

(19)
(12)(KR)
(A)(51) 。 Int. Cl. ⁷
C09K 11/06(11)
(43)2002 - 0082801
2002 10 31(21) 10 - 2002 - 0022535
(22) 2002 04 24(30) JP - P - 2001 - 00127311 2001 04 25 (JP)
JP - P - 2001 - 00158325 2001 05 28 (JP)(71) 가 가
103 2 2 1(72) ,
520 - 0842 가 2 13 1 322
가,
520 - 2152 가 3 57 1 203
,
520 - 0834 가 19 34

(74)

:

(54) ,

720 nm
720 nm

[3,4 - c]

1

580 nm
580 nm

(positive hole)

가

(C.W.Tang)

가

(Appl. Phys. Lett. 51

(12) 21. p. 913, 1987),

ITO

Mg:Ag

, 10 V

8 -
1,000 cd/m²

가

가

가

()

, Eu (Chem. Lett., 1

267(1991))

(dopant)

(8 -)

(10 -)

4 - (

) - 2 - - 6 - (p -
(squarylium)

(vio

(MgPc, AlPcCl)

) - 4H -
lanthrone)

() ,

(exiplex)

(eximer)

가

()

가

[3,4 - c]

2000 - 208270

580 nm

가

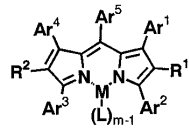
720 nm

가

가

1

1

, R¹, R² Lm가
r¹Ar⁵

1

, M
, A

3

가

가

가

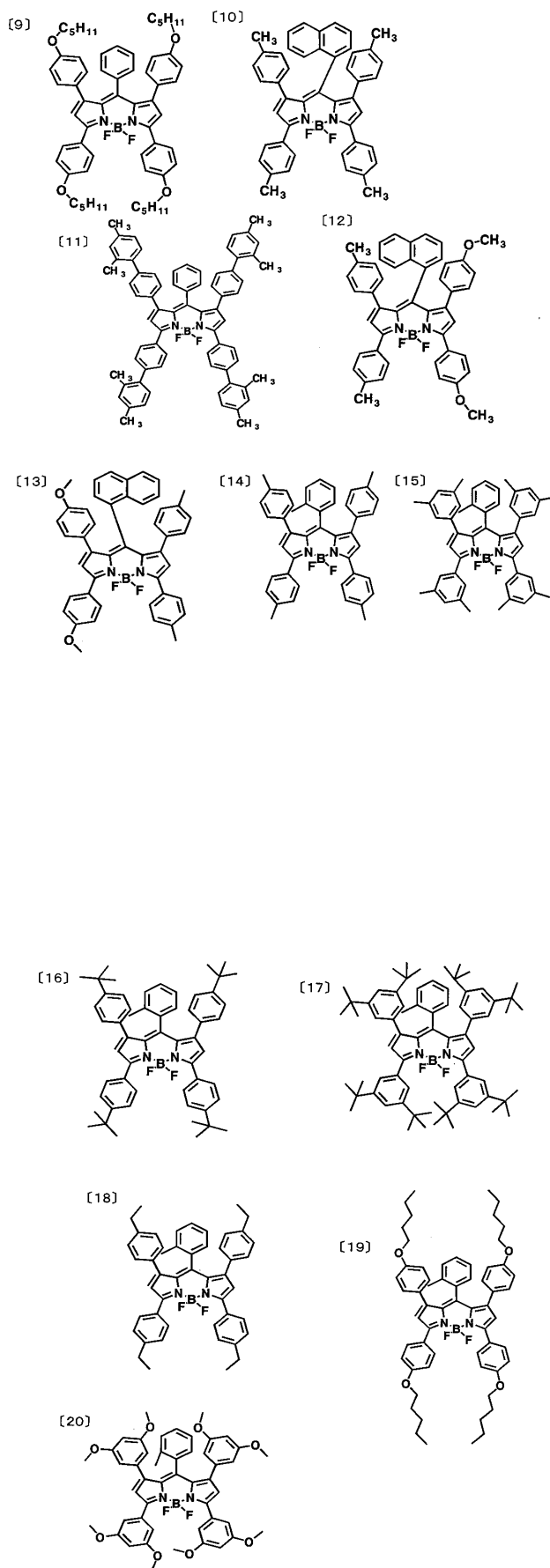
1

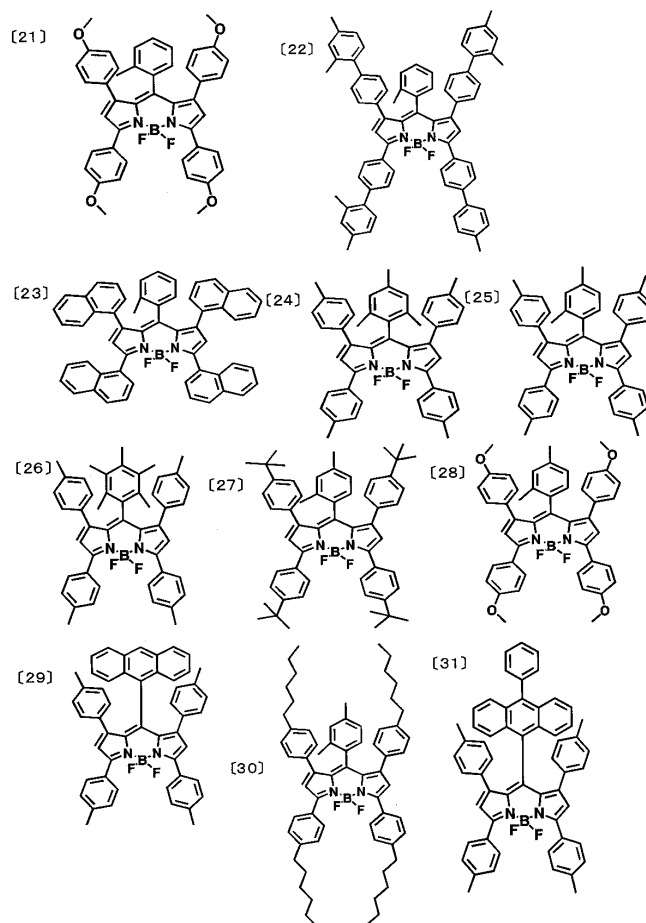
2

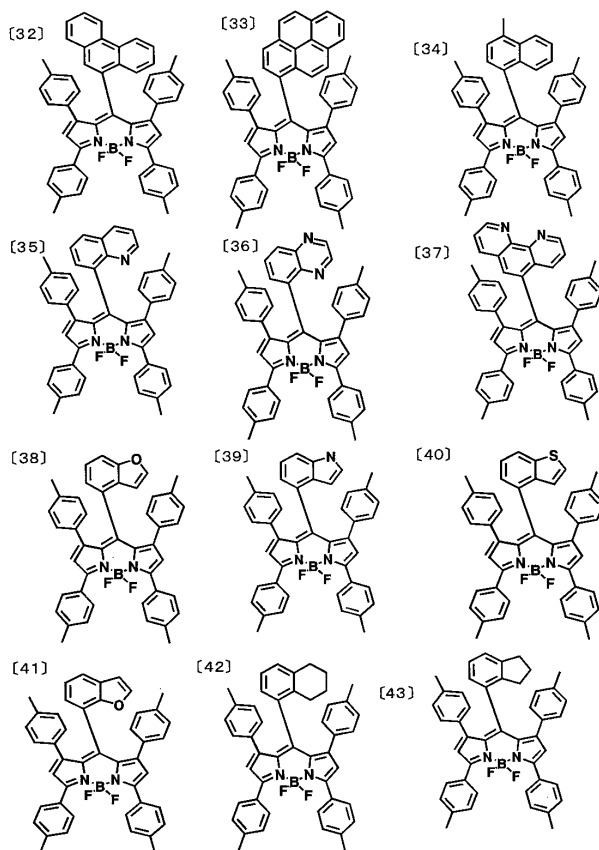

$$1 \quad \text{Ar}^1 \quad \text{Ar}^4$$
$$2 \quad \text{Ar}^6 \quad \text{Ar}^9$$

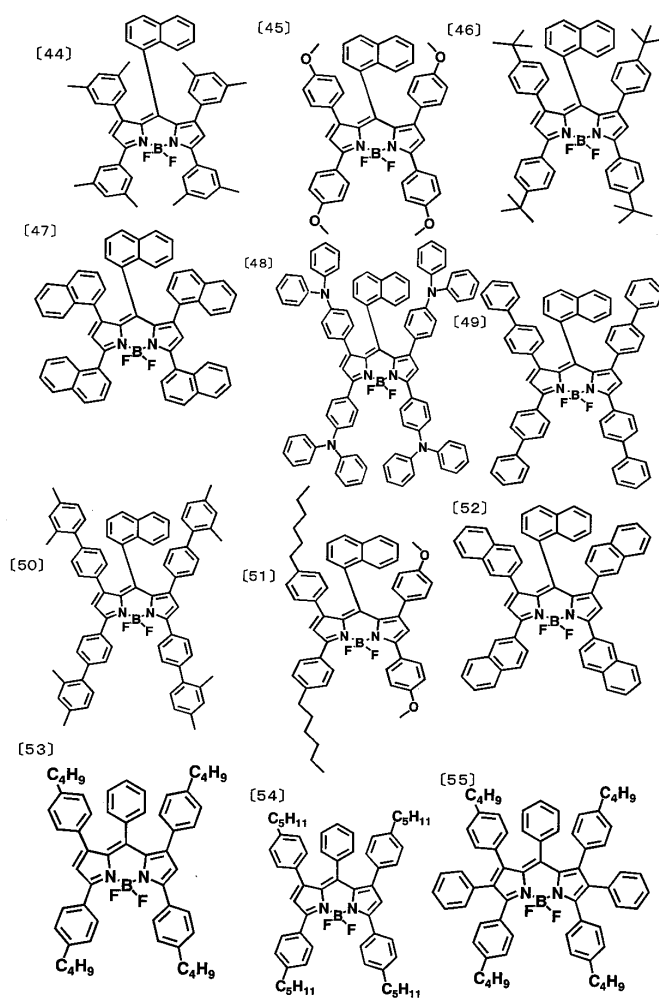
4

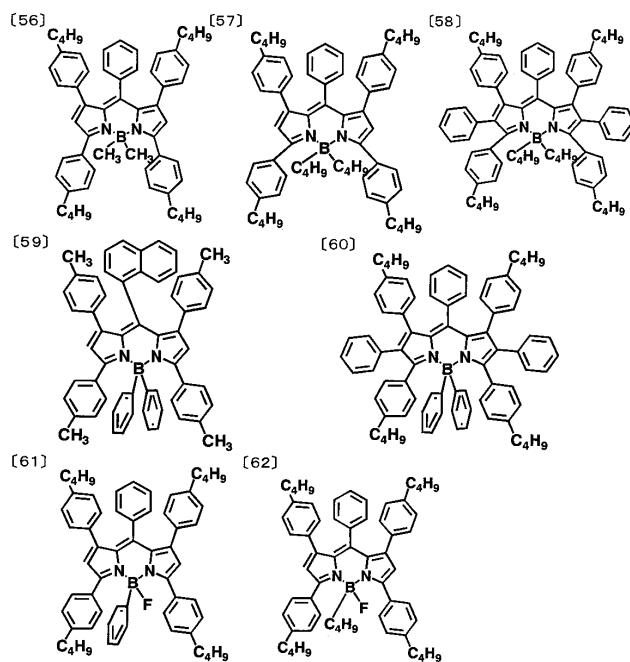
 $2 \quad R^5 \quad R^6$ 



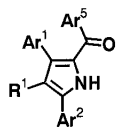




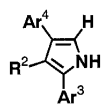




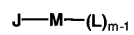
가 7
1 , 9
7
8
1,2 -
1,2 -



8



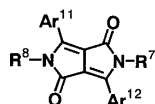
9



nm (a) (b) 가 580 nm 가 580 nm 720 nm , 720 nm

(a) 3 [3,4 - c] 580 nm 720 nm

3



[₉ R¹⁰, R⁷ R⁸ 1 25 4 $\begin{matrix} R^9 \\ | \\ -C-(CH_2)_n-Ar^{13} \\ | \\ R^{10} \end{matrix}$ (, R
; Ar¹³ 1 4 , ,
; n 0 4) ; Ar¹¹ Ar¹²
];

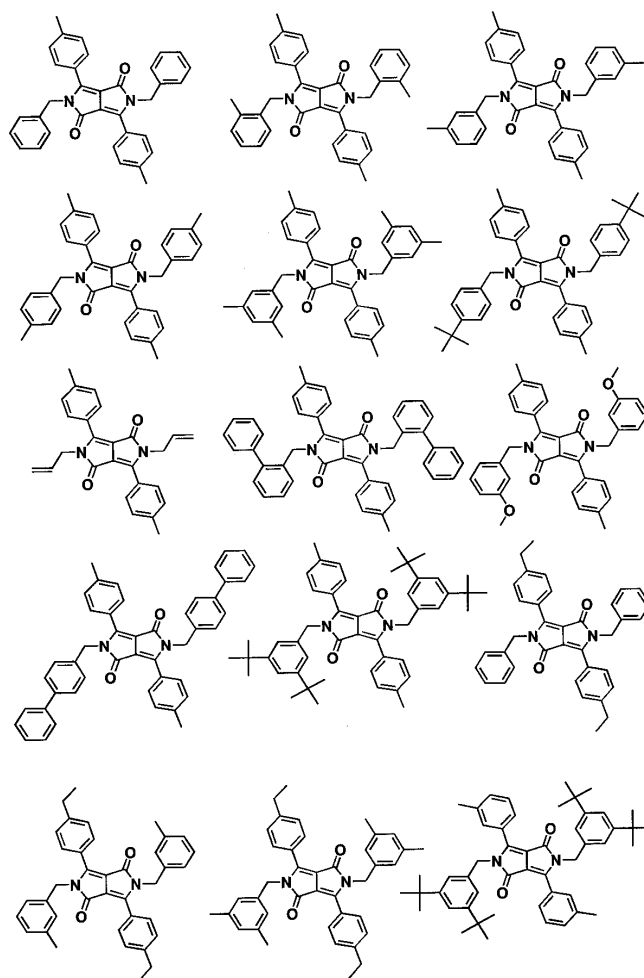
(b) 1

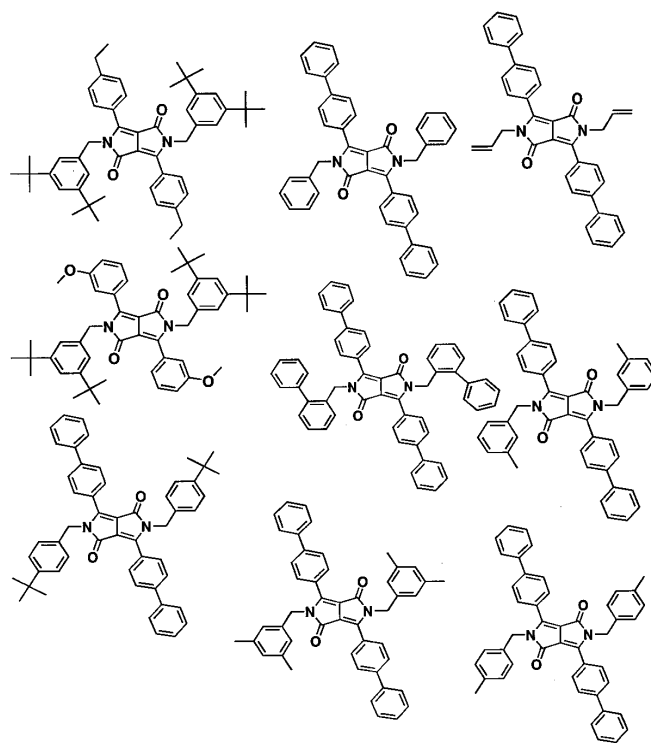
(a) , 3 [3,4 - c] 580 nm 720 nm
[3,4 - c]

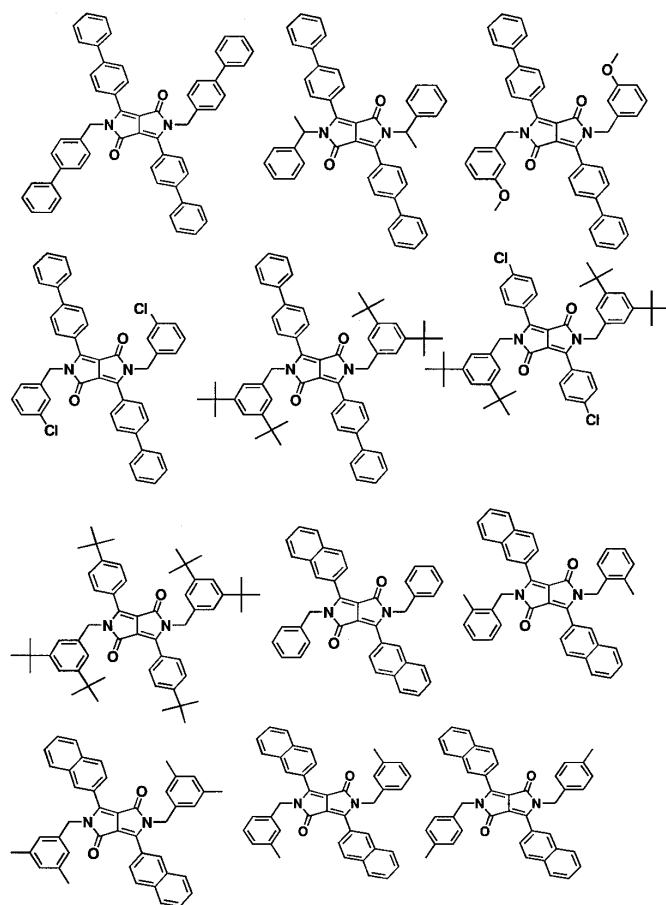
3 4 , R⁷ R⁸ 1
25 , , n - , n - ,
sec - , tert - , n - , 2 - , 3 - , 2,2 - , n - , n - ,
n - , 1,1,3,3 - , 2 - , n - , , ,
 , , , , , , , ,
 , 1 8 , n - , n - , sec - ,
 , tert - , n - , 2 - , 3 - , 2,2 - , n - , n - , n - ,
1,1,3,3 - , 2 - , 1 4 , n - ,
 , n - , sec - , tert - .

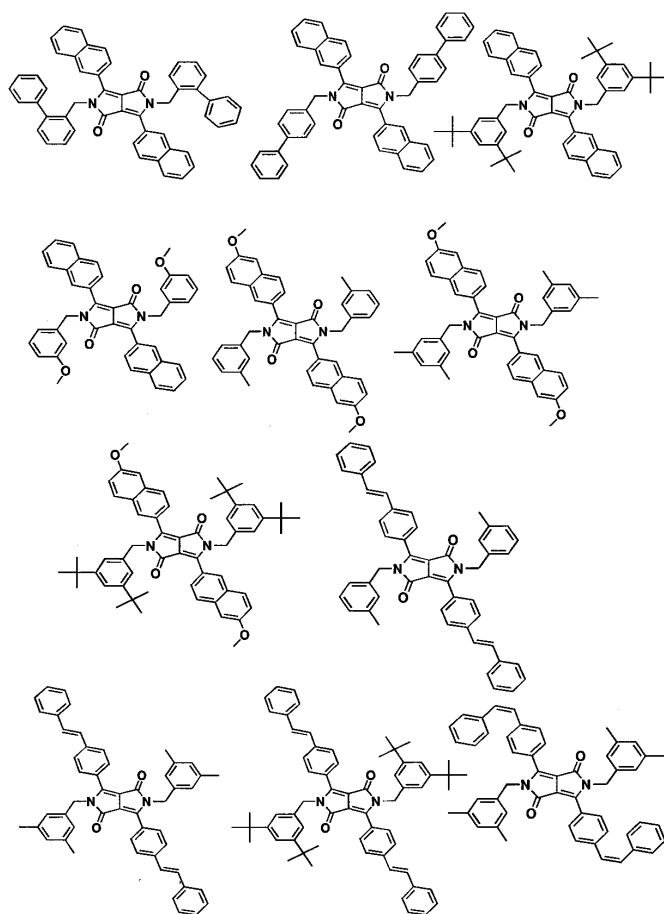
R^9 R^{10} 1 4 , , n - , , n - , sec - ,
 , tert - 가 R^3 R^4 1 3 , , ,
 , n - , . Ar^{13} , , , ,
 , 3 .
 , 1 8 . , , n - , , n -
 , sec - , , tert - , n - , 2 - , 3 - , 2,2 - , n - , n -
 , n - , 1,1,3,3 - , 2 - . 가 , 1
 8 , , n - , , n - , sec - ,
 , tert - , n - , 2 - , 3 - , 2,2 - , n - , n - ,
 n - , 1,1,3,3 - , 2 - . , , , ,
 . 1 8 , .
 . Ar^{13} , 1 - , 2 - ,
 , .

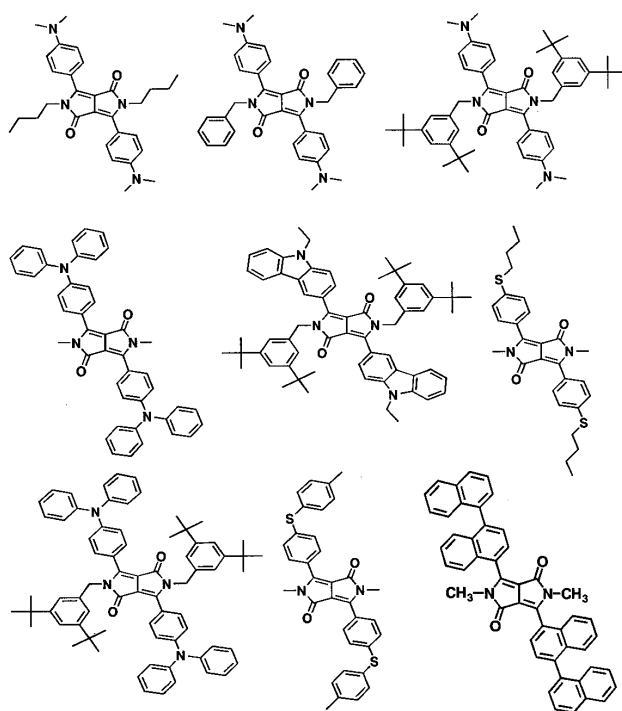
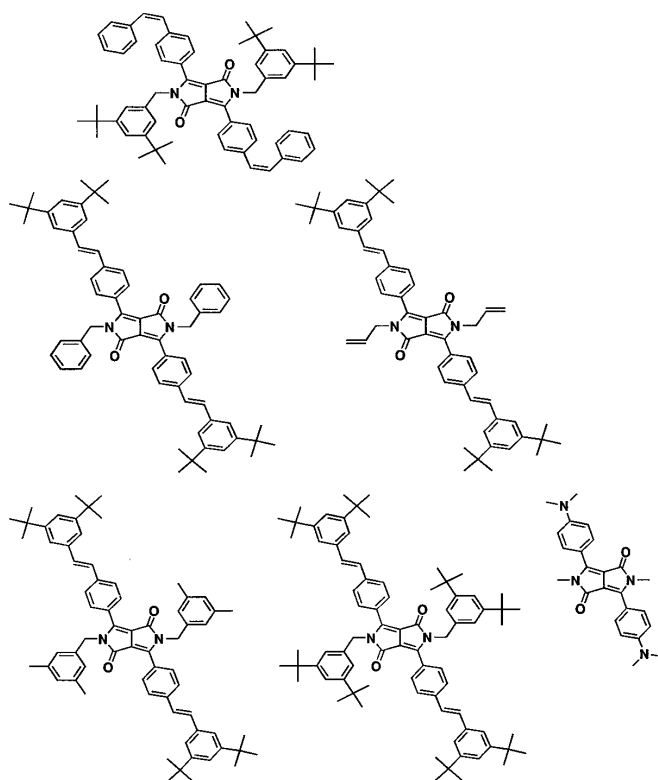
[illegible]

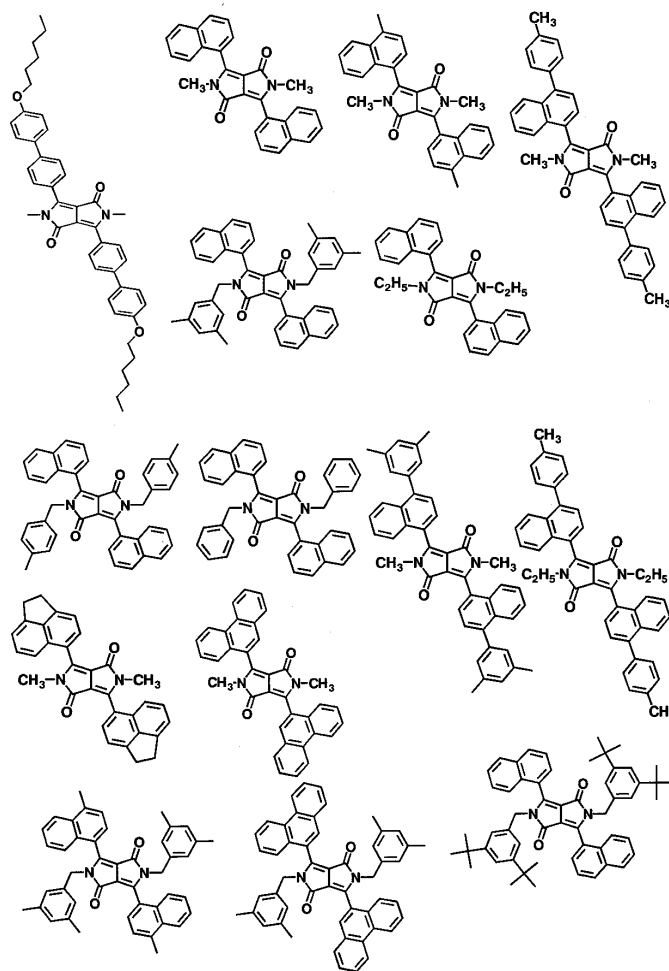


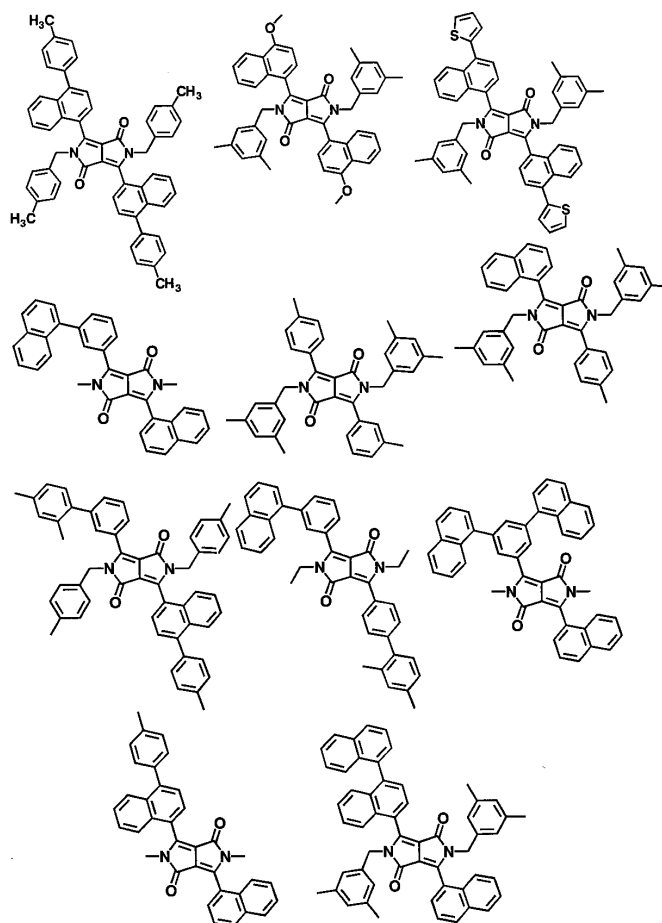












33156

가

[3,4 - c]

가

EP

0094911

EP

01

- t -

t -

- t -

[3,4 - c]

DMF)

[3,4 - c]

가 5000

0.3 (

580 nm

720 nm

, (

)

Eu

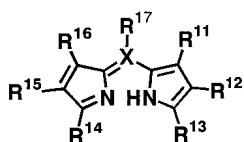
, 4 - (

) - 2 - - 6 - (p -

) - 4H -

5

5

R¹¹ R¹⁷

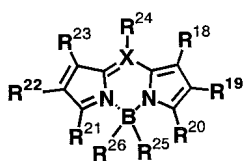
. X

R¹⁷
1

1

6

6

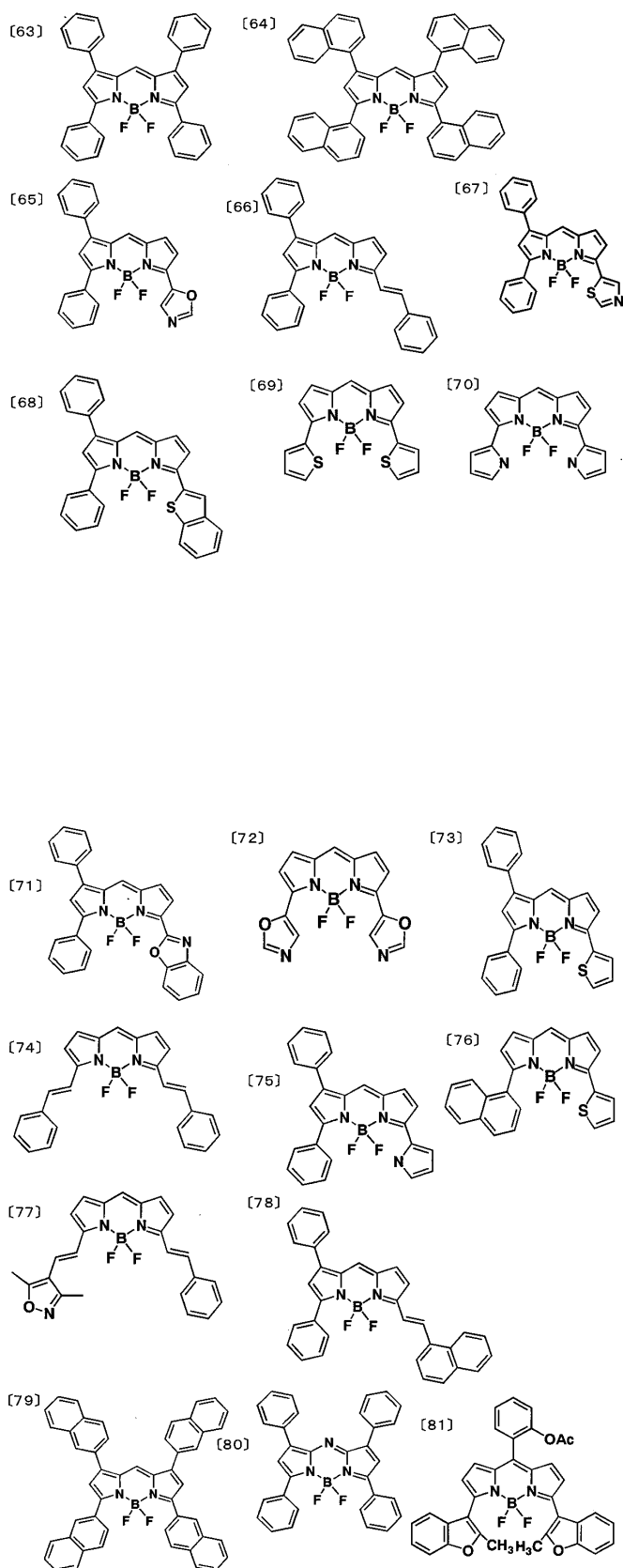
R¹⁸ R²⁴
R²⁵, R²⁶

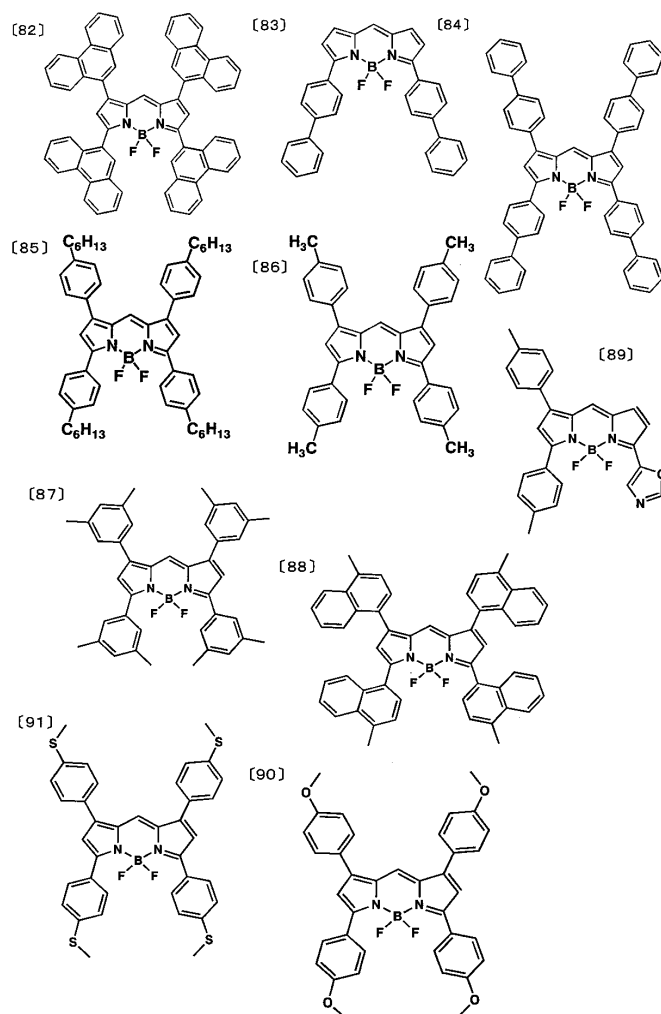
. X

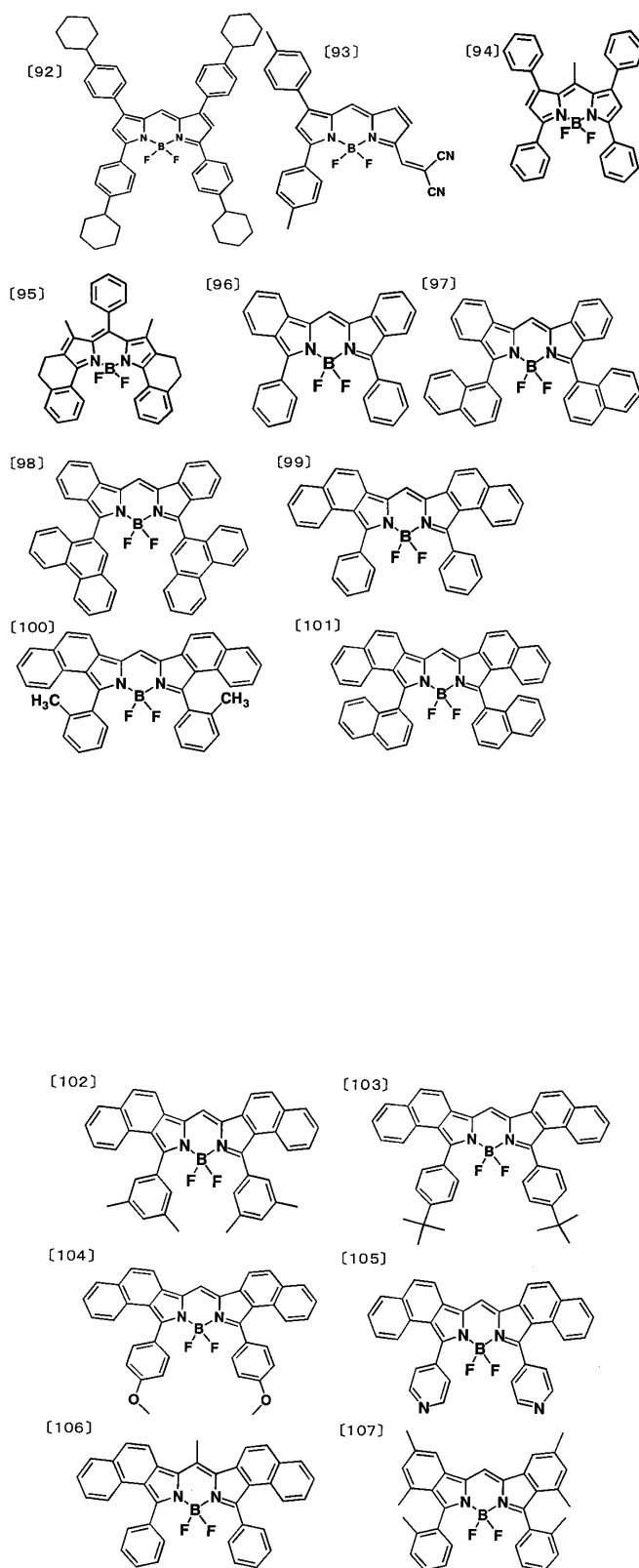
R²⁴

1

1







() , () ,
가
(Stokes' shift,
) nm , 580 nm 720 nm
(540 nm 720 nm)가 .

 , 580 nm 720 nm 가 ,
540 nm 720 nm
[3,4 - c] , 1 , 1

(b) , 1 가 .

1, 3, 5, 7 ,
가 ,
8 , 8
가
8
1 Ar¹ Ar⁴, 2 Ar⁶ Ar⁹가 가

10 % 가 ,
2 % ,
가
1
1
() Eu
4 - () - 2 - - 6 - (p -) - 4H - ,
가 [3,4 - c]

(8 -)

가

8 -

[3,4 - c]

5.9 eV

가

500

600

400

400

가

가

가 90

110

150

1

가

가

가

가

2

(N -),

, ABS

가

가

가

¹H - NMR FTNMR EX - 270(()),

CHN - MT - 3 (()), DX320(())

ICP SPS4000(())

JMS - DX303(())

U - 3200 , F - 2500 (

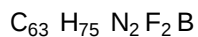
()) 4×10^{-6} /L

< 1>

[1]

1,2 - 30 Mℓ 2 - - 3,5 - (4 - n -) 1.3 g, 2,4 - (4 - n -) 1
g, 0.47 Mℓ 가 12 . 3.
6 Mℓ, 2.6 Mℓ 가 6 . 50 Mℓ 가 ,
 , 1 g .
¹H - NMR .

¹H - NMR (CDCl₃ (δ = ppm)): 0.90(t, 12H), 1.29 - 1.65(m, 32H), 2.39(t, 4H), 2.64(t, 4H), 6.44(t, 2H), 6.49(s, 2H), 6.60 - 6.63(m, 9H), 6.83(d, 2H), 7.25(d, 4H), 7.82(d, 4H)



C: 83.5 % (83.2 %), H: 8.4 % (8.3 %), N: 3.2 % (3.1 %), F: 3.2 % (4.2 %), B: 1.2 % (1.2 %).

$m/Z=908$

[1]

[1]

: λ max 568 nm (:)

: λ max 613 nm (:).

[1]

. ITO

150 nm

(

() , $15\Omega/\square$,

) 30×40 mm

56"

15

15

1

U

V -

가

가 5×10^{-5} Pa

가

4,4' -

(N - (m -

) - N -

)

50 nm

1,4 -

- 2,5 -

(3,5 -

) - 3,6 -

(4 -

[3,4 - c]

[1]

가 1

%가

15 nm

3

5 nm

0.5 nm,

150 nm

5×5 mm

618 nm,

4.2 cd/A

< 2 >

[2]

2 - - 3,5 -

1.2 g, 2,4 -

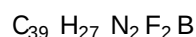
0.8 g

[1]

1.4 g

^1H - NMR

^1H - NMR (CDCl_3 (δ = ppm)): 6.46(t, 2H), 6.52(s, 2H), 6.67 - 6.88(m, 11H), 7.43(m, 6H), 7.90(d, 4H)



. C: 82.3 % (81.8 %), H: 4.

8 % (4.7 %), N: 4.9 % (4.9 %), F: 6.6 % (6.6 %), B: 1.9 % (2.0 %).

$m/Z=572$

[2]

[2]

: λ max 556 nm (:)

: λ max 600 nm (:).

[2]

1

608 nm,

2.6 cd/A

< 3 >

[3]

2 - (2 -

) - 3,5 -

(4 - n -

)

0.4 g, 2,4 -

(4 - n -

0.25 g

[1]

0.1 g

^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 0.88(t, 12H), 1.29 - 1.67(m, 32H), 2.39(t, 4H), 2.63(t, 4H), 3.51(s, 3H), 6.00(d, 2H), 6.51(s, 2H), 6.63 - 6.73(m, 10H), 7.23(d, 4H), 7.81(d, 4H)

$\text{C}_{64}\text{H}_{77}\text{N}_2\text{F}_2\text{B}$. C: 83.3 % (83.3 %), H: 8.4 % (8.4 %), N: 3.1 % (3.0 %), F: 3.2 % (4.1 %), B: 1.2 % (1.2 %).

m/Z=922

[3]

[3]

: λ max 568 nm (:)

: λ max 613 nm (:).

[3]

1

618 nm, 4.0 cd/A

< 4 >

[4]

2 - (4 -) - 3,5 - (4 - n -) 0.5 g, 2,4 - (4 - n -) 0.25 g ,
[1] 0.18 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 0.84(t, 12H), 1.07 - 1.65(m, 32H), 2.25(t, 4H), 2.64(t, 4H), 6.53(s, 2H), 6.61 - 6.69(m, 11H), 6.88(d, 2H), 7.23(d, 4H), 7.24 - 7.37(m, 5H), 7.83(d, 4H)

$\text{C}_{69}\text{H}_{79}\text{N}_2\text{F}_2\text{B}$. C: 84.3 % (84.1 %), H: 8.1 % (8.0 %), N: 2.9 % (2.8 %), F: 3.0 % (3.9 %), B: 1.2 % (1.2 %).

m/Z=984

[4]

[4]

: λ max 569 nm (:)

: λ max 615 nm (:).

[4]

1

618 nm, 3.8 cd/A

< 5 >

[5]

2 - (4 -) - 3,5 - (4 - n -) 0.45 g, 2,4 - (4 - n -) 0.25 g ,
[1] 0.15 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 0.91(t, 12H), 1.28 - 1.67(m, 32H), 2.00(s, 3H), 2.38(t, 4H), 2.63(t, 4H), 6.21(d, 1H), 6.43(s, 2H), 6.46(d, 2H), 6.63(m, 8H), 6.80(d, 1H), 7.25(d, 4H), 7.82(d, 4H)

$\text{C}_{64}\text{H}_{77}\text{N}_2\text{OF}_2\text{B}$. C: 82.1 % (81.9 %), H: 8.3 % (8.2 %), N: 3.1 % (3.0 %), O: 1.8 % (1.7 %), F: 3.0 % (4.0 %), B: 1.2 % (1.2 %)

m/Z=938

[5]

[5]

: λ max 566 nm (:): λ max 611 nm (:).

[5]

1

615 nm,

4.0 cd/A

< 6 >

[6]

2 - (4 -) - 3,5 - (4 - n -) 0.4 g, 2,4 - (4 - n -) 0.25 g ,
 [1] 0.3 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 0.91(t, 12H), 1.33 - 1.65(m, 32H), 2.44(t, 4H), 2.64(t, 4H), 6.52(s, 2H), 6.59(d, 2H), 6.70 - 6.75(m, 8H), 6.93(d, 2H), 7.25(d, 4H), 7.83(d, 4H)

 $\text{C}_{64}\text{H}_{74}\text{N}_3\text{F}_2\text{B}$

. C: 82.6 % (82.3 %), H: 7.

9 % (7.9 %), N: 4.6 % (4.5 %), F: 3.3 % (4.1 %), B: 1.2 % (1.2 %)

m/Z=933

[6]

[6]

: λ max 576 nm (:): λ max 626 nm (:).

< 7 >

[7]

2 - (1 -) - 3,5 - (4 - n -) 0.5 g, 2,4 - (4 - n -) 0.25 g ,
 [1] 0.2 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 0.93(t, 12H), 1.25 - 1.65(m, 32H), 2.21(t, 4H), 2.64(t, 4H), 6.27(m, 8H), 6.40(s, 2H), 6.64(t, 1H), 7.00(dd, 2H), 7.24(d, 4H), 7.24 - 7.34(m, 3H), 7.80 - 7.87(m, 5H)

 $\text{C}_{67}\text{H}_{77}\text{N}_2\text{F}_2\text{B}$

. C: 84.3 % (83.9 %), H: 8.

1 % (8.0 %), N: 2.9 % (2.9 %), F: 3.1 % (4.0 %), B: 1.1 % (1.2 %).

m/Z=958

[7]

[7]

: λ max 571 nm (:)

: λ max 616 nm (:).

[7] 1
619 nm, 4.2 cd/A

< 8>

[8]

2 - - 3,5 - (4 -) 0.4 g, 2,4 - (4 -) 0.25 g, [1]
0.2 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 3.67(s, 3H), 3.86(s, 3H), 6.38(d, 2H), 6.47(s, 2H), 6.54(t, 2H), 6.64 - 6.75(m, 5H), 6.85(d, 2H), 6.96(d, 4H), 7.89(d, 4H)

$\text{C}_{43}\text{H}_{35}\text{N}_2\text{O}_4\text{F}_2\text{B}$. C: 75.0 % (74.6 %), H: 5.2 % (5.1 %), N: 4.2 % (4.0 %), O: 9.3 % (9.2 %), F: 4.4 % (5.5 %), B: 1.6 % (1.6 %).

[8] m/Z=692 [8]

: λ max 584 nm (:)

: λ max 632 nm (:).

[8] 1
641 nm, 2.7 cd/A

< 9>

[9]

2 - - 3,5 - (4 - n -) 0.35 g, 2,4 - (4 - n -) 0.25 g, [1]
0.1 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 0.94(t, 12H), 1.38 - 1.41(m, 16H), 1.68 - 1.83(m, 8H), 3.80(t, 4H), 4.00(t, 4H), 6.36(d, 2H), 6.46(s, 2H), 6.53(t, 2H), 6.62 - 6.73(m, 5H), 6.85(d, 2H), 6.94(d, 4H), 7.87(d, 4H)

$\text{C}_{59}\text{H}_{67}\text{N}_2\text{O}_4\text{F}_2\text{B}$. C: 77.5 % (77.3 %), H: 7.5 % (7.5 %), N: 3.2 % (3.1 %), O: 7.1 % (7.0 %), F: 3.1 % (4.1 %), B: 1.2 % (1.2 %)

[9] m/Z=916 [9]

: λ max 587 nm (:)

: λ max 636 nm (:).

< 10>

[10]

2 - (1 -) - 3,5 - (4 -) 0.6 g, 2,4 - (4 -) 0.25 g , [1]
 0.55 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 2.00(s, 6H), 2.40(s, 6H), 6.26(m, 8H), 6.39(s, 2H), 6.65(t, 1H), 7.00(d, 1H), 7.12(d, 1H), 7.24(d, 4H), 7.24 - 7.33(m, 3H), 7.77 - 7.86(m, 5H)

, $\text{C}_{47}\text{H}_{37}\text{N}_2\text{F}_2\text{B}$. C: 83.5 % (83.2 %), H: 5.6 % (5.5 %), N: 4.3 % (4.1 %), F: 4.8 % (5.6 %), B: 1.5 % (1.6 %).

m/Z=678

[10]

[10]

: λ max 575 nm (:): λ max 613 nm (:).

[10]

1

620 nm, 3.0 cd/A

< 11 >

[11]

2 - - 3,5 - (4 - (2,4 -)) 0.35 g, 2,4 - (4 - (2,4 -)) 0.25 g
 , [1] 0.15 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)): 2.18(s, 6H), 2.32(s, 6H), 2.36(ss, 12H), 6.67(s, 2H), 6.81(d, 8H), 6.94 - 7.07(m, 11H), 7.11(d, 2H), 7.43(d, 4H), 8.01(d, 4H)

$\text{C}_{71}\text{H}_{59}\text{N}_2\text{F}_2\text{B}$. C: 86.4 % (86.2 %), H: 6.0 % (6.0 %), N: 2.9 % (2.8 %), F: 3.0 % (3.9 %), B: 1.2 % (1.1 %).

m/Z=988

[11]

[11]

: λ max 576 nm (:): λ max 626 nm (:).

< 12 >

[12]

2 - (1 -) - 3,5 - (4 -) 0.4 g, 2,4 - (4 -) 0.25 g , [1]
 1] 0.1 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)):1.97(s, 3H), 2.40(s, 3H), 3.54(s, 3H), 3.86(s, 3H), 5.99(d, 2H), 6.25(s, 4H), 6.30 - 6.39(m, 8H), 6.69(t, 1H), 6.97(d, 3H), 7.14(d, 1H), 7.26(d, 2H), 7.26 - 7.37(m, 3H), 7.78 - 7.95(m, 5H)

$\text{C}_{47}\text{H}_{37}\text{N}_2\text{O}_2\text{F}_2\text{B}$. C: 79.6 % (79.4 %), H: 5.1 % (5.2 %), N: 4.0 % (3.9 %), O: 4.6 % (4.5 %), F: 4.6 % (5.4 %). B: 1.6 % (1.6 %)

m/Z=710

[12]

[12]

: λ max 577 nm (:)

: λ max 624 nm (:).

[12]

1

628 nm,

2.9 cd/A

< 13 >

[53]

2 - - 3,5 - (4 - n -) 0.4 g, 2,4 - (4 - n -) 0.25 g , [1]
0.27 g ^1H - NMR

^1H - NMR (CDCl_3 (δ =ppm)):1.97(s, 3H), 2.40(s, 3H), 3.54(s, 3H), 3.86(s, 3H), 5.99(d, 2H), 6.25(s, 4H), 6.30 - 6.39(m, 8H), 6.69(t, 1H), 6.97(d, 3H), 7.14(d, 1H), 7.26(d, 2H), 7.26 - 7.37(m, 3H), 7.78 - 7.95(m, 5H)

$\text{C}_{55}\text{H}_{59}\text{N}_2\text{F}_2\text{B}$. C: 83.1 % (82.9 %), H: 7.5 % (7.4 %), N: 3.6 % (3.5 %), F: 4.0 % (4.8 %), B: 1.3 % (1.4 %).

m/Z=796

[53]

[53]

: λ max 569 nm (:)

: λ max 611 nm (:).

[53]

1

617 nm,

5.0 cd/A

< 14 >

[59]

30 M ℓ [10] 0.5 g , 20 (1.0 /L:
) 1.88 M ℓ 가 , 60 9 , 50 M ℓ 가
g ^1H - NMR 0.32

^1H - NMR (CDCl_3 (δ =ppm)):1.97(s, 3H), 2.40(s, 3H), 3.54(s, 3H), 3.86(s, 3H), 5.99(d, 2H), 6.25(s, 4H), 6.30 - 6.39(m, 8H), 6.69(t, 1H), 6.97(d, 3H), 7.14(d, 1H), 7.26(d, 2H), 7.26 - 7.37(m, 3H), 7.78 - 7.95(m, 5H)

$\text{C}_{59}\text{H}_{47}\text{N}_2\text{B}$. C: 89.3 % (89.2 %), H: 6.0 % (5.9 %), N: 3.5 % (3.5 %), B: 1.2 % (1.4 %).

m/Z = 794

[59]

[59]

: λ max 568 nm (:)

: λ max 613 nm (:).

[59]

1

616 nm,

3.8 cd/A

< 15 >

1

[53] 50 nm

0.5 nm,

150 nm

5 × 5 mm

622 nm,

2.5 cd/A

< 16 >

[63]

1

609 nm,

1.6 cd/A

< 17 >

[85]

1

628 nm,

1.1 cd/A

< 18 >

1

1,4 -

- 2,5 -

(3,5 -

) - 3,6 -

(4 -)

[3,4 - c]

9 -

- 5H -

(a)

- 5 -

(

610 nm)

가 0.5

%가

25 nm

2,9 -

- 4,7 -

- 1,10 -

(BCP)

25 nm

0.5 nm

150 nm

5 × 5 mm

609 nm,

71 nm

16 V

가

3000 cd/m²

< 19 25, 28 29, 1 >

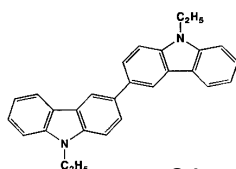
1

18

1

25

HTM1



HTM1

정공수송층	발광층	도판트재료	니켈로메탄 용액중		전하수송층	음극	발광 피크		인가전압	발광휘도
			형광 피크 파장	파장			스펙트럼	(nm)		
실시예 18	4,4'-비스(N-(m-톨릴-N-페닐아미노)비페닐)피롤로[3,4-c]피롤	9-디에틸아미노-5H-벤조(a)페녹사진-5-온	610nm		B C P	Li 0.5nm Ag 150nm	609	71	16	3000
실시예 19	상동	3-에틸-2-[3-(3-에틸-2-페조티아졸리덴)-1-프로페닐]페조티아졸로 요오다이드	596nm		B C P	Li 0.5nm Ag 150nm	602	45	18	1200
실시예 20	상동	4-(디시아노메틸렌)-2-에틸-6-(1,1,7,7-테트라유롤리딘-9-에닐)-4H-피란	625nm		B C P	Li 0.5nm Ag 150nm	609	88	16	1500
실시예 21	상동	화합물[99]	629nm		B C P	Li 0.5nm Ag 150nm	636	33	12	10000
실시예 22	상동	화합물[63]	605nm		B C P	Li 0.5nm Ag 150nm	617	42	16	3000
비교예 1	상동	1,4-디케토-2,5-디에틸-3,6-디페닐피롤로[3,4-c]피롤	605nm		B C P	Li 0.5nm Ag 150nm	609	52	16	900
실시예 23	상동	1,4-디케토-2,5-비스(3,5-디메틸페닐)-3,6-비스(4-메틸페닐)피롤로[3,4-c]피롤	625nm		B C P	Li 0.5nm Ag 150nm	632	40	19	3200
실시예 24	상동	화합물[65]	606nm		B C P	Li 0.5nm Ag 150nm	612	40	17	4200
실시예 25	HTM1	상동	606nm		B C P	Li 0.5nm Ag 150nm	612	40	14	7000
실시예 28	4,4'-비스(N-(m-톨릴-N-페닐아미노)비페닐)피롤로[3,4-c]피롤	화합물[73]	630nm		B C P	Li 0.5nm Ag 150nm	629	38	15	3600
실시예 29	상동	화합물[69]	641nm		B C P	Li 0.5nm Ag 150nm	645	32	17	2900

1 (CuPc) 10 nm 2 HT
 M1 24
 612 nm, 40 nm [65]
 14 V 가 6400 cd/m² .
 < 27>
 [100](619 nm)
 20 nm BCP 5 nm
 18
 629 nm, 28 nm [100] , 14 V
 가 7500 cd/m² .
 < 30 47>
 , , 2 3 27
 . 2 3 .

정공수층	발광층	도판트재료	니콜로메탄 용액 중 용액 피크 피싱	전사수층	음극	발광 피크 파장 (nm)	스펙트럼 결반폭 (nm)	인가전압 (V)	발광휘도 (cd/m ²)		
실시예 27	4,4'-비스(N-(4-톨릴)-N-페닐아미노)비페닐	1,4-디케토-2,5-비스(3,5-디메틸페닐)-3,6-비스(4-페틸페닐)피롤로[3,4-c]피롤	화합물[100]	619nm	호스트재료 20nm	B C P 5nm	U0.5nm A: 150nm	629	28	14	7500
실시예 30	상동	화합물[86]	617nm	호스트재료 20nm	B C P 5nm	상동		628	43	13	9500
실시예 31	상동	1,4-디케토-2,5-비스(3-페틸페닐)-3,6-비스(4-비페닐)피롤로[3,4-c]피롤	화합물[99]	629nm	호스트재료 20nm	B C P 5nm	상동	639	28	14	17000
실시예 32	상동	화합물[100]	619nm	호스트재료 20nm	B C P 5nm	상동		633	28	13	5300
실시예 33	상동	1,4-디케토-2,5-비스(2-페틸페닐)-3,6-비스(2-나프틸)피롤로[3,4-c]피롤	화합물[99]	629nm	호스트재료 20nm	B C P 5nm	상동	642	33	14	27000
실시예 34	상동	1,4-디케토-2,5-비스(3,5-디메틸페닐)-3,6-비스(2-(6-메톡시나프틸))피롤로[3,4-c]피롤	화합물[99]	629nm	호스트재료 20nm	B C P 5nm	상동	637	33	14	10000
실시예 35	상동	1,4-디케토-2,5-비스(3,5-디-tert-부틸페닐)-3,6-비스(2-나프틸)피롤로[3,4-c]피롤	화합물[99]	629nm	호스트재료 20nm	B C P 5nm	상동	637	33	16	35000
실시예 36	상동	1,4-디케토-2,5-비스(3,5-디-tert-부틸페닐)-3,6-비스(4-페틸페닐)피롤로[3,4-c]피롤	화합물[99]	629nm	호스트재료 20nm	B C P 5nm	상동	631	33	15	31000
실시예 37	상동	화합물[86]	617nm	호스트재료 20nm	B C P 5nm	상동		624	43	14	44000

경공수송용	비광용	도판트재료	다클로로메탄 용액 중 형광피크 파장	전자수송용		음극	발광 피크 파장 (nm)	스펙트럼 결반폭 (nm)	인가전압 (V)	발광휘도 (cd/m ²)
실시예 38	4,4'-비스(N-(π -톨릴) -N-페닐아미노)비페 닐	1,4-디케토-2,5-비스(3,5-디-tert-부틸페닐)-3, 6-비스(4-(4-페닐)피롤로[3,4-c]피롤	629nm	호스트재료 20nm	B C P 5nm	L10.5nm A1 150nm	638	33	15	5200
실시예 39	상동	상동	619nm	호스트재료 20nm	B C P 5nm	상동	628	28	16	7500
실시예 40	상동	상동	630nm	호스트재료 20nm	B C P 5nm	상동	628	38	18	2500
실시예 41	상동	상동	630nm	호스트재료 20nm	B C P 5nm	상동	645	32	16	1800
실시예 42	상동	1,4-디케토-2,5-비스(3,5-디-tert-부틸페닐)-3, 6-비스(3-페닐페닐)피롤로[3,4-c]피롤	629nm	호스트재료 20nm	B C P 5nm	상동	631	33	15	2300
실시예 43	상동	1,4-디케토-2,5-비스(3,5-디-tert-부틸페닐)-3, 6-비스(3-페닐페닐)피롤로[3,4-c]피롤	629nm	호스트재료 20nm	B C P 5nm	상동	640	33	15	3400
실시예 44	4,4'-비스(N-(π -톨릴) -N-페닐아미노)비페 닐	1,4-디케토-2,5-비스(3,5-디-tert-부틸페닐)-3, 6-비스(4-클로로페닐)피롤로[3,4-c]피롤	629nm	호스트재료 20nm	B C P 5nm	L10.5nm A1 150nm	640	33	15	4200
실시예 45	상동	1,4-디케토-2,5-비스(3,5-디-tert-부틸페닐)-3, 6-비스(4-(trans-스틸벤)피롤로[3,4-c]피롤	629nm	호스트재료 20nm	B C P 5nm	상동	637	33	17	1900
실시예 46	상동	상동	630nm	호스트재료 20nm	B C P 5nm	상동	630	38	22	1200
실시예 47	상동	상동	641nm	호스트재료 20nm	B C P 5nm	상동	648	32	18	1100

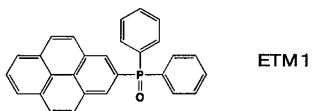
1,4 - 2,5 - (2 -) - 3,6 - (4 -) [3,4 - c]
 21 33 nm [99] , 13 V 가 639 nm, 2000 cd/m² .

< 49 >

1,4 - 2,5 - (3,5 -) - 3,6 - (4 -) [3,4 - c] ,
 [1](613 nm) 28
 618 nm, 48 nm [1]
 , 14 V 가 8000 cd/m² .

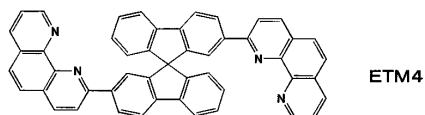
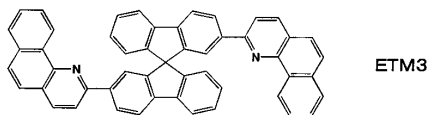
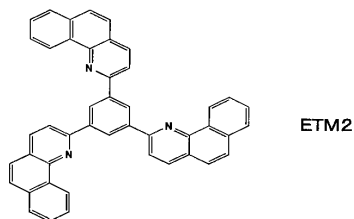
< 50 >

1 CuPc 10 nm 2 N,N' - - N,N' -
 (- 1 -) - 1,1' - - 4,4' - (α - NPD) 50 nm
 ETM1 49
 ETM1 5.99 eV ((AC - 1: ())
), 401 , 618 nm, 48 nm [1]
 , 15 V 가 9000 cd/m² .



< 51 53 >

4 49
 4 4 ETM2, ETM3, ETM4 .



정공수송층	면적층 면적	도펀트 재료	도펀트 재료 농도	전지수송층	이온화 포텐셜	분자량 Tg (°C)	음극 막	필광 피크 파장 (nm)	소배트럼 절반폭 (nm)	인가전압 (V)	발광면적 (cm^2)
실시예 49	4,4'-비스(N- α -톨릴)-N- α -톨릴아미노)비페닐 [3, 4-c]	1, 4-디케토-2, 5-비스(3, 5-디메틸페닐)-3, 6-비스(4-에틸페닐) 피롤로	화합물 [1]	BCP	5.85eV	360 $\leq$ 77	L10.5nm Al150nm	618	48	14	8000
실시예 51	상동	상동	상동	ETM2	5.97eV	609	112 상동	618	48	15	8000
실시예 52	상동	상동	상동	ETM3	6.07eV	670	185 상동	618	48	15	10000
실시예 53	상동	상동	상동	ETM4	6.07eV	672	219 상동	618	48	14	11000
실시예 54	상동	1, 4-디케토-2, 5-디메틸-3, 6-비스(1-나프틸) 피롤로 [3, 4-c] 피롤	화합물 [53]	ETM4	6.07eV	672	219 상동	615	43	14	12000
실시예 55	상동	1, 4-디케토-2, 5-디메틸-3, 6-비스(1-나프틸) 피롤로 [3, 4-c] 피롤	화합물 [53]	ETM4	6.07eV	672	219 상동	615	43	15	16000
실시예 56	상동	1, 4-디케토-2, 5-비스(4-메틸페닐)-3, 6-비스(4-p-톨릴나프틸렌-1-일) 피롤로 [3, 4-c] 피롤	화합물 [53]	ETM4	6.07eV	672	219 상동	616	43	13	9000
실시예 57	상동	1, 4-디케토-2, 5-디메틸-3, 6-비스(4-p-톨릴나프틸렌-1-일) 피롤로 [3, 4-c] 피롤	화합물 [53]	ETM4	6.07eV	672	219 상동	616	43	15	15000

1,4 - - 2,5 - - 3,6 - (1 -) [3,4 - c]

- t - 7.3 g t - 36 Mℓ , 90 1 - 10 g 가
 , 6.7 Mℓ 2 가 , 60 30 Mℓ,
 4.4 Mℓ 가 30 . ,
 2.89 g DMF 80 Mℓ - t - 2.1 g 가 1 .
 1.5 Mℓ 가 , 65 . 50 Mℓ 가 ,
 , 1.5 g . ¹H - NMR

¹H - NMR (CDCl₃ (δ =ppm)): 0.93(tt, 6H), 3.35(qq, 2H), 3.70(qq, 2H), 7.58 - 7.68(m, 6H), 7.76(t, 2H), 7.90(m, 4H), 8.02(d, 2H)

$C_{30}H_{24}N_2O_2$. C: 81.2 %(81.1 %), H: 5.3 %(5.4 %), N: 6.3 %(6.3 %), O:7.2 %(7.2 %).

m/Z=444 . 1,4
 - - 2,5 - - 3,6 - (1 -) [3,4 - c]
 , 1,4 - - 2,5 - - 3,6 - (1 -) [3,4 - c] ,
 [53] 53
 615 nm, 43 nm [53] , 14 V 가
 12000 cd/m² .

< 55 >

1,4 - - 2,5 - - 3,6 - (1 -) [3,4 - c]
 54 . 615 nm, 43 nm
 [53] , 15 V 가 16000 cd/m² .

< 56 >

1,4 - - 2,5 - (4 -) - 3,6 - (4 - p - - 1 -) [3,4 - c]

1 - 4 - p - - 1 - , 4 -
 54 . 1.2 g . ¹H - NMR

¹H - NMR (CDCl₃ (δ =ppm)):2.20(s, 6H), 2.49(s, 6H), 4.38(t, 2H), 4.93(t, 2H), 6.69(t, 4H), 6.88(t, 4H), 7.35(d, 4H), 7.42 - 7.64(m, 12H), 8.00(t, 4H)

$C_{56}H_{44}N_2O_2$. C: 86.6 %(86.6 %), H: 5.7 %(5.7 %), N: 3.5 %(3.6 %), O:4.1 %(4.1 %).

m/Z=776 .
 1,4 - - 2,5 - (4 -) - 3,6 - (4 - p - - 1 -) [3,4 - c]
 , 1,4 - - 2,5 - (4 -) - 3,6 - (4 - p - - 1 -) [3,4 - c]
 54
 616 nm, 43 nm [53] , 13 V 가
 9000 cd/m² .

< 57 >

1,4 - 2,5 - 3,6 - (4 - p - 1 -) [3,4 - c]

1 - 4 - p - 1 - , 1.4 g ¹H - NMR¹H - NMR (CDCl₃ (δ = ppm)): 2.49(s, 6H), 3.05(s, 6H), 7.35(d, 4H), 7.44 - 7.65(m, 10H), 7.98(d, 2H), 8.02(dd, 4H)C₄₂ H₃₂ N₂ O₂ . C: 84.6 % (84.6 %), H: 5.4 % (5.4 %), N: 4.7 % (4.7 %), O: 5.3 % (5.4 %).

1,4 - 2,5 - 3,6 - (4 - p - 1 -) [3,4 - c] m/Z=596 .

1,4 - 2,5 - 3,6 - (4 - p - 1 -) [3,4 - c] 54 616 nm, 43 nm [53] 15 V 가 15000 cd/m² .

< 58 >

1,4 - 2,5 - 3 - (1 -) - 6 - (3,5 - (1 -)) [3,4 - c] ,

[1] 54 616 nm, 48 nm [1] 13 V 가 9000 cd/m² .

< 59 >

1,4 - 2,5 - (4 -) - 3,6 - (1 -) [3,4 - c]

1 - 1 - , 4 - 54 0.9 g ¹H - NMR¹H - NMR (CDCl₃ (δ = ppm)): 2.18(ss, 6H), 4.40(t, 2H), 4.90(t, 2H), 6.64(t, 4H), 6.79(t, 4H), 7.62 - 7.86(m, 12H), 7.96(t, 2H), 8.79(t, 4H)C₅₀ H₃₆ N₂ O₂ . C: 86.3 % (86.2 %), H: 5.2 % (5.2 %), N: 3.9 % (4.0 %), O: 4.5 % (4.6 %).

1,4 - 2,5 - (4 -) - 3,6 - (1 -) [3,4 - c] m/Z=696 .

1,4 - 2,5 - (4 -) - 3,6 - (1 -) [3,4 - c] 54 616 nm, 43 nm [53] 15 V 가 130000 cd/m² .

< 60>

54 1,4 - - 2,5 - - 3,6 - (1 -) [3,4 - c] 616 nm, 43 nm
[53] , 14 V 가 17000 cd/m² .

	정공수층	발광층				전자수층				음극	발광 피크 파장 (nm)	스펙트럼 선반폭 (nm)	인가전압 (V)	발광면적도 (cdm ²)
		호스트 재료	도판트재료	다블로로메탄 형광 피크 파장	유액층	ETM4	이온화 포텐셜	문자량 Tg (°C)						
실시에 5 8	4,4'-비스(N-(4-톨릴)-N-페닐아미노)비페닐	1,4-디케토-2,5-디메틸-3-(1-나프틸)-6-(3,5-비스(1-나프틸)페닐)피롤로[3,4-c]피롤	화합물 [I]	613nm		ETM4	6.07ev	672	219	상등	616	48	13	9000
실시에 5 9	상등	1,4-디케토-2,5-비스(4-메틸벤질)-3,6-비스(1-페난트릴)피롤로[3,4-c]피롤	화합물 [53]	613nm		ETM4	6.07ev	672	219	상등	616	43	15	13000
실시에 6 0	상등	1,4-디케토-2,5-디메틸-3,6-비스(1-페난트릴)피롤로[3,4-c]피롤	화합물 [53]	613nm		ETM4	6.07ev	672	219	상등	616	43	14	17000

(5,7 - - 8 -) (III) 1
613 nm, 3.2 cd/A

< 2 >

[86] 61
627 nm, 1.0 cd/A

< 62 >

ITO 150 nm (() , $15\Omega/\square$,) 30×40 mm
300 μm (pitch) (270 μm) $\times 32$
가 . ITO 1.27 mm (800 μm) , " 56" 15 ,
(超純水) . 15 가 15
1 UV - ,
가 5×10^{-4} Pa 가 , TPD 100 nm .
1,4 - - 2,5 - (3,5 -) - 3,6 - (4 -) [3,4 - c]
[1] 가 0.6 %가 50 nm ETM2 50
nm 50 μm 16 250 μm (50
 μm , 300 μm) ITO , I
TO 50 nm, 150 nm 3
 2×16 가 가 .

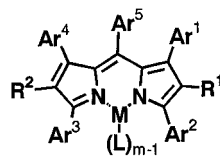
가 . ,

(57)

1.

1 .

< 1 >

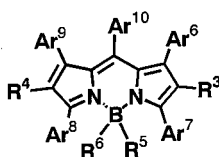


R^1, R^2 L ; M m가
; Ar⁻¹ A
 r^5

2.

$$1 \quad , \quad 2 \quad .$$

< 2>



R^3 R^6

10

$;$ Ar^6 Ar

3.

$$1 \quad , \quad 1 \quad \text{Ar}^1 \quad \text{Ar}^4 \quad 4$$

4.

$$2, \quad R^5, R^6.$$

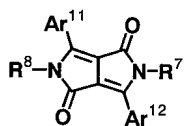
5.

6.

(a) (b) 1, 580 nm 720 nm

(a)	3	[3,4 - c]	580 nm	720 nm
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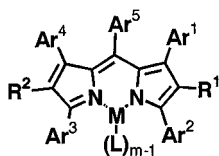
< 3>



[R^9 , R^{10} , R^7 , R^8], 1, 25, 4, 1, 4, 1, 3, (R^9 , R^{10}), Ar^{13} , Ar^{11} , Ar^{12} , $n = 0, 4$];

(b) 1

< 1 >



[R^1 , R^2 , L], M , m , Ar^5 , Ar^1 , Ar^2 , Ar^3 , Ar^4 , Ar^5 , R^1 , R^2 , L , M , m , Ar];

7.

6, [3,4 - c], 가

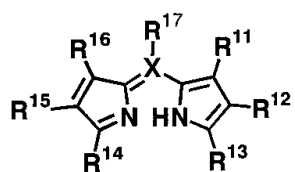
8.

7, [3,4 - c] 가

9.

6, 5

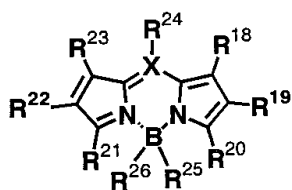
< 5 >


$$R^{11}, R^{17}$$
$$\begin{matrix} & & & & & & & & & & \\ & & & & & & & & & & \\ & & & & & & & & & & \\ & & & & & & & & & & \\ & & & & & & & & & & \\ & & & & & & & & & & \\ & & & & & & & & & & \\ & & & & & & & & & & \\ & & & & & & & & & & \\ & & & & & & & & & & \end{matrix}$$
$$R^{17}$$
$$X$$
$$1$$

10.

9 , 가 6 .

< 6>

[illegible]

11.

6 , 1

专利名称(译)	PYROMETHENE METAL COMPLEX , 使用相同的发光装置材料 ,		
公开(公告)号	KR1020020082801A	公开(公告)日	2002-10-31
申请号	KR1020020022535	申请日	2002-04-24
[标]申请(专利权)人(译)	东丽株式会社		
申请(专利权)人(译)	东丽有限公司卡布隆		
当前申请(专利权)人(译)	东丽有限公司卡布隆		
[标]发明人	MURASE SEIICHIRO 무라세세이찌로 TOMINAGA TSUYOSHI 도미나가쓰요시 KOHAMA AKIRA 고하마아끼라		
发明人	무라세,세이찌로 도미나가,쓰요시 고하마,아끼라		
IPC分类号	C09K11/06 C07F5/02		
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优先权	2001127311 2001-04-25 JP 2001158325 2001-05-28 JP		
其他公开文献	KR100856981B1		
外部链接	Espacenet		

摘要(译)

本发明涉及可用作荧光染料的亚甲基吡咯金属配合物和使用其的发光装置。本发明还涉及一种通过电能发光的装置，其中发光物质存在于阳极和阴极之间，并且发射发射峰值波长为580nm或更大且720nm或更小的光并形成二酮吡咯并[吡咯衍生物和荧光峰值波长为580nm以上且720nm以下的有机荧光材料，或含有吡咯金属金属络合物的发光元件材料。指数方面 Pyromethene金属配合物，发光器件，吡咯衍生物，有机荧光物质

