

(19) (KR)
(12) (A)

(51) 。 Int. Cl.⁷ (11) 2003-0087522
C09K 11/06 (43) 2003 11 14

(21) 10-2003-0010439
(22) 2003 02 19

(30) 1020020025084 2002 05 07 (KR)

(71) 20

(72) 1006

381-42LG 8 405

108 110

247-184

390-9 301

220 108 301

386-17 401

872 209 409

(74) :

(54)

1

,

1 5 가 가 .

1 , 2 , 3 , 4 , 5 , 6 , 7 .

.

(2) 가 1 가
[hole transporting layer (4)], [hole injection layer, (3)],
[emitting layer (5)], (7)
[electron transporting layer (6)], (7)
가

gh vacuum) (thermal evaporation) , (spin coating), (hi
(dip coating), (doctor blading), (inkjet printing), (thermal transf
er)

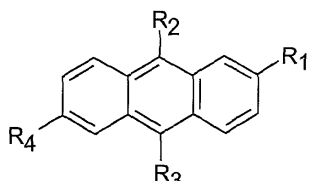
가
가
(work function)가
(indium tin oxide: ITO)
(oxygen plazma)
ITO 가 (valence band) 가
(band
)

가
(conduction band) (Ca), (Li), (

Mg), (K), (Na), (Cs) 가 / , /
(alloy) 가 (,) ,
 , ,
 ,
가 (exciton) 가 (pi-electron)가 가
(doping) (, ' ,
) ,
(host)
가 가 ,
가 ,
yquinoline aluminum salt, , Alq3) 가 8- (8-hydrox
Alq3 (trap) 가
가 ,
가
Alq3 가

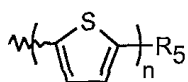
L) 가 , (E
가

[1]



1 , R₁ R₄ 2 ,

[2]



R_5

(EL; organic electroluminescence)

1, 1, 가, 가, 1, 2, 7, (hole blocking layer), 1, 가, 1, 가

1 2가 . 2 2 가 가 , 7
가 4eV (indium tin oxide), (indium zinc oxide), (tin oxide)
(polythiophene) (3-methylthiophene)), (3,4-(1,2-)) (poly(3,4-(ethylene-1,2-dioxy)thiophene)) (polypyrrole), (polyaniline)
가
, 10nm 1000nm , 10nm 500nm .
2 3 . 3 3
가 , 4가 , (balancing)
32 4,356,429), (oligothiophene) (metal porphyrine)가 (4,720,4
(5,540,999). , (arylamine) 가
5,256,945 , 5,609,970 6,074,734). , (hexanitride hexaazatriphenylene)
3 4가 . 4 (hole mobility)가 (arylamine) 가
)-N-] (4,4'-bis[N-(1-naphthyl)-N-phenylamino]biphenyl, 'NPB' 4,4'-[N-(1-)
(balancing) ,
4 5가 . 5 (exiton) ,
가
, 1 가 4가 , 2 5가 가
, 3 4 5가 , 3가 1가
, 5 5가 , 가
1,3,4 , 5 6 . 6 7
5 LUMO (Lowest Unoccupied Molecular orbital) 가
가
, Alq3 (5,061,569), (5,811,833)
7 6 7 . 7 6 , , , 가
, (europium), , (Ga), (Sm) , 0.1 10 nm

(LiF)

(Li₂O),

(magnesium fluoride)

0.2 7 nm

가

(ITO)

1

5
가
가

가

가

가

(doping)

가

1

가

1

가

가

가

가

7 Alq3가

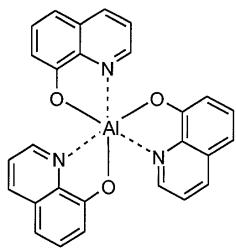
Alq3

가 가

4,4'-

(4,4'-Diphenylvinyl biphenyl, DPVBi)

[7]



Alq3

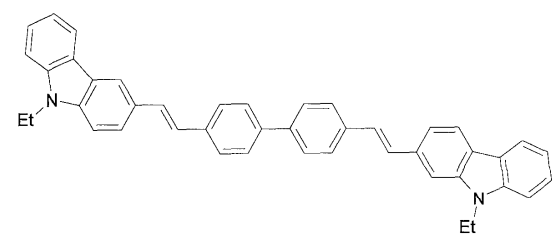
(perylene)

8 BCzVBi (DSA)

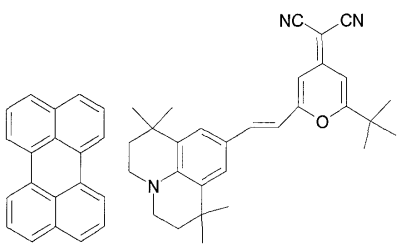
9

10 DCJTb (DCM)

[8]

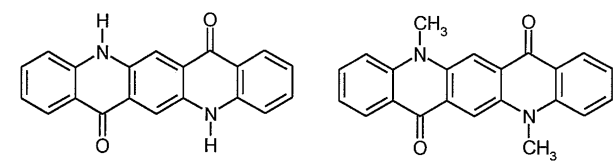


[9] [10]

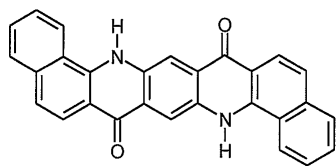


(quinacridone) , (coumarine)
(6,020,078 , 5,059,863 , 6,312,836 B1 , 4,736,032 ,
5,432,014 , 5,227,252 , 1 087 006 A1 , 6-2240243 , 6-9952 ,
7-166160 , 6-240243 6-306357). (Pioneer)
11-1 11-2 11-2

[11-1] [11-2]

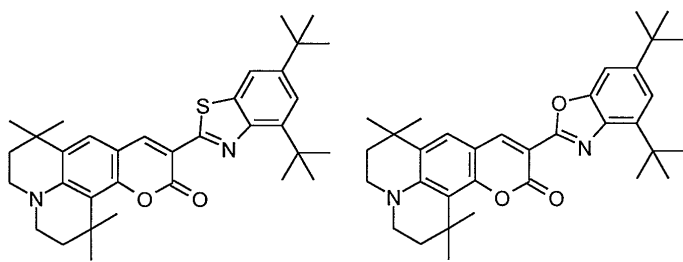


[11-3]

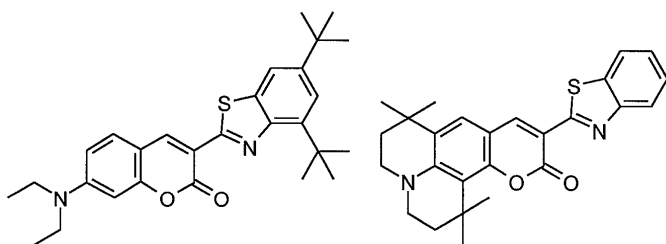


, (TDK), , (Eastman Kodak)
12-1 12-8 (6,020,078 , 6-9952 ,
6-240243 7-166160).

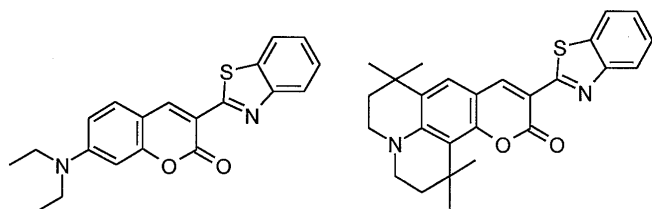
[12-1] [12-2]



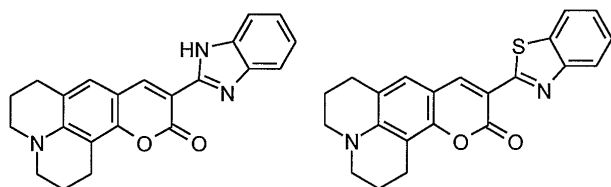
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[12-5] [12-6]

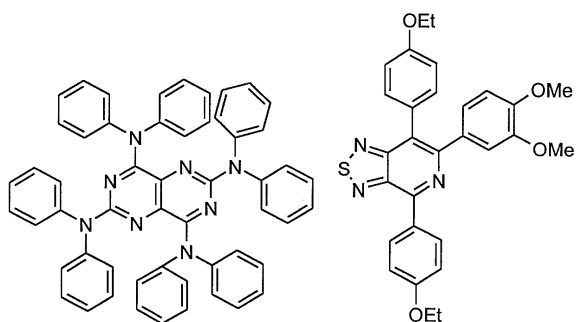


[12-7] [12-8]

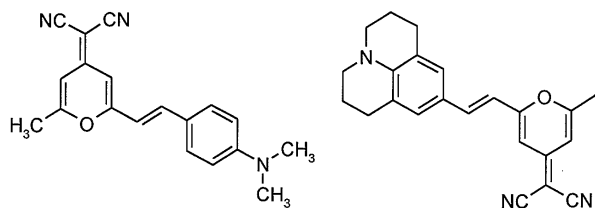


rimidine) (13), (Mitsubishi) 1(DCM1, 15) (tetradiphenylamino pyrimido-py (pyridinothiadiazole) 2 (DCM2, 16)

[13] [14]



[15] [16]



Alq3가 , 가

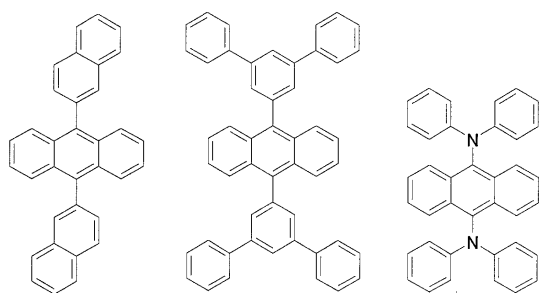
(Ir) (Pt)
 .(C. Adachi, M. A. Baldo, and S. R. Forrest, *Applied Physics Letter* , 77, 904, 2000., C. Adachi, M. A. Baldo, S. R. Forrest, S. Lamansky, M. E. Thompson, and R. C. Kwong, *Applied Physics Letter* , 78, 1622, 2001).

가 Alq3
 , 1 ,
 , ,
 Alq3 , , .

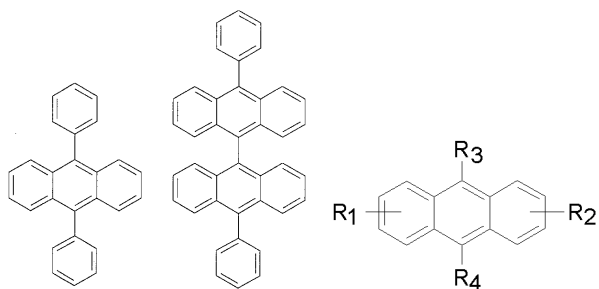
1
 1960 . 1965 (Helfrich) (Pope)
 ,
 가 (W. Helfrich, W. G. Schneider, Phys. Rev. Lett. 14, 229, 1965.
 M. Pope, H. Kallmann, J. Giachino, J. Chem. Phys., 42,2540, 1965).

가 , 40
 , TDK , (Toyo Ink) , (Fuj
 i) 가 , 17(5,935,721),
 18 (5,972,247), 19 (6,251,531 B1), 20 (5,635,308),
 21 (0 681 019 A2) , 22 (1 009 044
 A2) , 23 (11-345686)

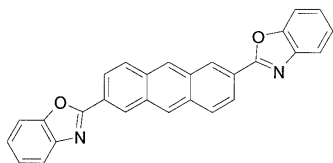
[17] [18] [19]



[20] [21] [22]



[23]



22, R₁, R₄, 1, 5, 5, 20, 5, 24.

11-345686

1

R₁, R₄, 2,6,9,10, 10, 1, 9,10, 2, 2,6, 2, R

5, 9, 9,10, 2, 2,6

Alq3가

가 2

1

DCJTb

1

Alq3

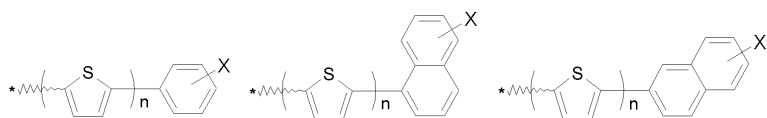
1

2

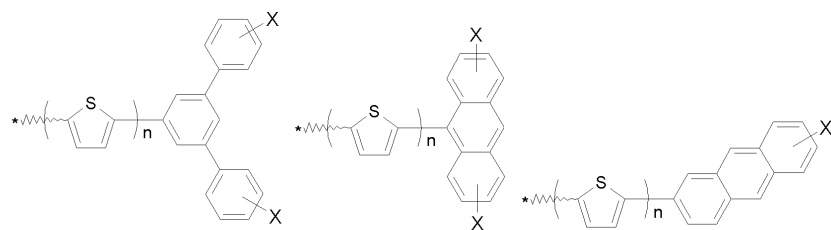
2-1

2-13

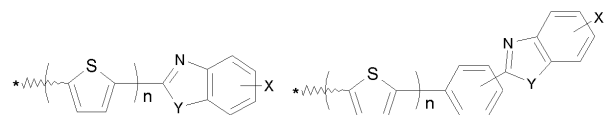
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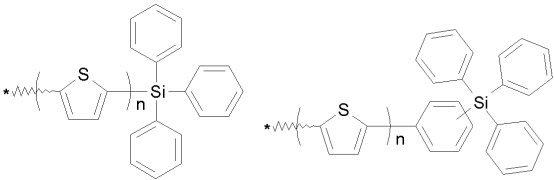
[2-4] [2-5] [2-6]



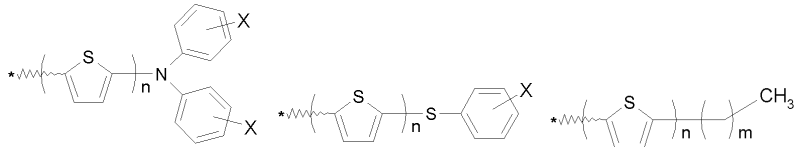
[2-7] [2-8]



[2-9] [2-10]



[2-11] [2-12] [2-13]

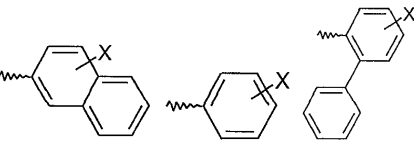


, n 1 4 , m 0 20 , Y , , , ,

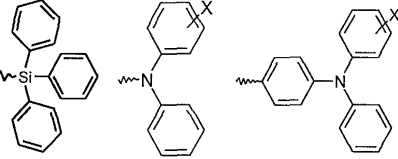
X ; , , , ; 1 20 ; 5 6 ; 6 24 ; 1 20 ; 6 24 ; 3-1 3-14 ;

, 1 , R 1 R 4 , ; 1 20 ; 5 6 ; 1 20 6 24 ; 3-1 3-14 ;

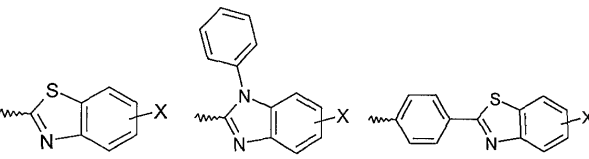
[3-1] [3-2] [3-3]



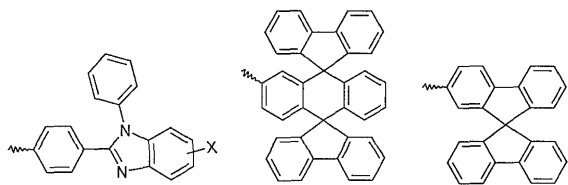
[3-4] [3-5] [3-6]



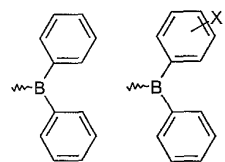
[3-7] [3-8] [3-9]



[3-10] [3-11] [3-12]



[3-13] [3-14]



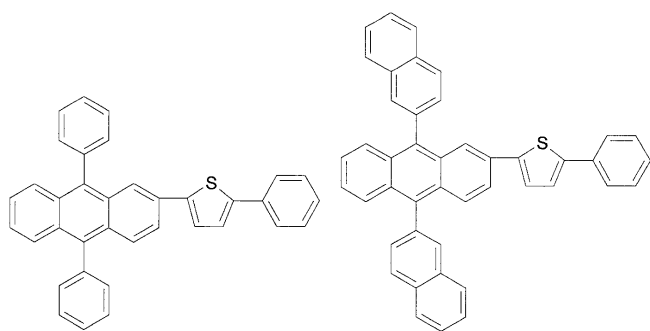
1 20, X ; , , , ; ; 5 6 ; 6 24 ; 1 ; 20 6 ;

가

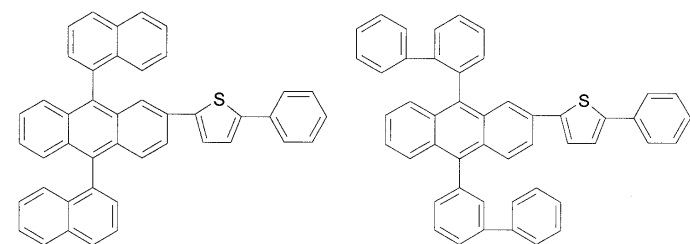
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1-30

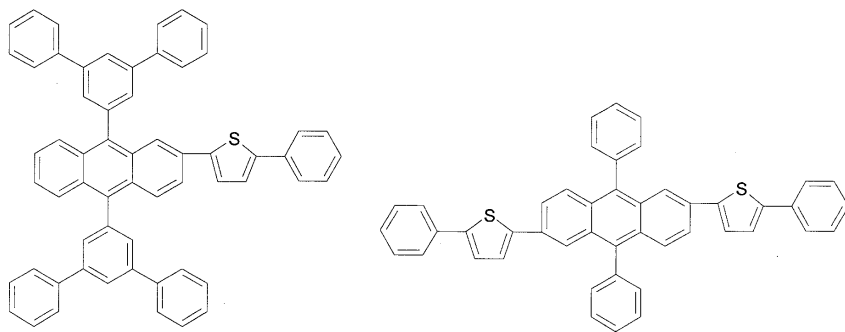
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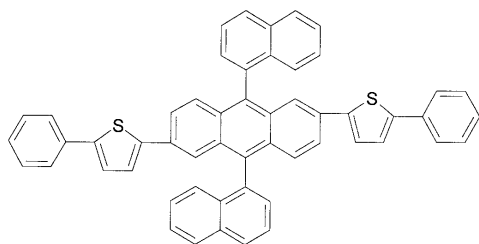
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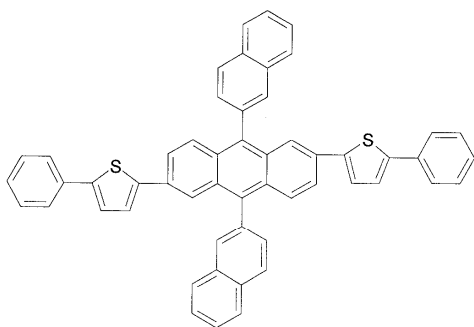
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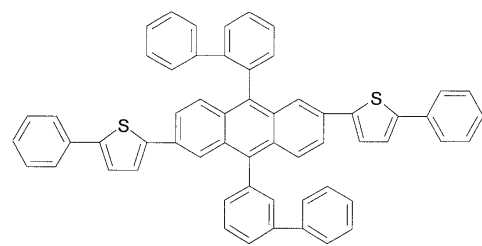
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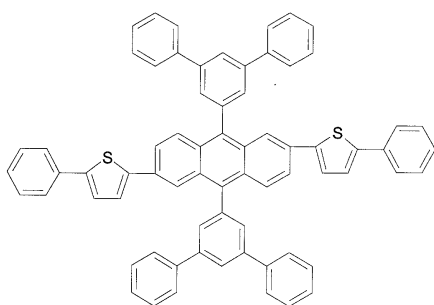
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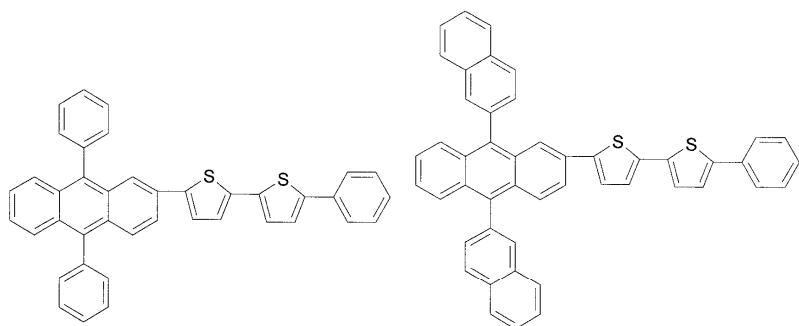
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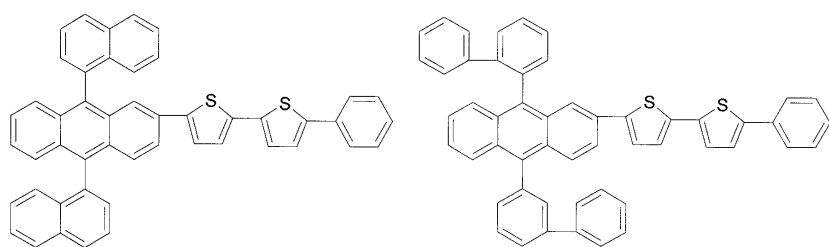
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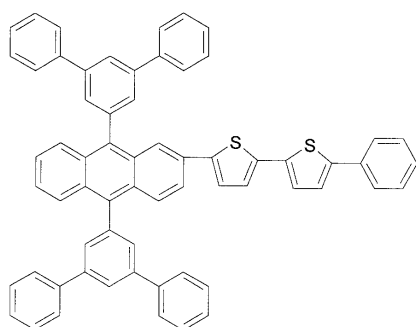
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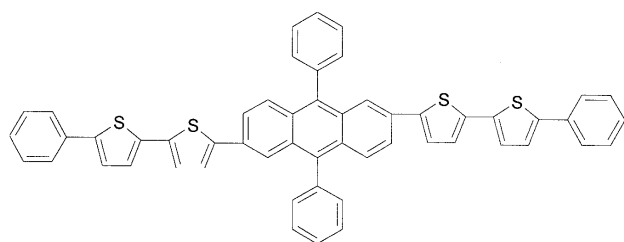
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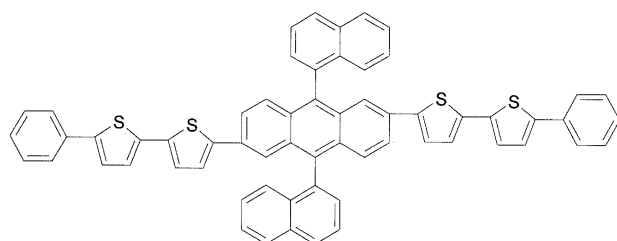
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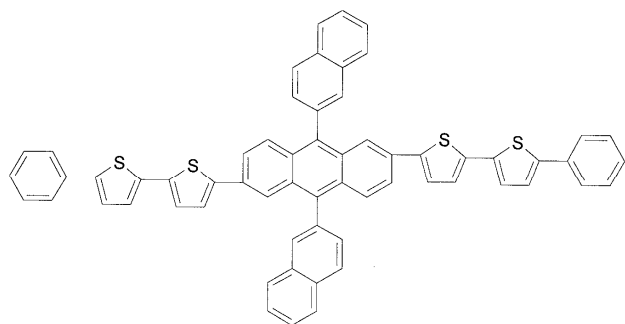
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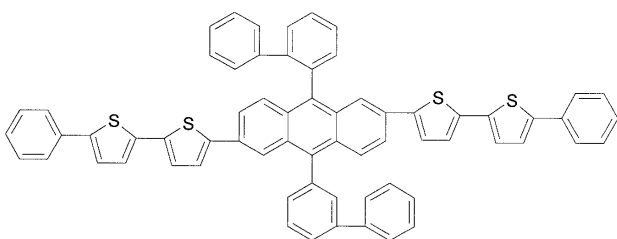
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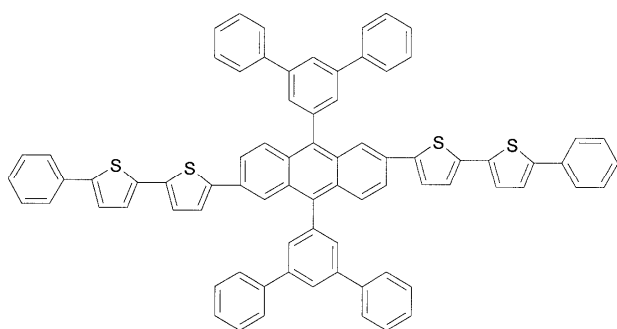
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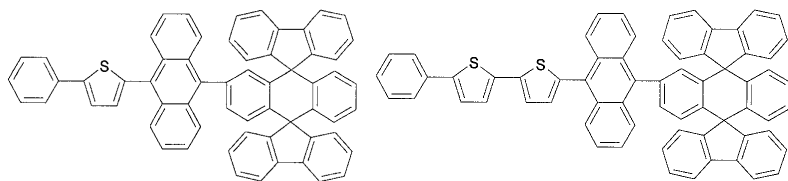
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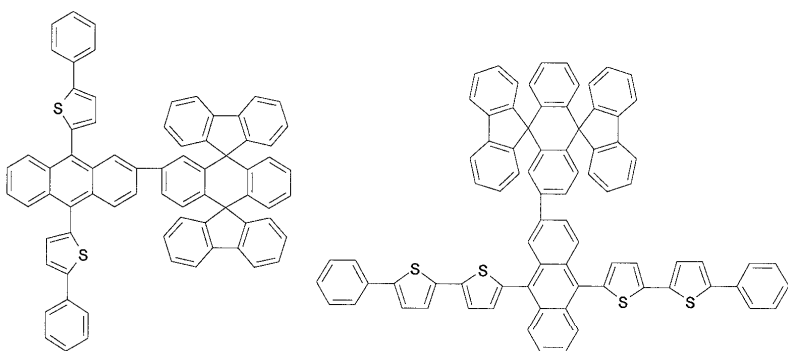
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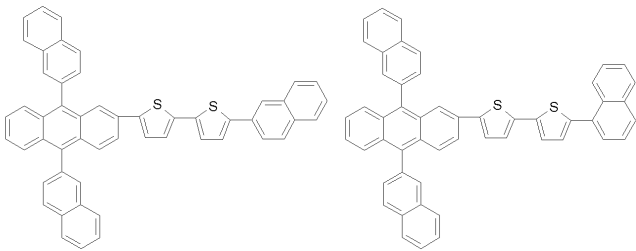
[1-21] [1-22]



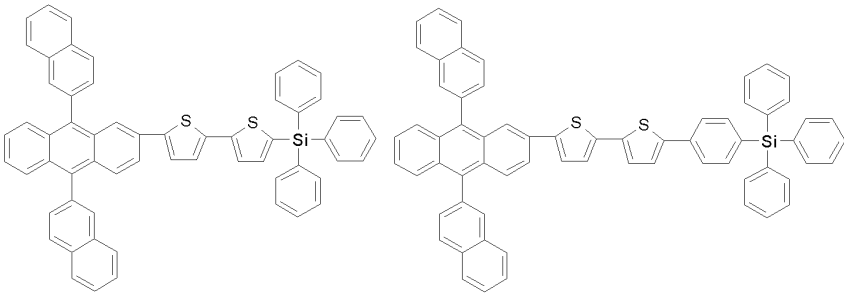
[1-23] [1-24]



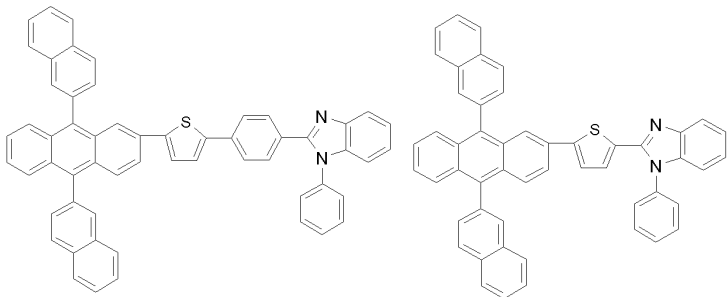
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[1-27] [1-28]



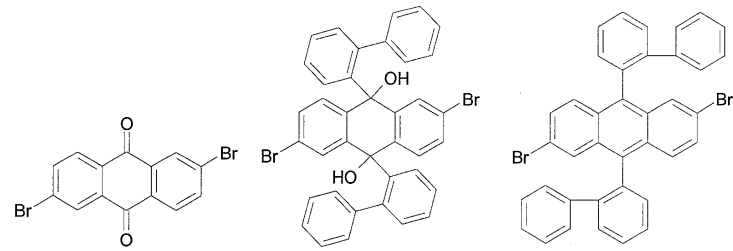
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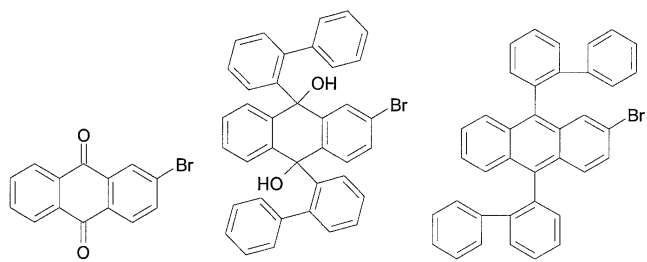
[]

1-1 1-30 , 1 23 4-1 4-23 .

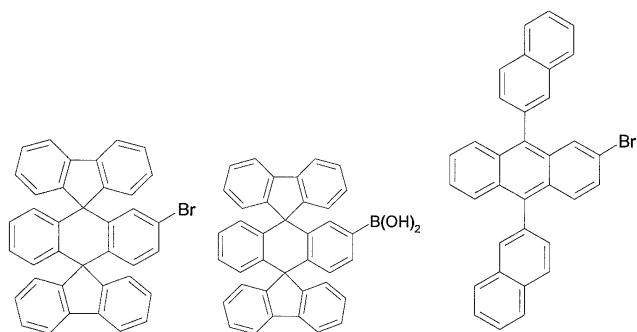
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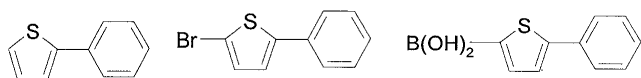
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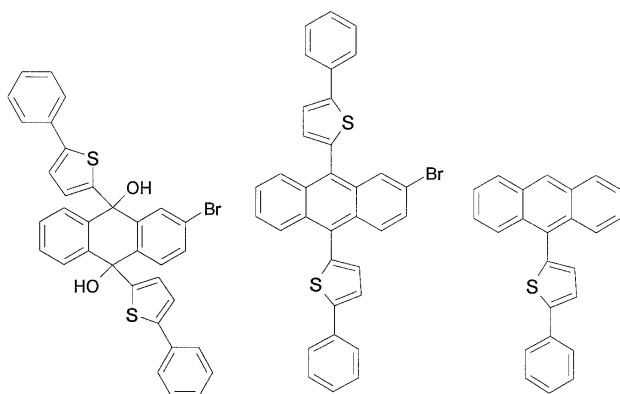
[4-7] [4-9] [4-9]



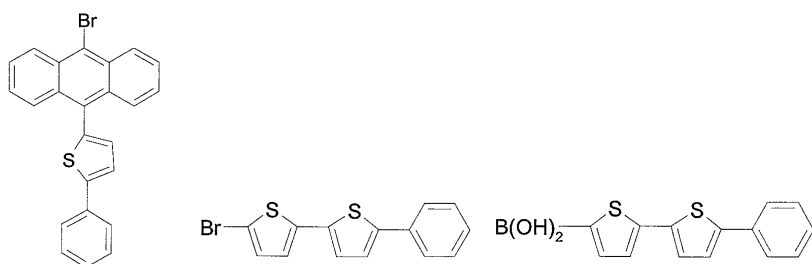
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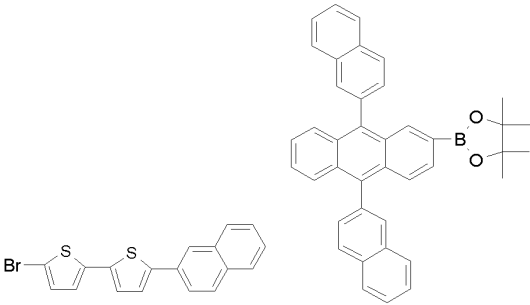
[4-13] [4-14] [4-15]



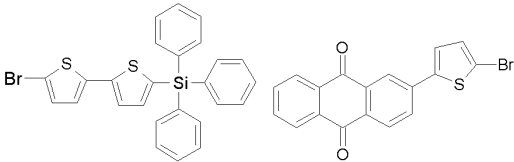
[4-16] [4-17] [4-18]



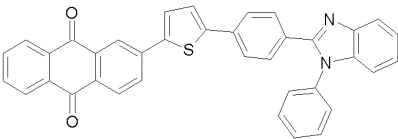
[4-19] [4-20]



[4-21] [4-22]



[4-23]



1

(4-1)

2,6- (2,6-diaminoanthraquinone, 23.8 g, 100 mmol) 48% (HBr)
, -20 (NaNO₂, 14.1 g, 204 mmol) 가 .
48% (63ml) (CuBr, 29.5 g, 206 mmol)
(50ml) 가 .
4-1 (10.0 g, 27%) . ¹H NMR (300
MHz, CDCl₃) δ 8.44 (d, J = 2.1 Hz, 2H), 8.18 (d, J = 8.0 Hz, 2H), 7.95 (dd, J = 2.1, 8.0 Hz, 2H; Anal. Calcd
for C₁₄H₆Br₂O₂: C, 45.94; H, 1.65; Br, 43.6. Found: C, 46.97; H, 1.90; Br, 44.4.

2

(4-2)

2- (2-bromobiphenyl, 8.83 mL, 51.2 mmol) THF (200 mL),
-78 t- (t-BuLi, 60 mL, 1.7 M) 가 40
1 4-1(7.50 g, 20.5 mmol) 가 .
15 (200 mL) 2 N (200 mL)
가 40
4-2(11.8 g, 85%) .

3

(4-3)

2 4-2(4.00 g, 5.93 mmol), (KI, 9.85 g, 59.3 mmol),
(NaH₂PO₄ · H₂O, 10.4 g, 119 mmol) o- (o-dichloroben
zene, 600 mL) (80 mL) 24 .

4-3(3.30 g, 99%) . mp 478.1 ; ^1H NMR (300 MHz, CDCl_3) δ 7.92 (d, J = 7.6 Hz, 4H), 7.46 (t, J = 8.0 Hz, 4H), 7.33 (t, J = 7.4 Hz, 4H), 7.21 (d, J = 7.6 Hz, 4H), 6.88 (dd, J = 2.1, 8.6 Hz, 2H), 6.47 (d, J = 2.1 Hz, 2H), 6.22 (d, J = 8.6 Hz, 2H); MS (M^+) 636; Anal. Calcd for $\text{C}_{38}\text{H}_{22}\text{Br}_2$: C, 71.50; H, 3.47; Br, 25.03. Found: C, 71.90; H, 3.40; Br, 25.7.

4

(4-4)

65 (CH₃ CN, 250 mL) (CuBr₂, 18.0 g, 80.0 mmol) t- (t-BuONO, 12 mL, 101 mmol) 2- (2-aminoanthraquinone, 15.0 g, 67.2 mmol) 5 가 20% (1000 mL) 가

(/n- =4/1) 4-4(14.5 g, 75%) . mp 207.5 ; ^1H NMR (500 MHz, CDCl_3) δ 8.43 (d, J = 1.8 Hz, 1H), 8.30 (m, 2H), 8.17 (d, J = 8.3 Hz, 1H), 7.91 (dd, J = 1.8, 8.3 Hz, 1H), 7.82 (m, 2H); MS (M^+) 286; Anal. Calcd for $\text{C}_{14}\text{H}_7\text{BrO}_2$: C, 58.57; H, 2.46; Br, 27.83; O, 11.14. Found: C, 58.88; H, 2.39; Br, 27.80; O, 10.93.

5

(4-5)

(THF, 100 mL) 2- (2-bromobiphenyl, 9.0 mL, 52 mmol) , -78 t- (t-BuLi, 40 mL, 1.7 M) 가 1 4-4(5.0 g, 17 mmol) 가 3 (NH₄Cl) 가 (CH₂Cl₂) 1 4-5(9.5 g, 92%)

6

(4-6)

5 4-5(6.00 g, 10.1 mmol) 300 mL (KI, 16.7 g, 101 mmol) (NaH₂PO₂ · H₂O, 17.7 g, 201 mmol) 가 3 4-6(5.00 g, 88%) . MS (M^+) 560; Anal. Calcd for $\text{C}_{38}\text{H}_{24}\text{Br}_2$: C, 71.27; H, 3.78; Br, 24.9. Found: C, 70.47; H, 3.68; Br, 21.0.

7

(4-7)

(100 mL) 2 4-2(9.5 g, 16 mmol) 5 가 3 4-7(8.0 g, 89%)

8

(4-8)

150 mL THF 4-7(10.0 g, 17.9 mmol) , -78 t- (t-BuLi, 31.5 mL, 1.7 M) 가 1 [B(OMe)₃, 8 mL, 71.5 mmol] 가 3 2 N (100 mL) 가 1.5 2 4-8(7.60 g, 81%)

9

(4-9)

g, 53.1 mmol), -78 t- (THF, 100 mL) 2- (2-bromonaphthalene, 11.0
 1 (t-BuLi, 46.8 mL, 1.7 M) 가
 3 4-4(6.36 g, 22.0 mmol) 가 .
 (NH₄Cl) 가 (CH₂Cl₂)
 가 .
 naphthylalcohol, 11.2 g, 93%) . (11.2 g, 20.5 mmol) 200 m
 L (KI, 34.0 g, 210 mmol), (NaH₂PO₂ · H₂
 O, 37.0 g, 420 mmol) 가 3 ,
 4-9(7.2 g, 64%) .

10

(4-10)

2- (2-bromothiophene, 8.42 g, 51.6 mmol), (phenyl boronic acid, 9.44 g, 77.4 mmo
 l), (sodium carbonate, 16.4 g, 155 mmol), () (0) (tetrakis(triphenyl
 phosphine)palladium(0), 1.80 g, 1.55 mmol), 50 ml 100 ml 250 ml 24
 1 N HCl(100 mL) 가
 가 .
 4-10(6.27 g, 75.8 %) . ¹H NMR (300 MHz, CDCl₃) δ 7.60 (m, 2H), 7.44-7.23 (m,
 5H), 7.05 (m, 1H); MS (M+H) 161.

11

(4-11)

10 4-10(5.00 g, 31.2 mmol), N- (N-bromosuccinimide, NBS, 5.60 g,
 31.2 mmol) (80 mL) 가 (80 mL) , 1 가 60 가 24
 , KOH 가 ,
 4-11(3.66 g, 49%) : MS (M+) 238.

12

(4-12)

11 4-11(2.50 g, 10.4 mmol) THF 50 ml , -78 - (
 n-BuLi, 8.4 mL, 20.9 mmol, 2.5 M) . 1 (trimethyl bor
 ate, 20.9 mmol, 2.4 ml) 가 . 30 3 .
 1N HCl (100 mL) 가 .
 4-12 (1.04 g, 48.8 %) .

13

(4-13)

11 4-11(1.00 g, 4.18 mmol) 30 ml THF , -78 t- (t-BuLi,
 3.3 mL, 5.6 mmol, 1.7 M) 가 . 1 2- (2-bromoanthraquin
 one, 0.40 g, 1.4 mmol) 가 . 30 3 .
 1 N HCl (50 mL) 가 .
 4-13(0.70 g, 82%) .

14

(4-14)

13 4-13 (0.71 g, 1.15 mmol), (potassium iodide, 1.91 g, 11.5 mmol),
(sodium hypophosphite hydrate, 2.02 g, 23.0 mmol) 15 ml
3
0.57 g, 86.9%) : MS [M+] 572. 4-14 (

15

(4-15)

9- (9-bromoanthracene, 1.90 g, 7.35 mmol), 12 4-12 (1.80 g, 8.82 m
mol), (Na₂CO₃, 2.34 g, 22.1 mmol) () (0)(tetrakis(triphenylphos
phine)palladium(0), 0.25 g, 0.22 mmol) 10 ml, 3 ml, 20 ml 24
4-15(2.10 g, 84%)

16

(4-16)

15 4-15 (2.10 g, 6.24 mmol) (CCl₄, 60 mL) (bromine, 0.
32 mL, 6.24 mmol) 0 3 가 (NaHCO₃)
가
() () 4-16(0.92 g, 35%)

17

(4-17)

5,5'- -2,2'- (5,5'-dibromo-2,2'-bithiophene, 5.00 g, 15.4 mmol), (phenylboronic
acid, 2.07 g, 17.0 mmol), (sodium carbonate, 4.90 g, 46.3 mmol) ()
(0)(tetrakis(triphenylphosphine)palladium(0), 0.50 g, 0.46 mmol) 15 ml 30 ml
24
(n-hexane) 4-17(2.80 g, 57%)

18

(4-18)

17 4-17(6.71 g, 20.9 mmol) THF 100 ml , -78 t- (18.0 mL
, 31.3 mmol, 1.7 M) 가 . 1 (trimethyl borate, 4.68 g, 4
1.8 mmol) . 30 3 1 N HCl 가
(%) 4-18(5.33 g, 89

19

(4-19)

5,5'- -2,2'- (5,5'-dibromo-2,2'-bithiophene, 5.00 g, 15.4 mmol) THF 50 ml
, -2- (naphthalene-2-boronic acid, 1.86 g, 10.8 mmol), 2M (aq. potassium
carbonate, 30 mL), () (0) (tetrakis(triphenylphosphine)palladium(0), 0.18 g,
1 mole%) 24
THF 가
4-19(2.6 g, 45.4%)

20

(4-20)

2- -9,10- (5.00 g, 9.81 mmol), (Bis(pinacolato)diboron, 2.75 g, 10.9 mmol), (potassium acetate, 2.89 g, 29.4 mmol), (palladium (diphenylphosphinoferrocene) chloride, 0.24 g, 3 mol%) 250 mL (50 mL) 가 80 6 (50 mL×3) EtOH 4-20(5.46 g, 92%)

21

(4-21)

ol) 50 mL THF 2,2'-(2,2'-dibromothiophene, 2.7 g, 8.3 mmol), -78 t- (t-BuLi, 6 mL, 1.5 M) 가 1 (triphenylsilyl chloride, 2.35 g, 8.00 mmol) 가 (50 mL) 가 10 (crude) (n-Hexane) 4-21(2.3 g, 55.0%)

22

(4-22)

2- (2-Chloroanthraquinone, 3.00 g, 12.3 mmol) THF 100 mL -2- (thiophene-2-boronic acid, 2.00 g, 15.6 mmol), 2 M K₂CO₃ 20 mL, 0.14 g (tetrakis(triphenylphosphine) palladium) 48 (thiophene-2-anthraquinone) 1.70 g(47.4%)

2- (1.70 g, 5.85 mmol) CHCl₃ 30 mL AcOH 5 mL NBS (1.04g, 5.85 mmol) 4 (succinimide) 4-22(1.8 g, 87.4%)

23

(4-23)

2- -5- (2-Anthraquinone-5-bromothiophene, 1.80 g, 4.87 mmol) THF 100 mL 가 1.00 g 4- (4-formylphenylboronic acid, 6.91 mmol) 2 M K₂CO₃ 30 mL 가 Pd(PPh₃)₄ 0.05 g(0.046mol) 3 (1.70 g, 4.31 mmol) N-1,2- (N-phenyl-1,2-phenylenediamine) 50 mL 5 mL 140 1 6 (phenylbenzimidazole) 가 THF (thiopheneanthraquinone) (0.75 g, 32%).

1

(1-4)

6 4-6(1.00 g, 1.79 mmol), 5- -2- (5-phenylthiophene-2-boronic acid, 0.55 g, 2.67 mmol), (0.57 g, 5.34 mmol) Pd(PPh₃)₄ (0.06 g, 0.05 mmol) 10 mL, 20 mL, 3 mL

(/ = 1/5) 1-4(500 mg, 44%) . mp 113.17 ; ^1H NMR (300 MHz, CDCl_3) δ 7.75(s, 1H), 7.64-7.46(m, 12H), 7.44-7.28(m, 4H), 7.26-7.18(m, 5H), 6.99(t, 4H), 6.86(d, 6H); MS [M+H] 641; Anal. Calcd for $\text{C}_{48}\text{H}_{32}\text{S}$: C, 89.96; H, 5.03; S, 5.00. Found: C, 90.82; H, 5.17; S, 4.8.

2

(1-14)

6 4-6(0.85 g, 1.51 mmol), 5- -2,2'- -5'- (0.65 g, 2.27 mmol), (0.48 g, 4.53 mmol) $\text{Pd}(\text{PPh}_3)_4$ (0.05 g, 0.05 mmol) 20 mL, 40 mL 5 mL 2 (/ - = 1/4) 1-14(700 mg, 64%) . mp 117.86 ; MS [M+H] 723.

3

(1-19)

3 4-3(1.15 g, 1.80 mmol), 5- -2,2'- -5'- (1.23 g, 4.31 mmol), (1.14 g, 10.8 mmol) $\text{Pd}(\text{PPh}_3)_4$ (0.05 g, 0.045 mmol) 20 mL, 40 mL 5 mL 2 (/ - = 1/2) 1-19(180 mg, 10%) . mp 326.07 ; MS [M+H] 963; Anal. Calcd for $\text{C}_{66}\text{H}_{42}\text{S}_4$: C, 82.29; H, 4.39; S, 13.31. Found: C, 80.89; H, 4.39; S, 12.7.

4

(1-12)

9 4-9(1.00 g, 1.96 mmol), 5- -2,2'- -5'- (0.84 g, 2.94 mmol), (0.62g, 5.88 mmol) $\text{Pd}(\text{PPh}_3)_4$ (0.05 g, 0.045 mmol) 25 mL, 50 mL 5 mL 2 (/ - = 1/2) 1-12(830 mg, 63%) . mp 30.4.49 ; MS [M+H] 671.

5

(1-23)

8 4-8 (0.45g, 0.86 mmol), 14 4-14 (0.45g, 0.78 mmol), (K₃PO₄, 0.33 g, 1.56 mmol) $\text{Pd}(\text{PPh}_3)_4$ (0.03 g, 0.023 mmol) 10 mL DMF 2 80 1-23(0.3 g, 36%) . mp 396.7 ; MS [M+H] 973.

6

(1-21)

8 4-8(1.34 g, 2.56 mmol), 16 4-16 (0.80 g, 1.93 mmol), (0.82 g, 3.86 mmol) $\text{Pd}(\text{PPh}_3)_4$ (0.07 g, 0.06 mmol) DMF 25 mL 2 80 1-21(1.10 g, 53%) . mp 438.5 ; MS [M+H] 815.

7

(1-25)

2 N 20 4-20(4.50 g, 5.39 mmol), 19 4-19 (2.00 g, 5.39 mmol),
 20 mL, 50 mL, 20 ml Pd(PPh₃)₄ (0.13 g) 15
 H₂O EtOH 1-25 (3.88 g)

8

(1-27)

21 4-21(1.00 g, 2.00 mmol), 20 4-20 (1.10 g, 2.00 mmol),
 2 M (2mL) Pd(PPh₃)₄ (0.02 g, 0.02 mmol) THF 25 mL 10
 THF (THF/ = 1/5)
 1-27 (1.20 g, 70%) : mp 156.4 C; MS [M+H] 853.

9

(1-29)

2- (2-Bromonaphthalene, 0.83 g, 4.03 mmol) THF 40ml -78 t-BuL
 i(1.7 M) 3.15 mL 10 가 40 23
 (0.75 g, 1.75mmol) . 3 -78 1
 NH₄Cl 50 mL 40 mL
 가 16 0.80 g(73.%)

0.80 g(0.98 mmol) 1.66 g KI (10 mmol) 1.76 mmol(20 mmol) NaH₂PO₂ · H₂O
 AcOH 100 ml 가 140 3 200 mL
 1-29 (0.80 g)

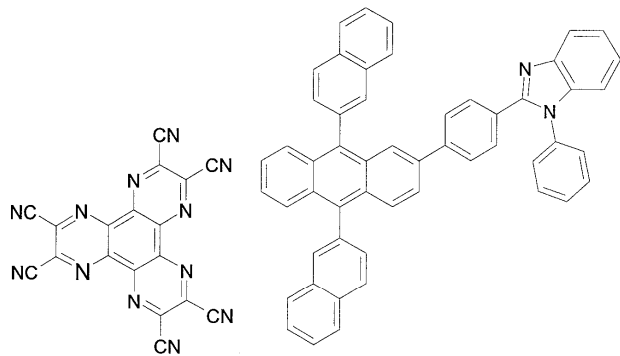
10

()

ITO(indium tin oxide)가 1500 ,
 (Fischer Co.) , (Millipore Co.) (

5
 ene) 500 ITO 5 (hexanitrile hexaazatriphenyl
 1-12 200 NPB(600)
 6 가 300
 5 (LiF)
 2500 1 /sec
 0.2 /sec, 3 7 /sec

[5] [6]



color coordinate) $x = 0.30, y = 0.56$ 가 , 10 mA/cm² 1931 CIE (
 mA/cm² 358 nit 가 , 50
 6 가 90% 가 54.

1

()

7 ITO 5 (hex
anitrile hexaazatriphenylene) 500
NPB(600)
6 Alq3 200
가 300
5
(LiF) 25
1 /sec
0.2 /sec, 3 7 /sec

color coordinate) $x = 0.33, y = 0.56$ 가 , 10 mA/cm² 1931 CIE (
 mA/cm² 325 nit 가 , 50
 가 90% 가 33.5

11

()

7 ITO 5 (hexa
nitrile hexaazatriphenylene) 500
NPB(600)
Alq3 300
q3 5 (LiF) 2500
1 /sec , 0.2 /sec, 3 7
/sec

color coordinate) $x = 0.25, y = 0.44$ 가 , 10 mA/cm² 1931 CIE (
 mA/cm² 151 nit 가 , 50
 가 90% 가 11.9

12

()

7 ITO 5 (hex
anitrile hexaazatriphenylene) 500
NPB(600) 1-19 200

Alq3 300 A
 lq3 5 (LiF) 2500
 1 /sec, 0.2 /sec, 3 7
 /sec

3.74 V 가 , 10 mA/cm² 1931 CIE (
 color coordinate) x = 0.39, y = 0.57 404 nit , 50
 mA/cm² 가 가 90% 가 19.8

13

()

7 ITO 5 (hex
 anitrile hexaazatriphenylene) 500
 NPB(600) 1-14 200
 Alq3 300
 5 (LiF) 2500
 1 /sec, 0.2 /sec,
 3 7 /sec

4.06 V 가 , 10 mA/cm² 1931 CIE (
 color coordinate) x = 0.28, y = 0.58 486 nit , 50
 mA/cm² 가 가 90% 가 10.6

2

()

7 ITO 5 (hex
 anitrile hexaazatriphenylene) 500
 NPB(600) Alq3 500
 Alq3 5 (LiF) 2500
 1 /sec, 0.2 /sec, 3 7 /sec

5.20 V 가 , 10 mA/cm² 1931 CIE (
 color coordinate) x = 0.33, y = 0.53 326 nit , 50
 mA/cm² 가 가 90% 가 1.0

, , Alq3 1 가

14

()

7 ITO 5 (hex
 anitrile hexaazatriphenylene) 500
 NPB(600) 1-12 DCJTb 100:2
 200 6 300
 5 (LiF)
 2500 1 /sec
 0.2 /sec, 3 7 /sec

492 nit 가 90% 가 10 mA/cm² , 50 mA/cm² 132.5 , 3.26 V , 604 nm 가

3

()

7 nitrile hexaazatriphenylene) 500 ITO 5 (hexa
NPB(600) 6 300 Alq3 DCJTB 100:2 200
5 (LiF) 2500
0.2 /sec, 3 7 /sec 1 /sec

210 nit 가 90% 가 10 mA/cm² , 50 mA/cm² 14.0 , 4.81 V , 612 nm 가

Alq3 1 가

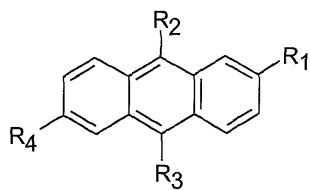
(EL)

(57)

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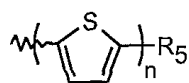
1 :

[1]



1 , R₁ R₄ 2 ,

[2]



2 , n 1 4 ,

R₅ ; , , , ; 5 6

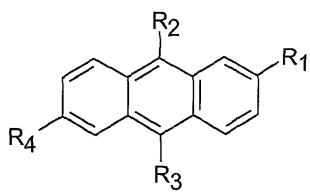
5 6 ; 1 20 ; 6 24 ;

1 20 ; 1 20 ; 5 6 ; 6 24 ;

2.

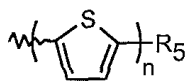
1 :

[1]



1 , R₁ R₄ 2 ,

[2]



2 , n 1 4 ,

R₅ ; 5 6 ; 1 20 ; 6 24 ;

1 20 ; 1 20 ; 5 6 ; 6 24 ;

3.

2 , 가 .

4.

2 , .

5.

2 , 가

6.

2 , 가

7.

2 , 가

8.

2 , , 가 , ,

9.

2 , 가 , ,

10.

2 , 가 , 1

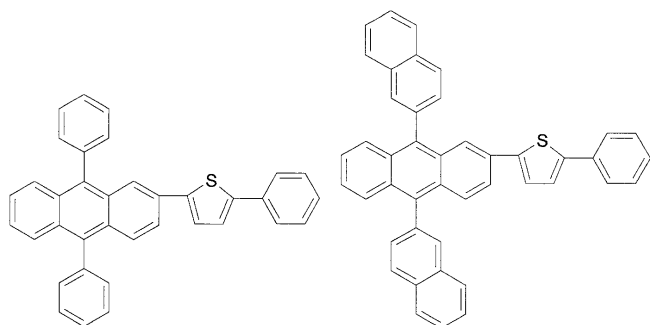
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9 , 가 , ,

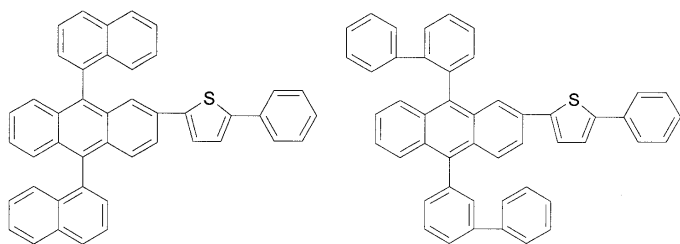
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2 , 1 : 1-1 1-30

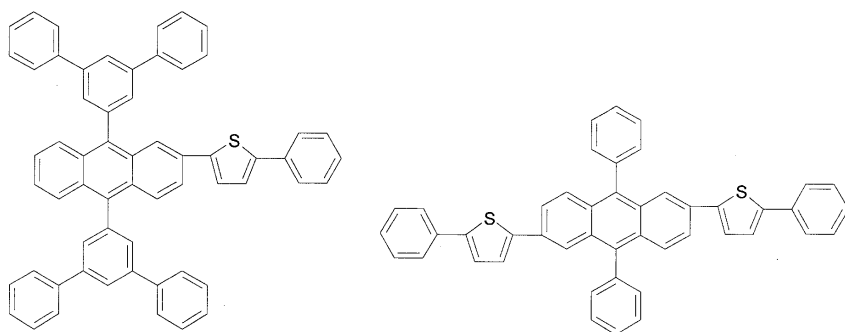
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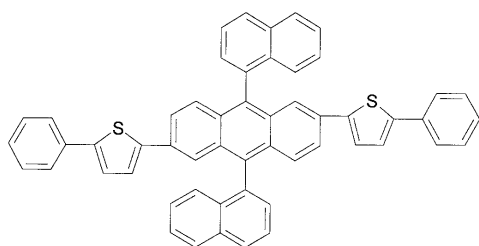
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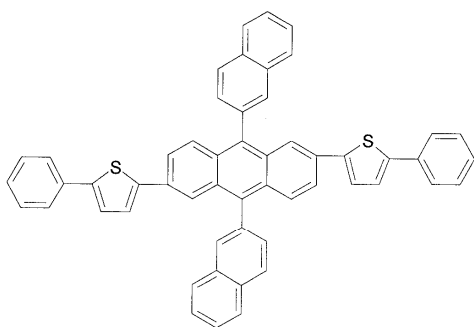
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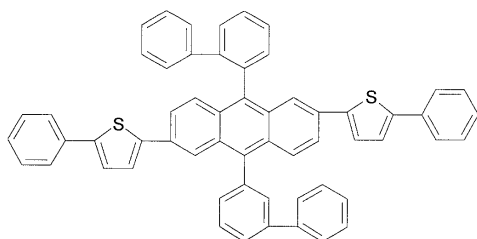
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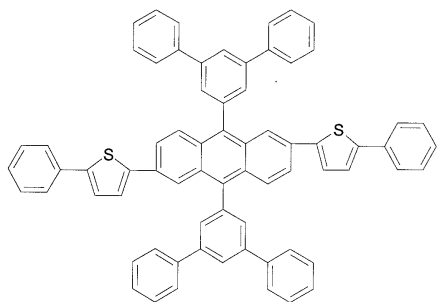
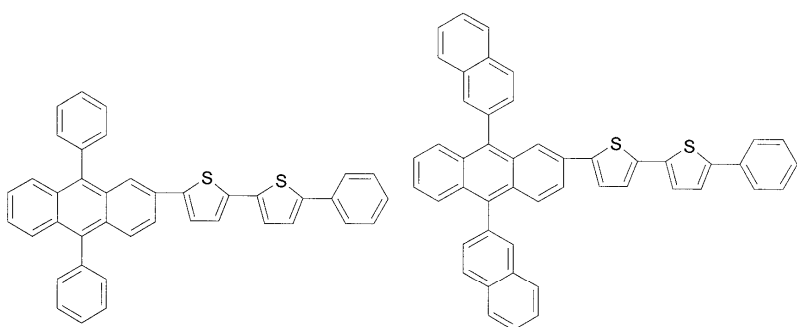
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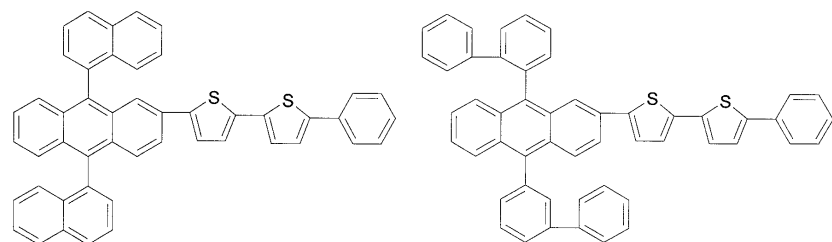
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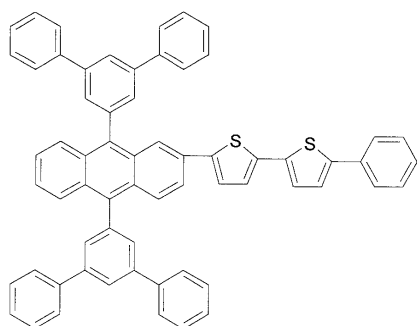
[1 - 10]


$$\begin{bmatrix} 1 & -11 \end{bmatrix} \begin{bmatrix} 1 & -12 \end{bmatrix}$$


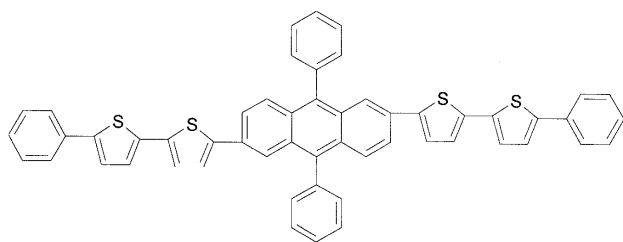
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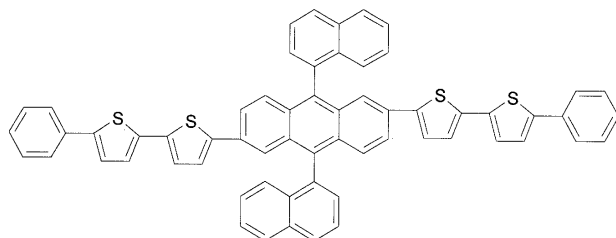
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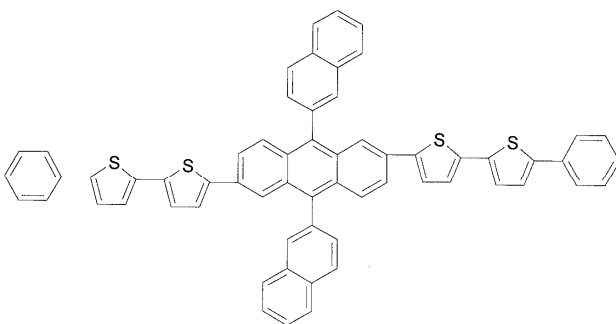
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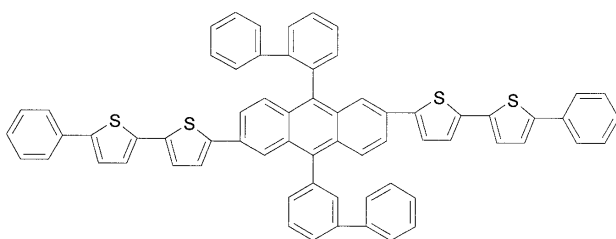
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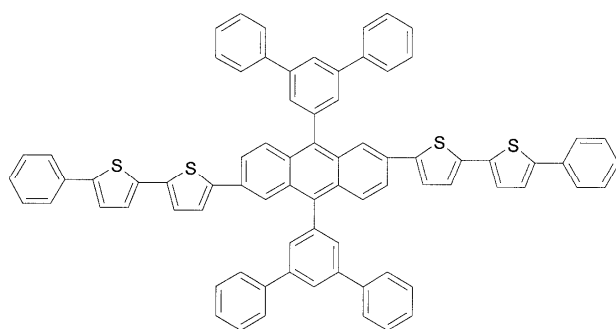
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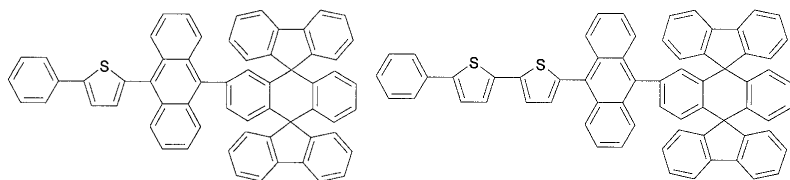
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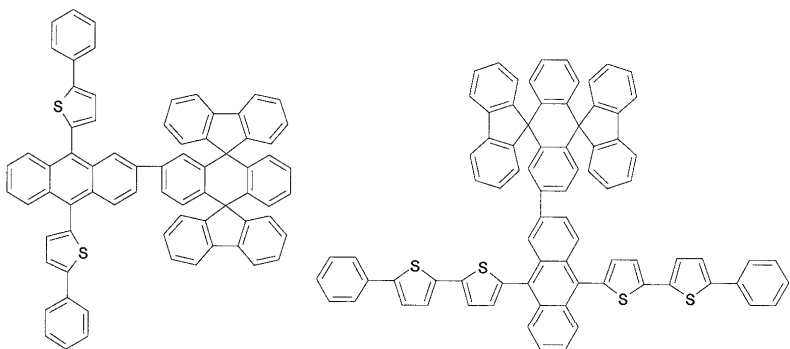
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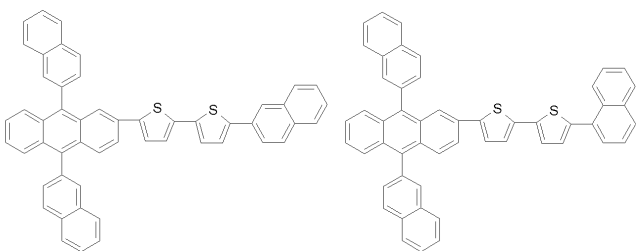
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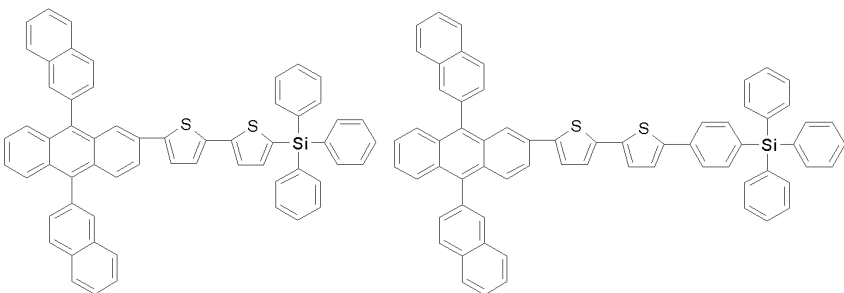
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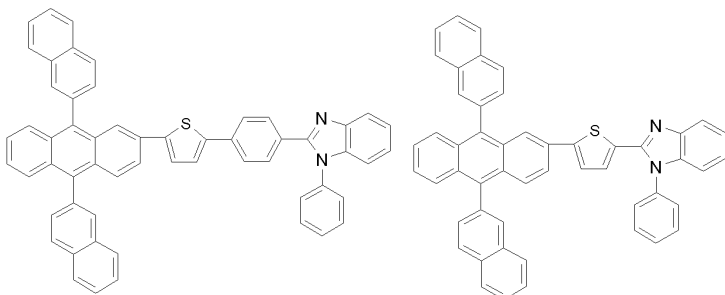
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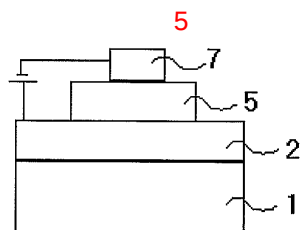
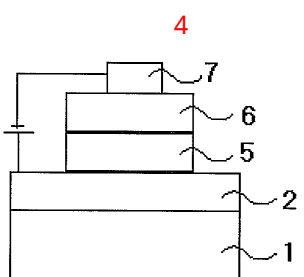
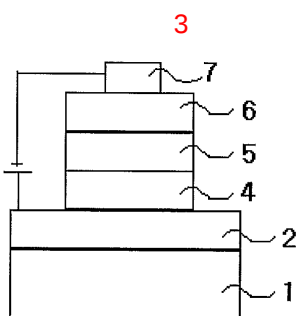
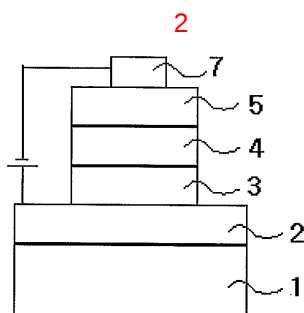
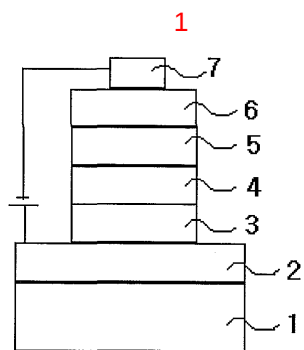


[1-27] [1-28]



[1-29] [1-30]





专利名称(译)	新的有机发光层材料和使用其的有机发光器件		
公开(公告)号	KR1020030087522A	公开(公告)日	2003-11-14
申请号	KR1020030010439	申请日	2003-02-19
[标]申请(专利权)人(译)	乐金化学股份有限公司		
申请(专利权)人(译)	LG化学有限公司		
当前申请(专利权)人(译)	LG化学有限公司		
[标]发明人	KIM JIEUN 김지은 SON SEHWAN 손세환 BAE JAESOOON 배재순 LEE YOUNGU 이윤구 KIM KONGKYEUM 김공겸 LEE JAECHOL 이재철 JANG JUNGI 장준기 IM SUNGGAP 임성갑		
发明人	김지은 손세환 배재순 이윤구 김공겸 이재철 장준기 임성갑		
IPC分类号	C09K11/06		
CPC分类号	C07D333/06 H01L51/0052 H01L51/0067 H01L51/0068 H01L51/0071 H05B33/14 Y10S428/917		
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摘要(译)

本发明涉及有机发光器件，其包括形成绿色或黄色或红色发光层的主体层的有机化合物层，并且可以改善器件的寿命和效率，以用于多层有机光。- 发光装置，其中允许不同薄膜的有机层并确保有机发光装置的稳定性和低电压操作，包括有机发光装置，尤其是至少一层以上的有机化合物在基板和阳极和阴极上，阳极层和阴极层位于基板上。有机发光器件，绿色发光层，主体，蒽，噻吩，有机化合物层。

