7.16(m, 2H), 7.01(t, 2H), 6.55(t, 1H), 6.2(t, 1H),

2.98(d, 2H).

[Preparation Example 4] Preparation of Aryl Amine Derivative Represented by Formula 1-17 (HT-4)

Preparation Example 4-1: Preparation of N-(4-bromophenyl)-N-phenylnaphthalene-1-amine

[Reaction Scheme 9]

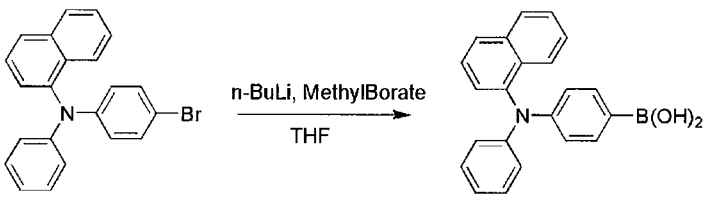


10g of N-phenylnaphthalene-1-amine (1eq, 0.046mol) and 14.3g of 1-bromo-4-iodobenzene (1.1eq, 0.05mol) were dissolved in 150ml of toluene in a flask. 0.27g of $Pd_2(dba)_3$ (0.03eq, 3mmol), 10.5g of Na(t-Bu)O (1.1eq, 0.05mol), and 0.1g of $P(t\text{-}Bu)_3$ (0.06eq, 0.6mmol) were added to the mixture solution respectively, and then the resultant mixture solution was heated and stirred for 12 hours. After completion of the reaction, the reaction solution was filtered through celite, and then 13.4g of N-(4-bromophenyl)-N-phenylnaphthalene-1-amine was obtained from the filtrate through column chromatography (yield 80.4%).

GC-Mass (theoretical value: 373.05g/mol, measured value: 373g/mol)

Preparation Example 4-2: Preparation of 4-(naphthalene-1-yl(phenyl)amino)phenylboronic acid

[Reaction Scheme 10]

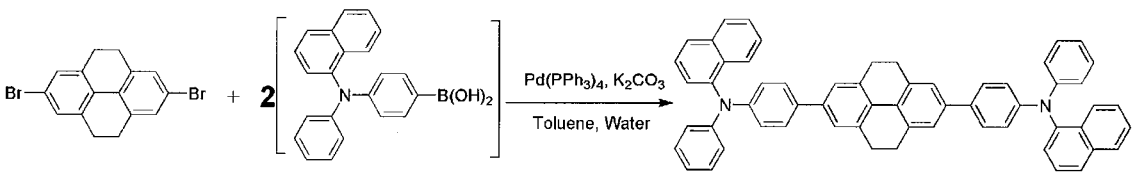


5g of N-(4-bromophenyl)-N-phenylnaphthalene-1-amine (1eq, 0.013mol) obtained in Preparation Example 4-1 was dissolved 100ml of THF in a flask. 1.03g of n-BuLi (1.2eq, 0.016mol) was slowly drip-added to the mixture solution at a temperature of 78°C. The

resultant mixture solution was stirred for 30 minutes, and then 1.47g of methyl borate (1.5eq, 0.0195mol) was slowly drip-added thereto at the same temperature. After completion of the addition, the temperature of the mixture solution was elevated to room temperature, and then the mixture solution was stirred for 2 hours. On completion of the reaction, 50ml of 1N HCl was added to the reaction solution, and then the reaction solution was stirred. White solid produced in the reaction flask was filtered, washed with hexane, and then dried to obtain 3.6g of 4-(naphthalene-1-yl(phenyl)amino)phenylboronic acid (yield 82%).

Preparation Example 4-3: Preparation of Aryl Amine Derivative Represented by Formula 1-17

[Reaction Scheme 11]



7g of N-(biphenyl-4-yl)-7-bromo-N-phenyl-4,5,9,10-tetrahydropyrene-2-amine (1eq, 0.013mol) obtained in Preparation Example 3-2 and 4.74g of 4-(naphthalene-1-yl(phenyl)amino)phenylboronic acid (1.1eq, 0.014mol) were dissolved in 150ml of toluene in a flask. 0.3g of $Pd(PPh_3)_4$ (0.02eq, 0.4mmol) and 60ml of 2M K_2CO_3 solution were added to the mixture solution respectively, and then the resultant mixture solution was heated and stirred for 12 hours. After completion of the reaction, the reaction solution was filtered through celite, the filtrate was extracted with MC, and then 9.07g of aryl amine derivative represented by Formula 1-17 (HT-4) was obtained from the filtrate through column chromatography (yield 88.4%).

Tg: 205°C

^{1}H-NMR: 7.61 (t, 1H), 7.48 (m, 2H), 7.44 (m, 6H), 7.22 (t, 2H), 7.16(m, 2H), 6.56(t, 1H), 2.95 (d, 2H).

[Example 1] Manufacture of organic electroluminescent

device (OELD) by Use of Aryl Amine Derivative Obtained in Preparation Example 1 (HT-1)

An OELD was manufactured by the following method:

A glass substrate, on which an ITO (indium tin oxide) film was coated to a thickness of 1500Å, was ultrasonically cleaned with distilled water. On completion of the cleaning with distilled water, the substrate was ultrasonically cleaned with a solvent, such as isopropyl alcohol, acetone, or methanol, was dried, and then was delivered to a plasma cleaner. In the plasma cleaner, the substrate was cleaned using oxygen plasma for 5 minutes, and then was delivered to a vacuum deposition apparatus.

DS-205 (Doosan, Korea) was thermally vacuum-deposited to a thickness of 800Å on the so-prepared ITO (anode) to form a hole injection layer, and the aryl amine derivative represented by Formula 1-5 (HT-1) was vacuum-deposited to a thickness of 150Å on the hole injection layer to form a hole transport layer. DS-H45 (Doosan, Korea) and DS-405 (Doosan, Korea) were vacuum-deposited to a thickness of 300Å on the hole transport layer to form a light emitting layer. Alq3 was vacuum-deposited to a thickness of 250Å on the light emitting layer to form an electron transport layer. Subsequently, LiF was deposited to a thickness of 10Å on the electron transport layer to form an electron injection layer, and finally aluminum (cathode) was deposited to a thickness of 2000Å to manufacture an OELD having a structure shown below in Table 4.

Table 4

classification	material	Thickness(Å)
hole injection layer (HIL)	DS-205	800
hole transport layer (HTL)	HT-1	150
organic light emitting layer (EML)	DS-H45 + DS-405	300
electron transport layer (ETL)	Alq3	250
electron injection layer (EIL)	LiF	10
Cathode	Al	2,000

[Example 2] Manufacture of OELD by Use of Aryl Amine Derivative Obtained in Preparation Example 2 (HT-2)

An OELD was manufactured in the same manner as in Example 1, except that the aryl amine derivative represented by Formula 1-1 (HT-2), obtained in Preparation Example 2, was used as the hole transport material, instead of the aryl amine derivative represented by Formula 1-5 (HT-1), obtained in Preparation Example 1.

[Example 3] Manufacture of OELD by Use of Aryl Amine Derivative Obtained in Preparation Example 3 (HT-3)

An OELD was manufactured in the same manner as in Example 1, except that the aryl amine derivative represented by Formula 1-14 (HT-3), obtained in Preparation Example 3, was used as the hole transport material, instead of the aryl amine derivative represented by Formula 1-5 (HT-1), obtained in Preparation Example 1.

[Example 4] Manufacture of OELD by Use of Aryl Amine Derivative Obtained in Preparation Example 4 (HT-4)

An OELD was manufactured in the same manner as in Example 1, except that the aryl amine derivative represented by Formula 1-17 (HT-4), obtained in Preparation Example 4, was used as the hole transport material, instead of the aryl amine derivative represented by Formula 1-5 (HT-1), obtained in Preparation Example 1.

[Comparative Example 1] Manufacture of OELD by Use of NPB

An OELD was manufactured in the same manner as in Example 1, except that NPB was used as the hole transport material, instead of the aryl amine derivative represented by Formula 1-5 (HT-1), obtained in Preparation Example 1.

[Experimental Example 1]

For each of the OELDs manufactured in Examples 1 to 4 and Comparative example 1, luminous efficiency was measured at a current density of $10mA/cm^2$, the results of which are shown below

in Table 5.

Example 1 had a luminance of 608cd/m^2 and thus exhibited a luminous efficiency of 6.1cd/A at a current density of 10mA/cm^2 and a voltage of 5.2V, Example 2 had a luminance of 618cd/m^2 and thus exhibited a luminous efficiency of 6.5cd/A at a current density of 10mA/cm^2 and a voltage of 5.3V, Example 3 had a luminance of 602cd/m^2 and thus exhibited a luminous efficiency of 6.1cd/A at a current density of 10mA/cm^2 and a voltage of 5.5V, and Example 4 had a luminance of 609cd/m^2 and thus exhibited a luminous efficiency of 6.0cd/A at a current density of 10mA/cm^2 and a voltage of 5.7V. Also, Comparative Example 1 had a luminance of 560cd/m^2 and thus exhibited a luminous efficiency of 5.6cd/A at a current density of 10mA/cm^2 and a voltage of 5.7V.

Table 5

	Ex. 1	Ex. 2	Ex. 3	Ex. 4	Com. Ex. 1
current density(mA/cm^2)	10	10	10	10	10
voltage (V)	5.2	5.3	5.5	5.7	5.7
luminance (cd/m^2)	608	613	602	609	560
efficiency (cd/A)	6.1	6.5	6.1	6.0	5.6
efficiency (lm/W)	3.7	3.5	3.2	3.1	3.3

Consequently, first of all, the inventive materials have an effect of reducing a driving voltage as compared to existing NPB because material stability ensured by their increased glass transition temperature (T_g) contributes to device stability, and additionally can also improve luminous efficiency.

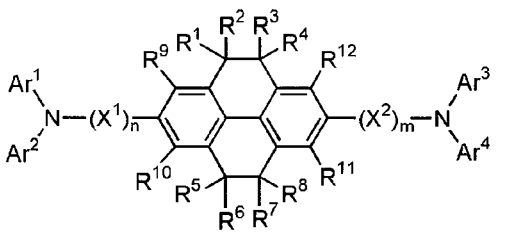
Although the above preparation examples and examples of the present invention have described only the preparation and test results of the aryl amine derivatives represented by Formulas 1-5, 1-1, 1-14, and 1-17, it is apparent to those skilled in the art that not only aryl amine derivatives of the present invention other than those described in the above preparation examples and examples can be easily prepared, but also OELDs comprising them may be manufactured based on the above description and common

knowledge in the art.

CLAIMS

1. An aryl amine derivative represented by the following Formula 1:

[Formula 1]



wherein, Ar^1 to Ar^4, X^1, and X^2 are each independently a C_5~C_{30} aromatic ring group that is an aromatic ring group substituted or unsubstituted by at least one kind selected from the group consisting of a C_1~C_{30} alkyl group, a C_2~C_{30} alkenyl group, a C_2~C_{30} alkynyl group, a C_5~C_{30} aryl group, a C_5~C_{30} heteroaryl group, a C_5~C_{30} aryloxy group, a C_1~C_{30} alkyloxy group, a C_5~C_{30} arylamino group, a C_5~C_{30} diarylamino group, a C_6~C_{30} arylalkyl group, a C_3~C_{30} cycloalkyl group, a C_3~C_{30} heterocycloalkyl group, and a halogen atom;

R^1 to R^{11} are each independently selected from the group consisting of a hydrogen atom, a C_1~C_{30} alkyl group, a C_2~C_{30} alkenyl group, a C_2~C_{30} alkynyl group, a C_5~C_{30} aryl group, a C_5~C_{30} heteroaryl group, a C_5~C_{30} aryloxy group, a C_1~C_{30} alkyloxy group, a C_5~C_{30} arylamino group, a C_5~C_{30} diarylamino group, a C_6~C_{30} arylalkyl group, a C_3~C_{30} cycloalkyl group, a C_3~C_{30} heterocycloalkyl group, and a halogen atom; and

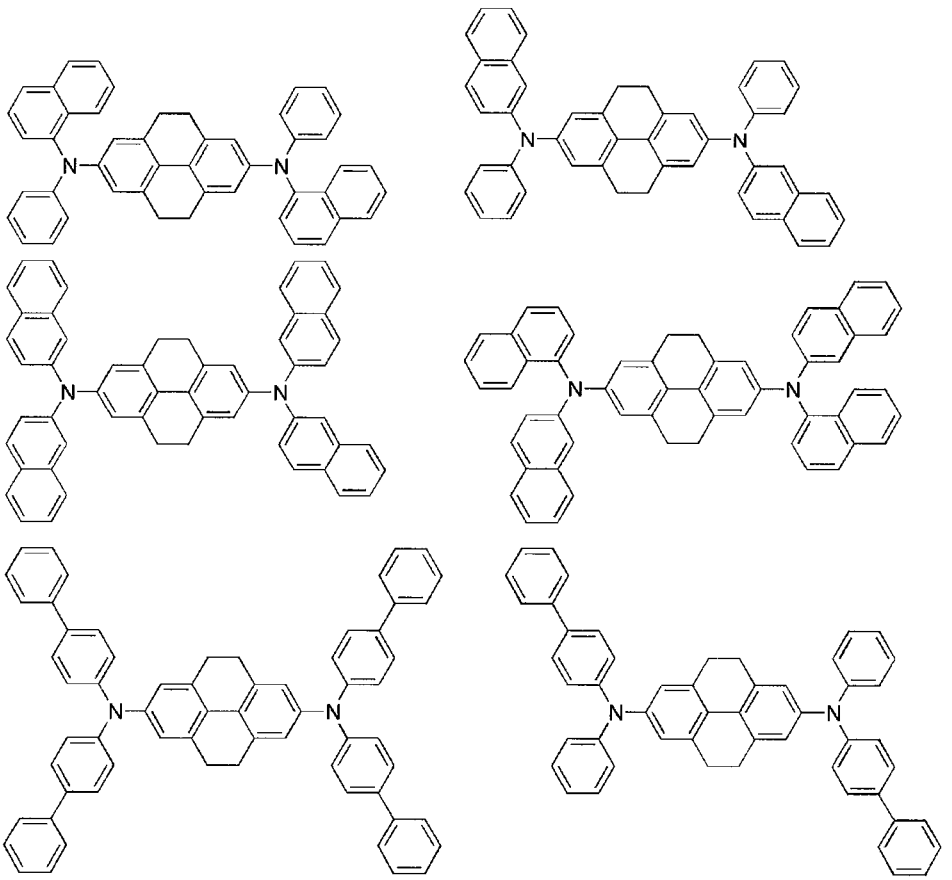
n and m are each independently an integer of 0 to 2.

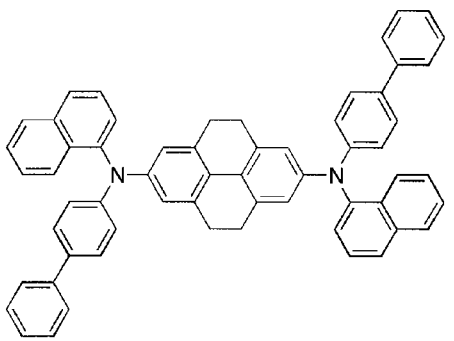
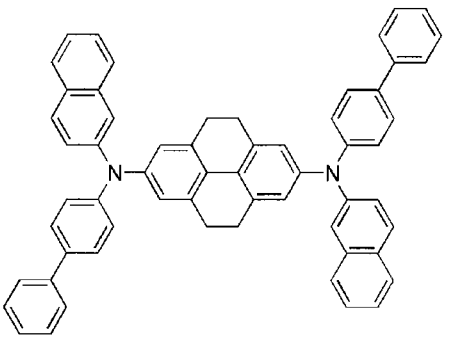
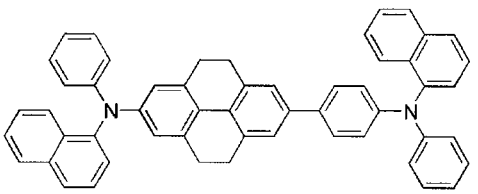
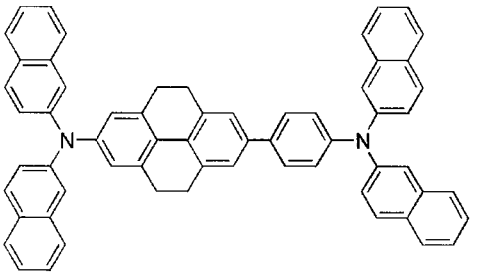
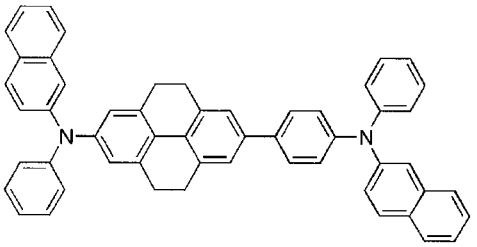
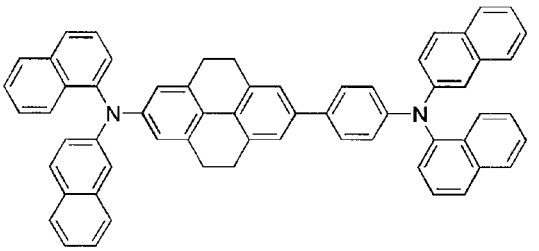
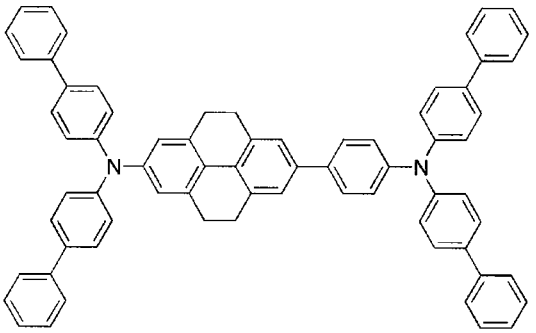
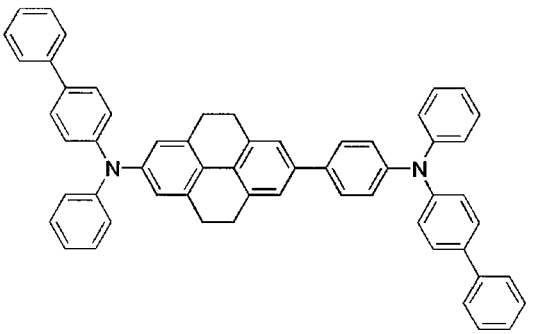
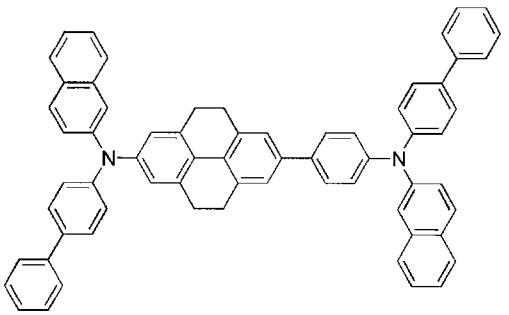
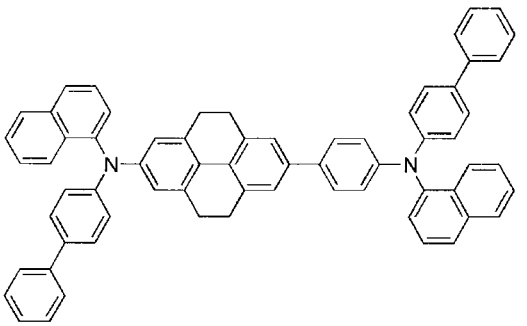
2. The aryl amine derivative as claimed in claim 1, wherein the aromatic ring group is selected from the group consisting of benzene, biphenyl, terphenyl, naphthalene, anthracene, triphenylamine, phenanthrene, pyrene, fluorene, and xanthene.

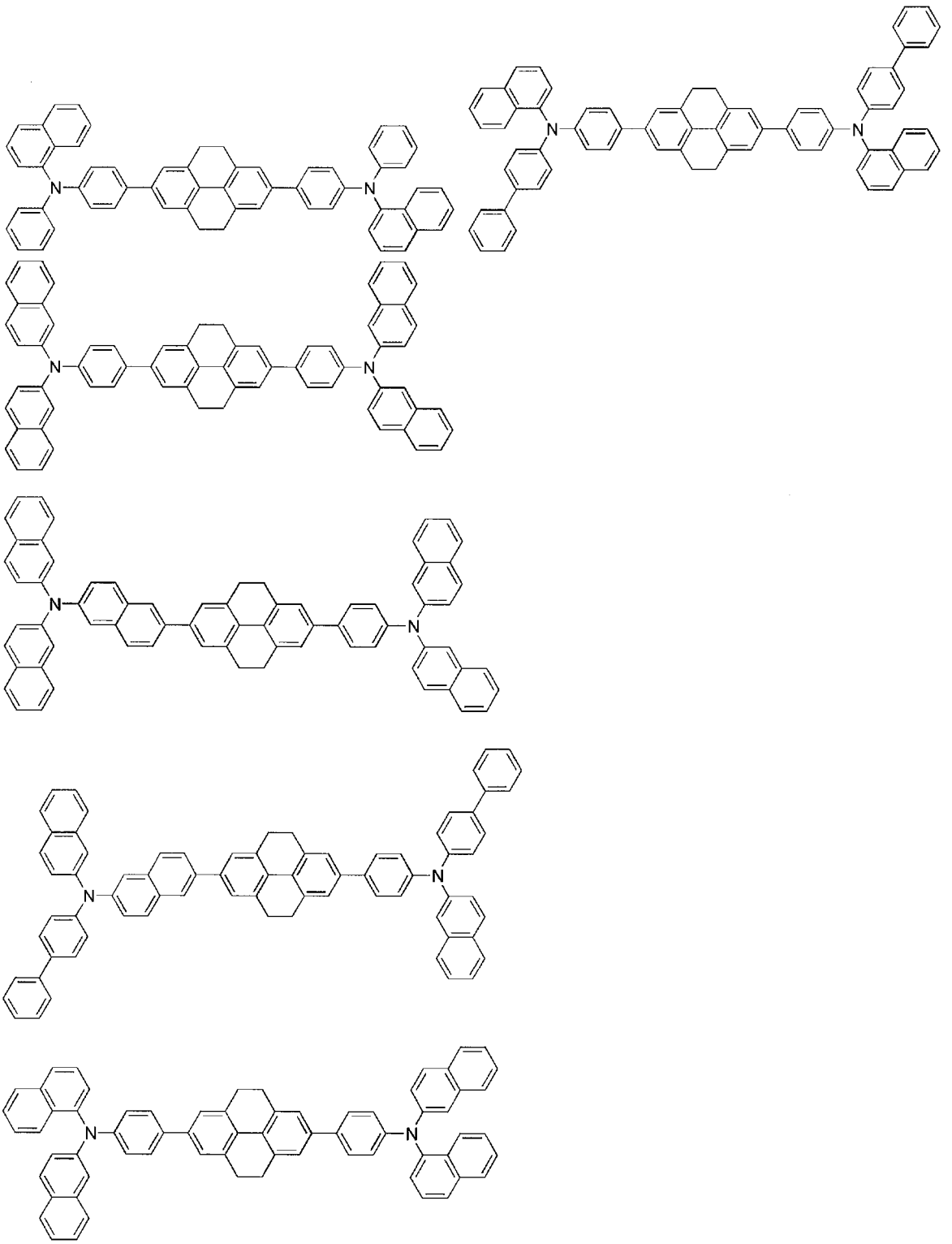
3. The aryl amine derivative as claimed in claim 1, wherein the C_1~C_{30} alkyl group, the C_2~C_{30} alkenyl group, the C_2~C_{30} alkynyl

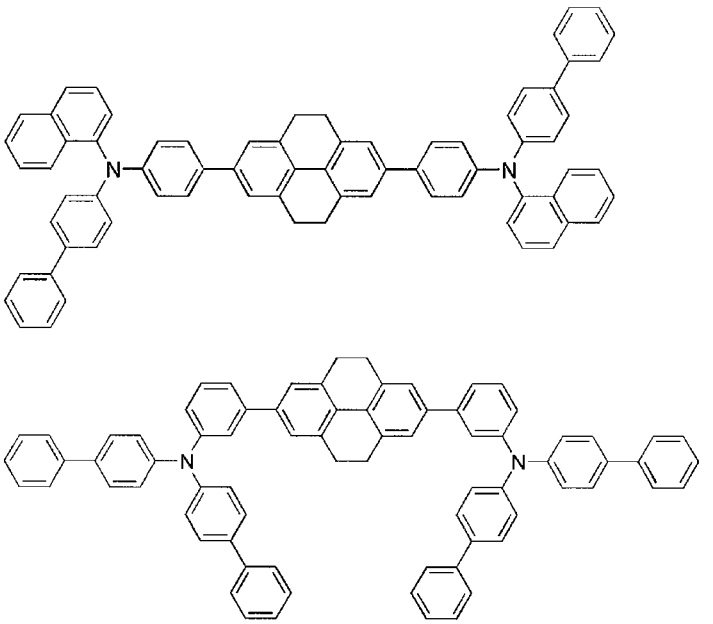
group, the C_5~C_{30} aryl group, the C_5~C_{30} heteroaryl group, the C_5~C_{30} aryloxy group, the C_1~C_{30} alkyloxy group, the C_5~C_{30} arylamino group, the C_5~C_{30} diarylamino group, the C_6~C_{30} arylalkyl group, the C_3~C_{30} cycloalkyl group, and the C_3~C_{30} heterocycloalkyl group in Ar^1 to Ar^4, X^1, X^2, and R^1 to R^{11} are each independently further substituted or unsubstituted by at least one kind of substituent selected from the group consisting of halogen, an amino group, a nitrile group, a nitro group, a C_1~C_{40} alkyl group, a C_2~C_{40} alkenyl group, a C_1~C_{40} alkoxy group, a C_3~C_{40} cycloalkyl group, a C_2~C_{40} heterocycloalkyl group, a C_5~C_{40} aryl group, and a C_4~C_{40} heteroaryl group.

4. The aryl amine derivative as claimed in claim 1, which is selected from the group consisting of compounds represented by the following Formulas:







5. An organic electroluminescent device comprising:

(i) an anode;

(ii) a cathode; and

(iii) one or more organic layers between the anode and the cathode, at least one of the one or more organic layers comprising the aryl amine derivative represented by Formula 1, as claimed in any one of claims 1 to 4.

6. The organic electroluminescent device as claimed in claim 5, wherein the organic layer comprising the aryl amine derivative represented by Formula 1 comprises a hole transport layer.