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(12)

(KR)
(A)

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(43)

2003-0038441
2003 05 16

(21) 10-2002-0068305
(22) 2002 11 06

(30) JP-P-2001-00344385 2001 11 09 (JP)

(71) 가 가 1 26 2

(72) ,
191-8511 1 가 가
191-8511 1 가 가
,
191-8511 1 가 가

(74)

:

(54)

,

.

(cathode), (host) (dopant),

1 1 ,

,

1 , 500 2000 , 415 nm ,
(H+F) (F) (F/(H+F))가 0 0.9 1 .

, , , ,

1 .

2 .

< >

1: 2:

3: 5:

6: 20:

21: 22:

23: 24:

25, 26: 27:

,

.

' EL') (, ' EL') . ELD (, EL EL

, V () , 가 , (,) , 가 , ,

, EL EL

3093796 ,

, 8- ()63-264692), 8- ()3-255190)가 . ,

, 가 1:3

25 % , 20 % (η_{ext})
) 5 %가 , EL 가
 (M.A.Baldo et al., nature, 395 , 151-154 (1998)),
 (, M.A.Baldo et al., nature, 403 , 17 , 750-753 (2000), 6,097,147).
 100 %가
 가 4 가 , 가 .

[The 10th International Workshop on Inorganic and Organic Electroluminescence (EL '00,)]

가 (Ikai)
 . (M.E.Tompson)
 . (Tsutsui) ()
 , [Appl. Phys. Lett.,79 , 156 (2001)] , ()

EL .

1. (cathode), (host) (dopant) ,

1 1 ,

1 , 500 2000 , 415 nm
 (H+F) (F) (F/(H+F))가 0 0.9 1 ,

2. 1 , 1 700 2000 .

3. 1 , 1 (F/(H+F)) 가 0.1 0.7 .

4. 1 , 1 400 nm .

5. 1 , 1 .

6. 1 , 415 nm .

7. 6 , 400 nm .

8. 1 , (anode) , 1
 2 가 , 2 2 .

9. 8 , 2 415 nm .

10. , ,

500 2000 1 1 415 nm , 1 (H
+F) (F) (F/(H+F))가 0 0.9 1 ,
.
11. 2 ,
(cathode),
1 500 2000 1 1 415 nm ,
(H+F) (F) (F/(H+F))가 0 0.9 1 ,
.
12. 1 , 1 , 1 500 2000 , 415 nm
(H+F) (F) (F/(H+F))가 0 0.9
.
13. 8 , 2 , 2 415 nm
.
,
.
1 1
1 (F/(H+F))가 , , ,
.
가 가 415 nm , 500 2000 ,)
가 0 0.9 (,
.
700 2000 , , 400 nm ,
0.7 , 415 nm 0.1
0 nm 1 2 2 , 40
415 nm .
100 nm
1 1 ,
() ,
()) , () 가 ()
()
EL , ()
()
2 , 2
2 ,
2
가 2 , A 2 , B 2 () ,
A:B=10:90 A , B .

A, B, C 3, A:B:C=5:10:85 A, B, C .

0.001 50 % 50

100 % .

가 가 가 415 nm .

2 EL, 2 EL 가

10 nm 3 EL, 400 700 nm

), 500 570 nm (), 570 680 nm () 430 480 nm (.

EL ,

(i) / / /

(ii) / / / /

(iii) / / / / /

(iv) / / / / / /

(v) / / / / / / /

EL 가 (4 eV) , , Au , CuI, (ITO),

SnO₂, ZnO , IDIXO(In₂O₃-ZnO)

(100 μm),

Ω/□ 10 200 nm 10 % , 10

1000 nm, 10 200 nm .

가 (4 eV) (), ,

(Al₂O₃) , / , / , / , /

2 (Al₂O₃)

Ω/□ ,

10 1000 nm, 50 200 nm

EL .

(1998 11 30 . .)' 2 2 ' (123 EL 166)

() () .

() ()9-45479 , ()9-260062 , ()8-288069
()

() ()6-325871 , ()9-17574 , ()10-74586

() , 0.1 100 nm

()11-204258 , ()11-204359 , ' EL (1998 11 30 . .
)' 237 ()

가

가

EL

415 nm

가
가
가

가

(LUMO)

(HOMO)

(LUMO)

(HOMO)

가

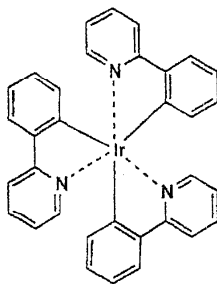
25

0.001

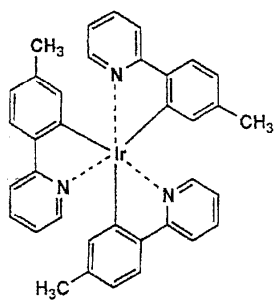
VIII

[Inorg. Chem. 40 , 1704-1711]

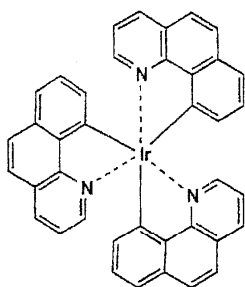
Ir-1



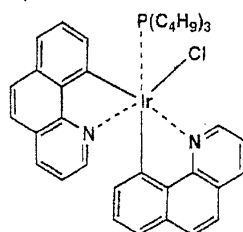
Ir-2



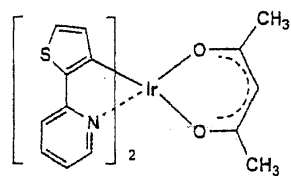
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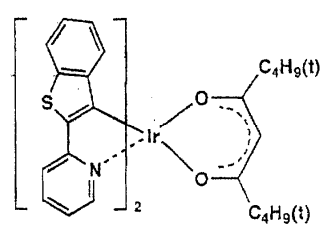
Ir-4



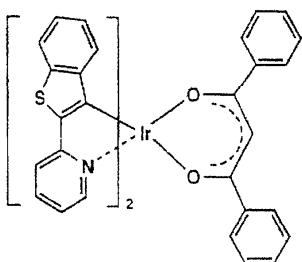
Ir-5



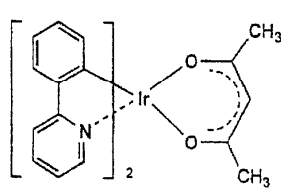
Ir-6



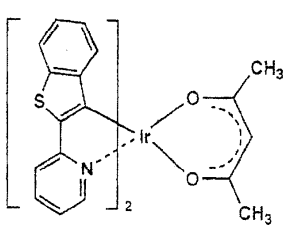
Ir-7



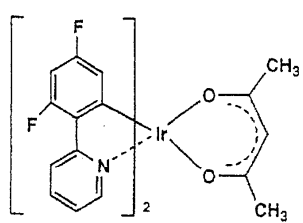
Ir-8



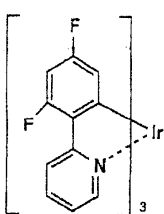
Ir-9



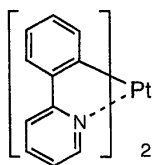
Ir-10



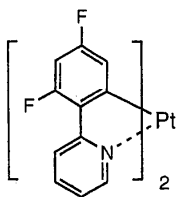
Ir-11



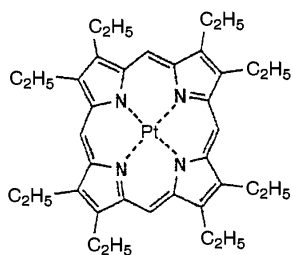
Pt-1



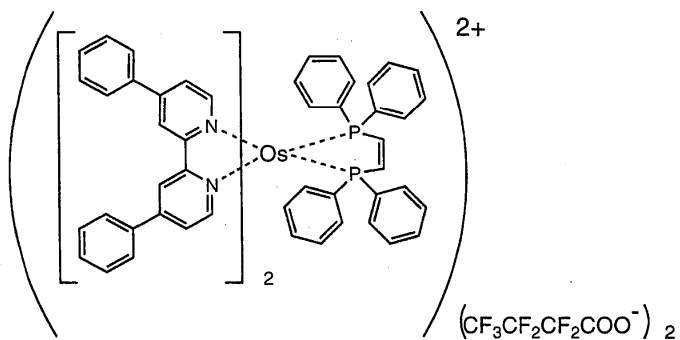
Pt-2



Pt-3

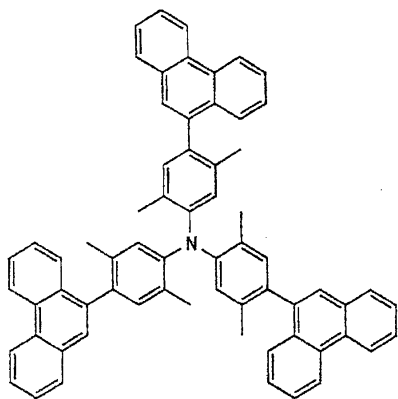


A-1

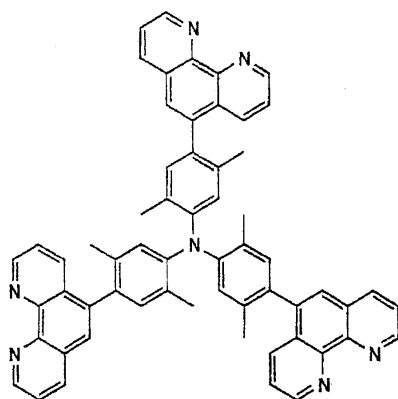


가 , 400 nm , 415 nm
 , BGR 가 .
 , 415 nm , π , $\pi - \pi$ 420 nm
 m (, HOMO-LUMO)
 EL
 ,
 ,
)가 , Tg (
 , π (, t-)
 , 가 Tg가 , Tg가
 Tg , , Tg가 ,
 , ,

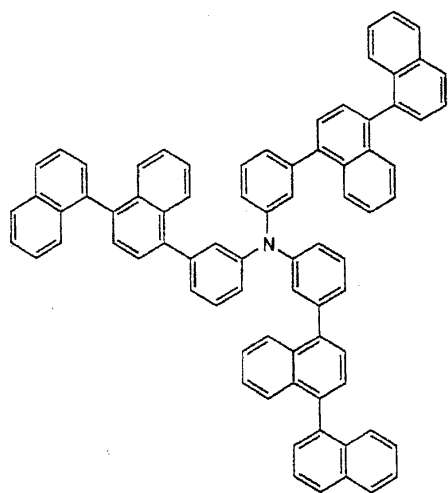
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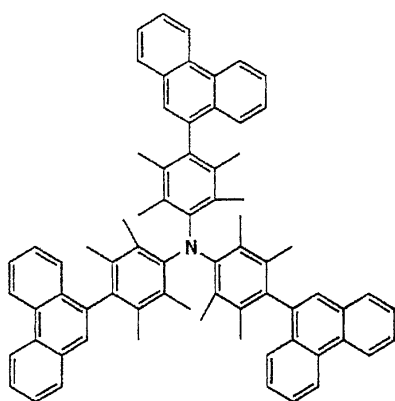
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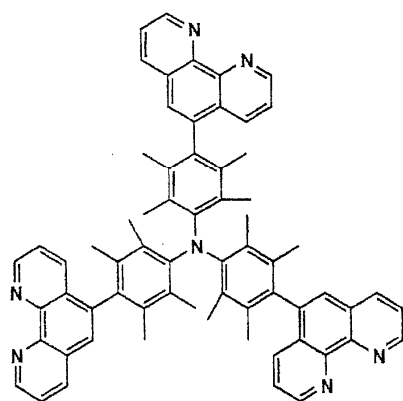
2-3



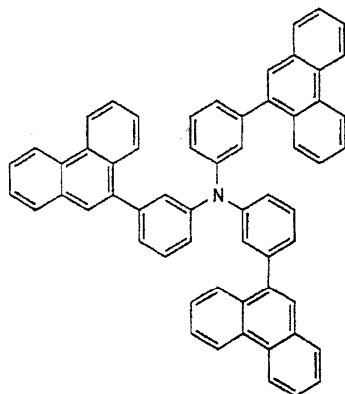
2-4



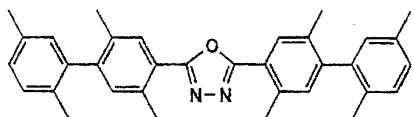
2-5



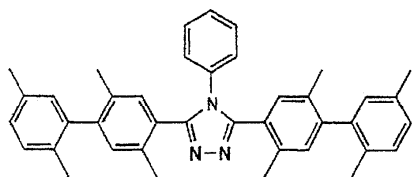
2-6



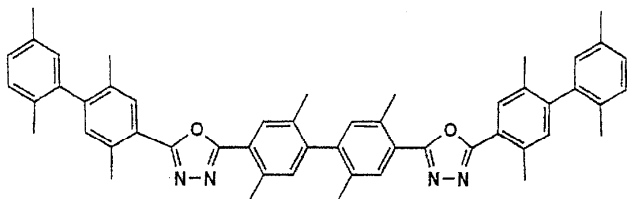
2-7



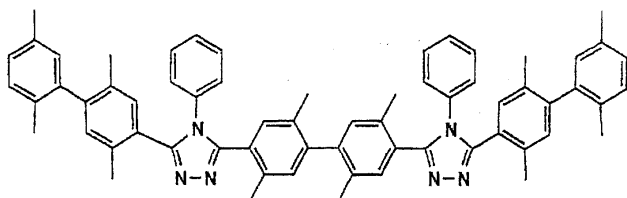
2-8



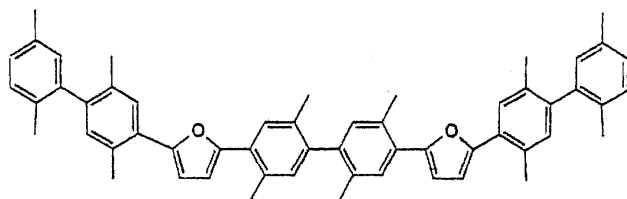
2-9



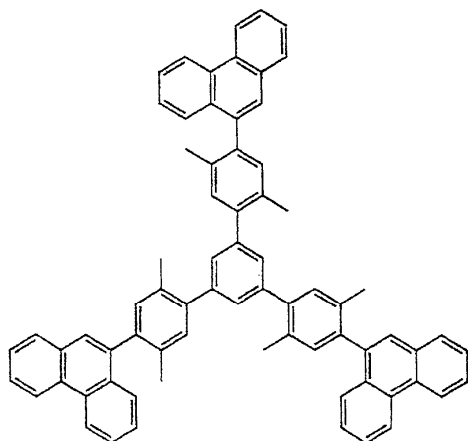
2-10



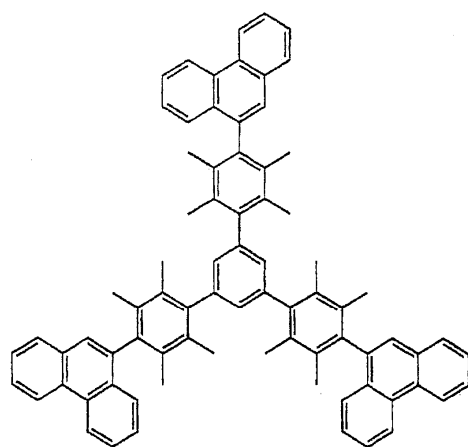
2-11



2-12



2-13



()

EL

3

3

³
 -N,N'- (3-) - [1,1'-] -4,4'-
 (4- -p-) ; N,N,N',N'-
) -4- ; (4-
 ; N,N'- -N,N'- (4-) -4,4'-
 ; 4,4'- () ; N,N,N'-
)] ; 4-N,N- - (2-
 5,061,569
 4,4'- [N-(1-) -N-]
 3
 (MTDATA)

, N,N,N',N'- -4,4'- ; N,N'-
 (TPD); 2,2- (4- -p-) ; 1,1-
 -p- -4,4'- ; 1,1- (4- -p-
 -2-) ; (4- -p-)
 ; N,N,N',N'- -4,4'-
 (p-) ; 4-(-p-) -4'-[4-(-p-
) ; 3- -4'-N,N- ; N-
 2
 (NPD), () 4-308688
 4,4',4''- [N-(3-) -N-]

, p-Si, p-SiC

가 415 nm, Tg가

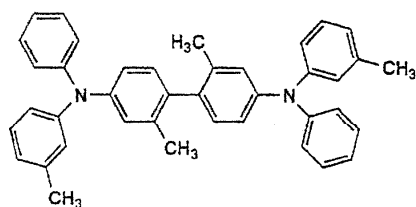
π (, t-)

가 Tg가 Tg

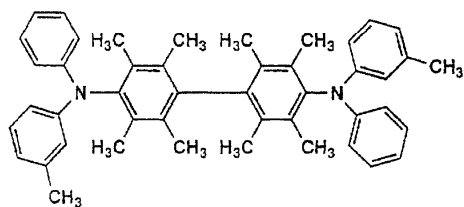
가

(,)

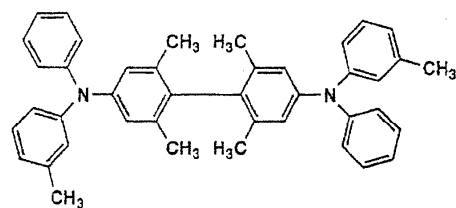
3-1



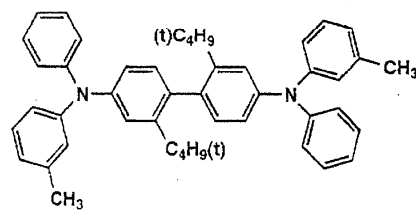
3-2



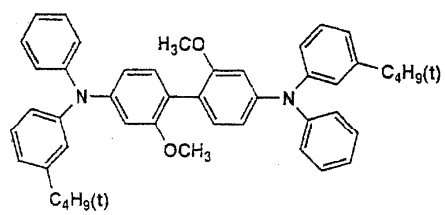
3-3



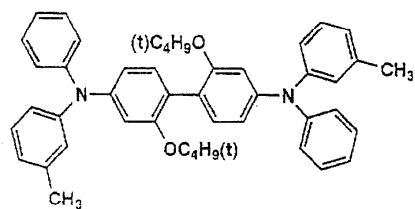
3-4



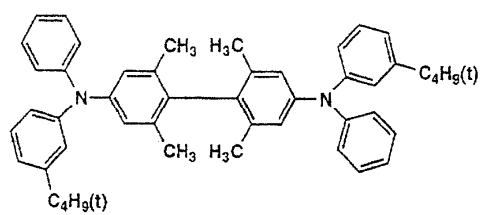
3-5



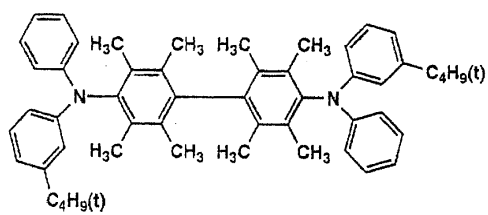
3-6



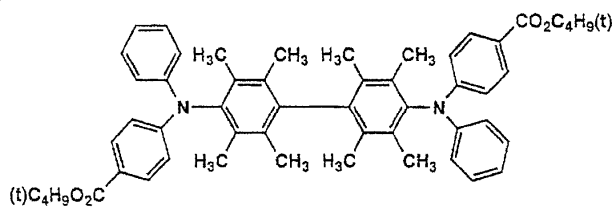
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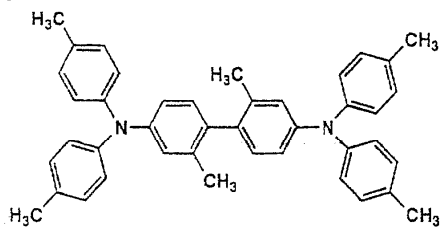
3-8



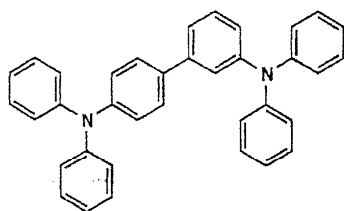
3-9



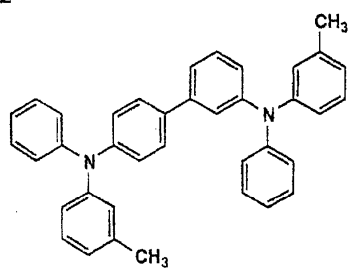
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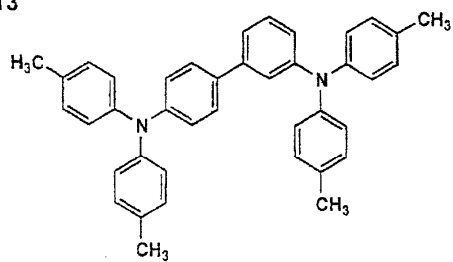
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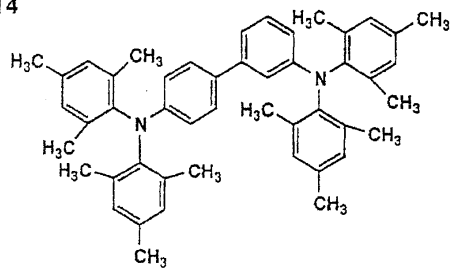
3-12



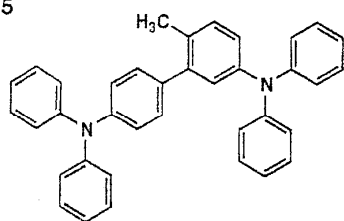
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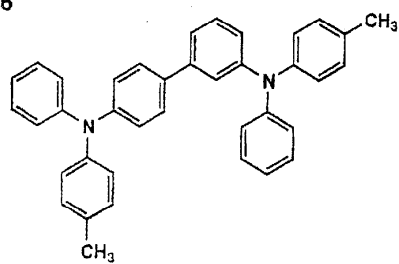
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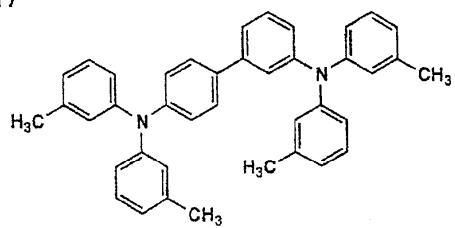
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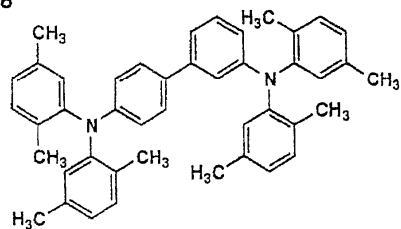
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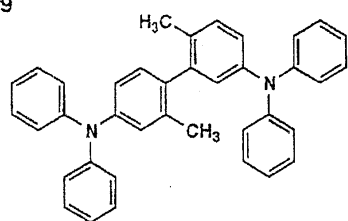
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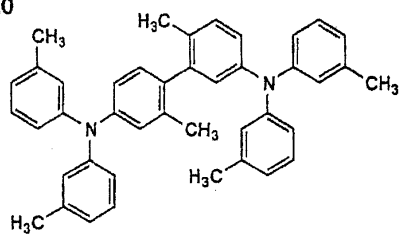
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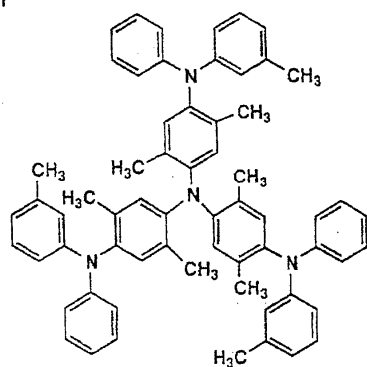
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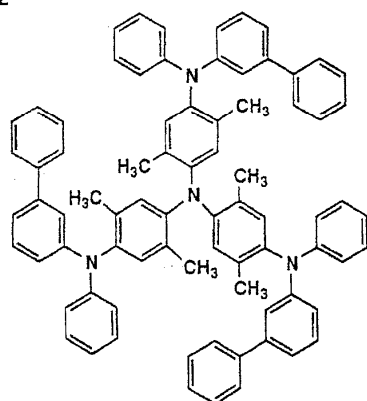
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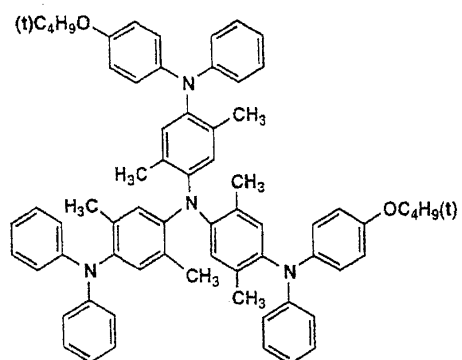
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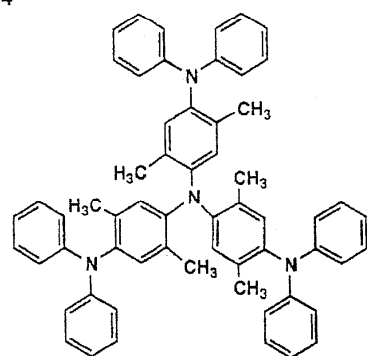
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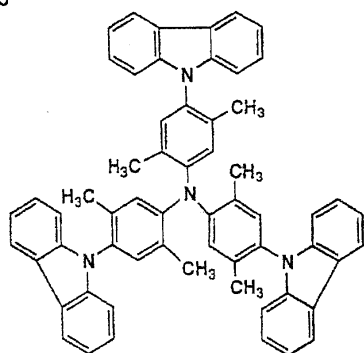
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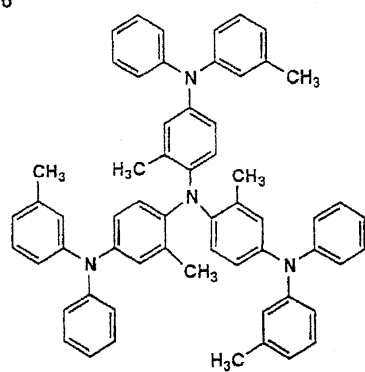
3-24



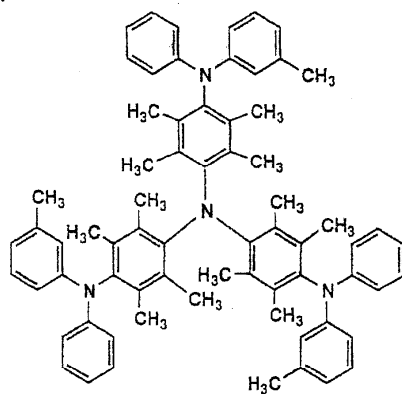
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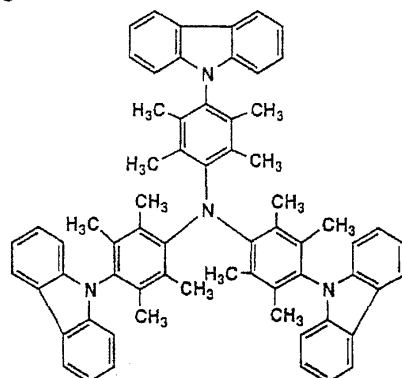
3-26



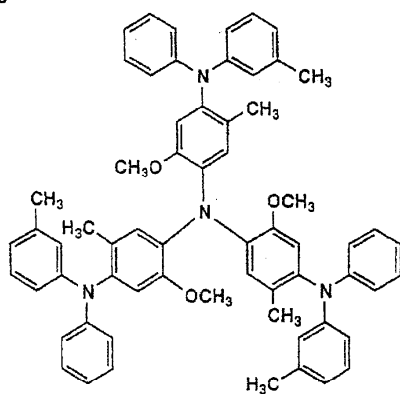
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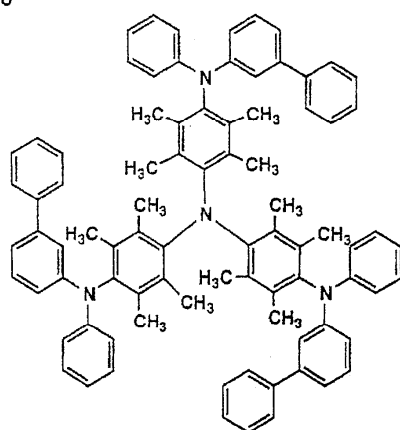
3-28



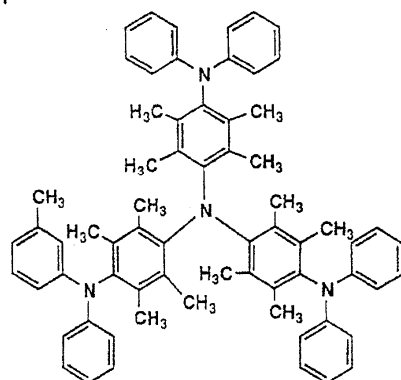
3-29



3-30



3-31



5000 nm

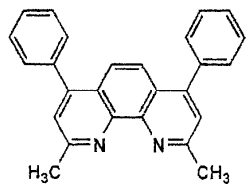
, , , , LB , 5

1 2

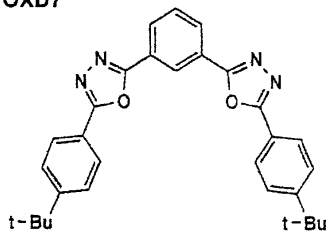
() ,

() ,

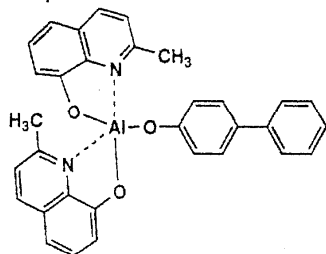
BCP



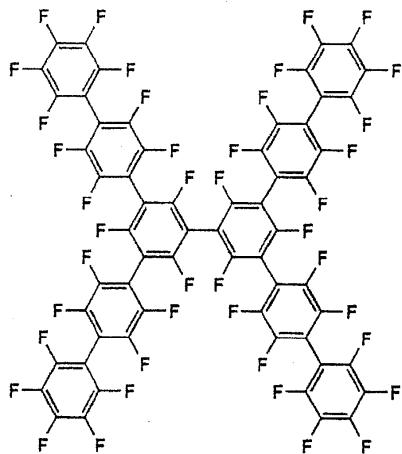
OXD7



BAIq

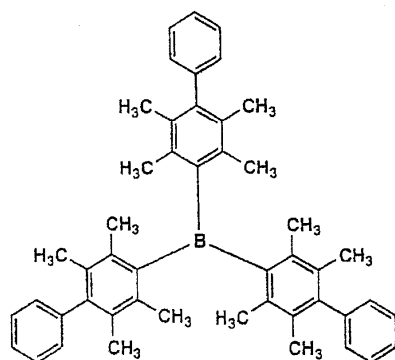


CF-X

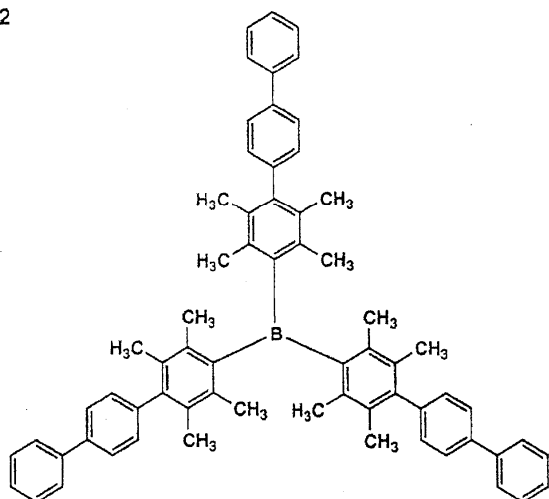


() 1 415 nm , 500 2000 ,
(F/(H+F))가 0 0.9 (,)

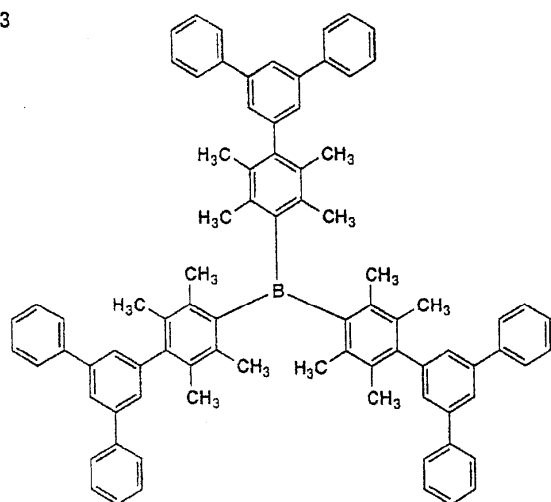
1



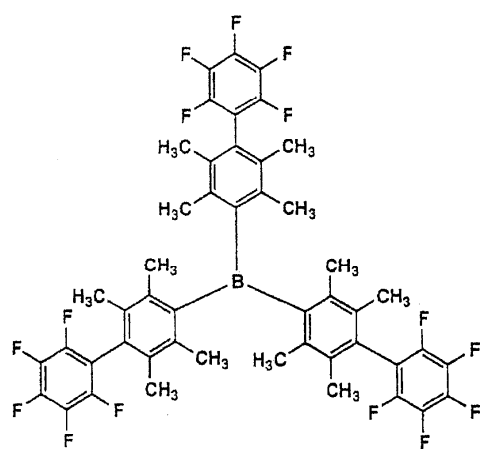
2



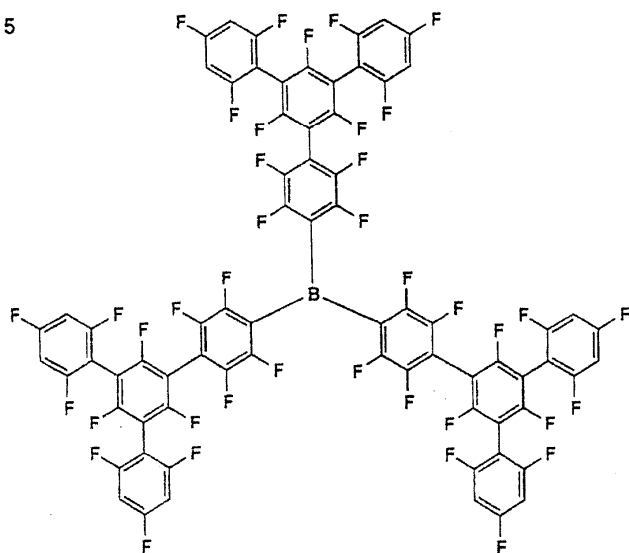
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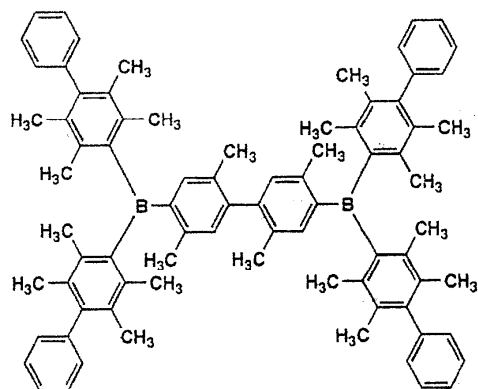
4



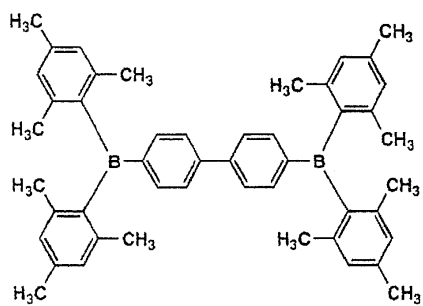
5



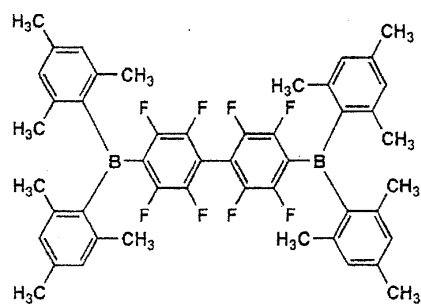
6



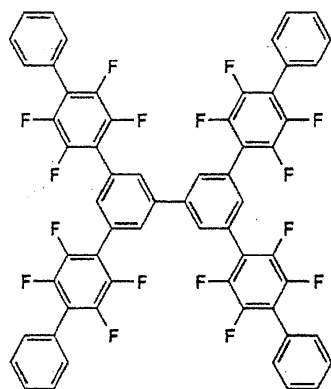
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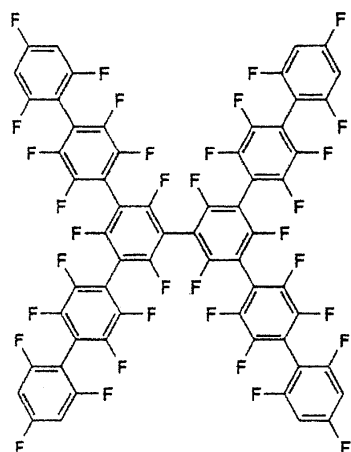
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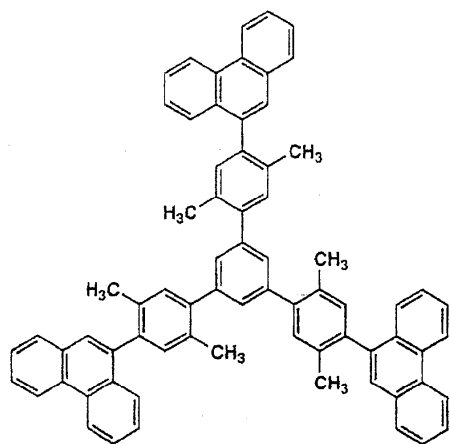
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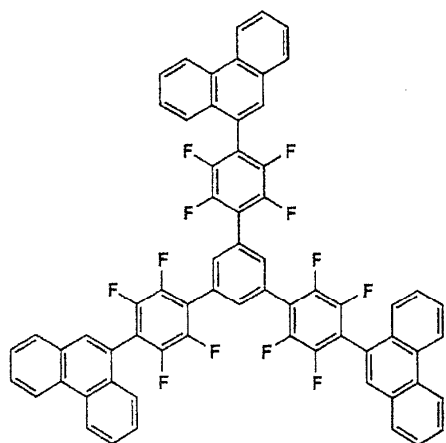
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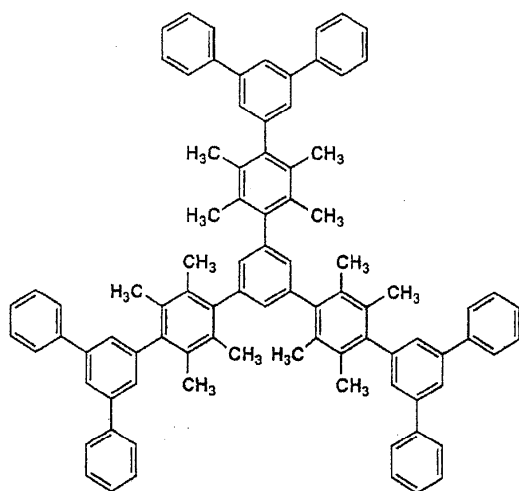
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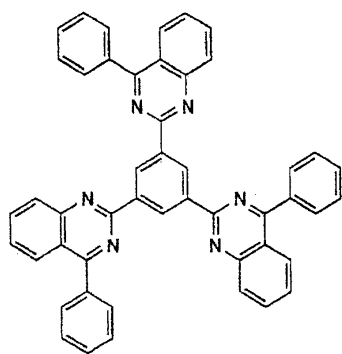
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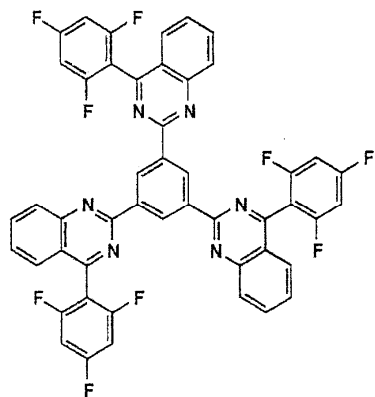
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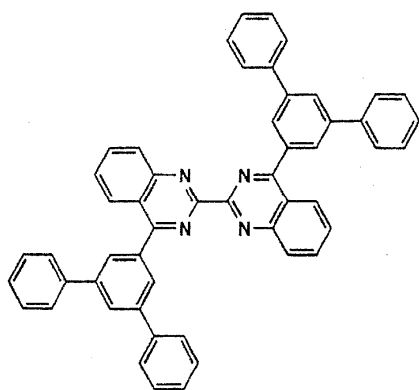
14



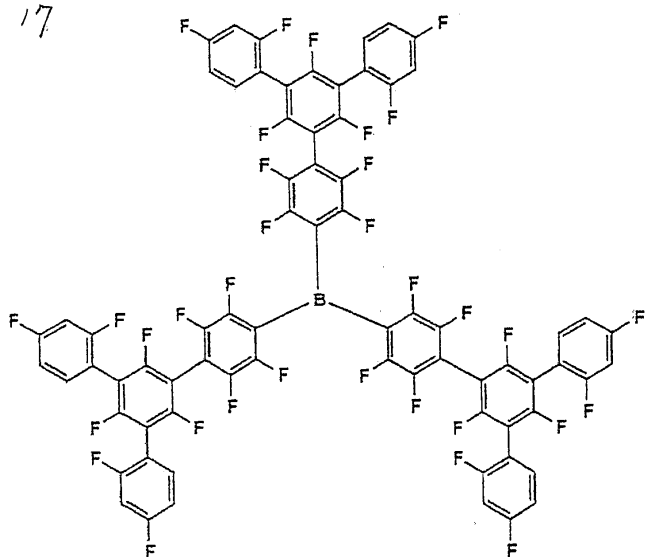
15



16



17



EL

, 1

가 50 %

90 %

EL

EL 가

(PET), (PEN), (PES (PC)

(TAC), (CAP)

(%) EL 1 % , 2 % EL

×100

2 EL / EL / EL / EL

1 μm 10 200 nm 가

0.01 50 nm/ , -50 300 가 50 450 , 10⁻⁶ 10⁻² Pa 0.1 nm 5 μm

가 1 μm , 50 200 nm EL

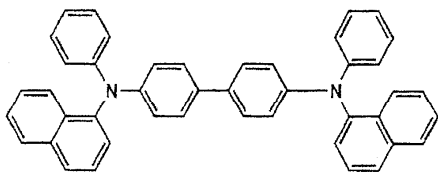
EL 1 가

가

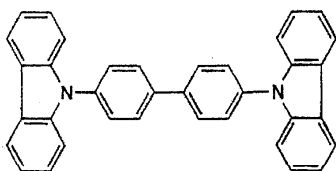
(shadow)

가

α -NPD



CBP



[가]

()

EL No.1 , EL No.1-1 3 V 가 23 , 가 9 V 가
CS-1000 100
EL () 1 .

()

, EL No.1 23 , 가 EL , 가 100 cd/m² () , 가 100

[1]

유기 EL 소자 No.	제1 전자 수송층(정공 거지층을 겸함)				발광층		정공 수송층		평가		비고
	화합물	λ_{max} (nm)	분자량	F(H+F)	화합물	λ_{max} (nm)	화합물	λ_{max} (nm)	발광휘도 (상대치)	수명 (상대치)	
1	BCP	398	360	0	CBP	405	α -NPD	440	100	100	비교
2	OXD7	375	478	0	CBP	405	α -NPD	440	114	109	비교
3	BAlq	492	512	0	CBP	405	α -NPD	440	60	835	비교
4	CF-X		1518	1	TCTA	390	α -NPD	440	125	111	비교
5	1	401	639	0	CBP	405	α -NPD	440	123	745	본발명
6	3	401	1095	0	CBP	405	α -NPD	440	121	856	본발명
7	4	398	909	0.29	CBP	405	α -NPD	440	130	1024	본발명
8	4	398	909	0.29	TCTA	390	α -NPD	440	150	1147	본발명
9	4	398	909	0.29	2-12	395	α -NPD	440	148	1130	본발명
10	4	398	909	0.29	CBP	405	3-21	393	172	1130	본발명
11	4	398	909	0.29	CBP	405	3-1	385	165	1112	본발명
12	5	395	1629	0.29	CBP	405	α -NPD	440	130	895	본발명
13	11	395	919	0	CBP	405	α -NPD	440	114	865	본발명
14	11	395	919	0	TCTA	390	α -NPD	440	131	997	본발명
15	11	395	919	0	2-12	395	α -NPD	440	129	989	본발명
16	11	395	919	0	CBP	405	3-21	393	152	1034	본발명
17	11	395	919	0	CBP	405	3-1	385	149	1007	본발명
18	14	415	691	0	CBP	405	α -NPD	440	111	798	본발명
19	17	403	1521	0.64	CBP	405	α -NPD	440	120	1104	본발명

λ_{max} : 형광극대 파장

1, EL No.1, 2, EL No.3, EL No.4, F
가, F/(H+F)가, 415 nm, 가
Ir-10 Ir-1 Ir-9 EL No.1 16 EL
, Ir-1, Ir-9
< 2>
[]
()
ITO 200 nm (30 $\Omega/\square$)
3-21 60 nm TCTA Ir-10 (
(TCTA:Ir-10=97:3) 40 nm

3, 4 30 nm Alq
20 nm
()

, TCTA Ir-1 () α - NPD 30 nm
(TCTA:Ir-1=97:3) 20 nm ,

3, 4 30 nm Alq
20 nm
()

, Bebq DCMII α - NPD 40 nm
(Bebq:DCMII =97:3) 30 nm ,

3, 4 30 nm Alq
30 nm

LiF 0.5 nm

Al 200 nm , ,

, ,

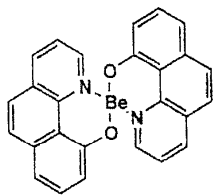
4: 398 nm;

: 460 nm;

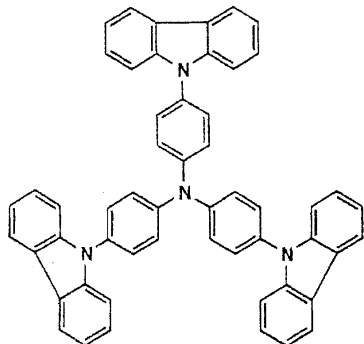
: 525 nm;

: 645 nm .

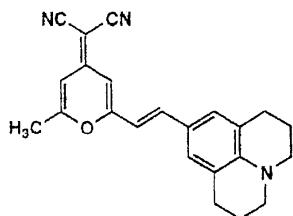
Bebq



TCTA



DCMII



1 (5) (6) (101) (2) (3) (1) (5) (3) (6) (3) (6) (3) (5) EL (5) 가 가 (6) 가 가 가

< 3> , 2 (1) ITO 200 nm (20) (30 Ω/□) (20) TCTA 3-21 60 nm (21) (TCTA:Ir-10=97:3) 33 nm (22) TCTA Ir-10 () (TCTA:Ir-10=97:3) 33 nm (23) TCTA Ir-1 () (TCTA:Ir-1=97:3) 33 nm (24) TCTA Ir-9 () (TCTA:Ir-9=97:3) 33 nm (25) 4 Alq₃ 20 nm 30 nm (26)

, Al 200 nm (27) , 2
 .
 ,
 : 440 nm;
 : 510 nm;
 : 580 nm .

가 가 가 . 3-21, 4, Alq₃ , LiF
 2 , .

, , ,

(57)

1.
 (cathode), (host) (dopant) ,
 1 1 ,
 ,
 1 , 500 2000 , 415 nm
 (H+F) (F) (F/(H+F))가 0 0.9 1 ,
 .
2.
 1 , 1 700 2000 .
3.
 1 , 1 (F/(H+F)) 가 0.1 0.7 .
4.
 1 , 1 400 nm .
5.
 1 , 1 .
6.
 1 , 415 nm .
7.
 6 , 400 nm .
8.
 1 , (anode) , 1
 2 가 , 2 2 .

9.

8, 2 415 nm .

10.

, , , 1 1 1 (H
+F) 500 2000 (F) (F/(H+F))가 0 415 nm 0.9 1 ,

11.

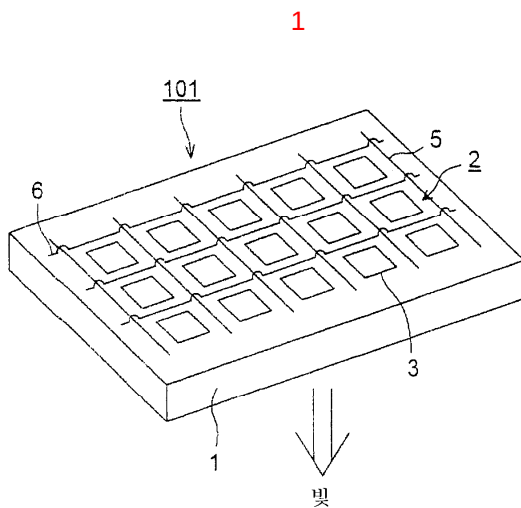
2 ,
(cathode),
1 1 1 , ,
1 (H+F) 500 2000 (F) (F/(H+F))가 0 415 nm 0.9 1 ,

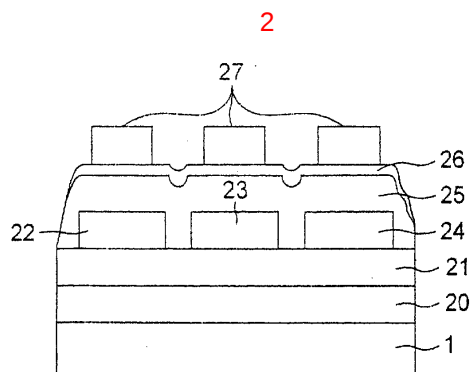
12.

1 , 1 , 1 500 2000 , 415 nm
(H+F) (F) (F/(H+F))가 0 0.9

13.

8 , 2 , 2 415 nm





专利名称(译)	有机电致发光器件和显示器件		
公开(公告)号	KR1020030038441A	公开(公告)日	2003-05-16
申请号	KR1020020068305	申请日	2002-11-06
[标]申请(专利权)人(译)	柯尼卡株式会社		
申请(专利权)人(译)	柯尼卡美能达有限公司		
当前申请(专利权)人(译)	柯尼卡美能达有限公司		
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发明人	마쯔우라,미쯔노리 야마다,다께또시 기따,히로시		
IPC分类号	H01L51/30 C09K11/06 H01L27/32 H01L51/50 H01L51/00		
CPC分类号	H01L51/0059 H01L51/0061 H01L51/006 H01L51/007 H01L51/008 H01L51/0085 H01L51/0067 H01L51/0088 H01L51/0071 H01L51/0087 H01L51/5016 H01L51/0058 H01L51/0081 H01L51/5048 H01L27/3211		
代理人(译)	CHU, 晟敏		
优先权	2001344385 2001-11-09 JP		
其他公开文献	KR100903918B1		
外部链接	Espacenet		

摘要(译)

本发明提供一种具有改善的发光亮度和寿命的有机电致发光器件，以及使用该器件的低功耗和高亮度的显示器件。本发明的有机电致发光器件包括 包含阴极和主体化合物和掺杂剂化合物的发光层，其中在阴极和发光层之间形成至少一个第一层，掺杂剂化合物是磷光化合物，其中第一层的分子量为500至2000，最大荧光波长为415nm或更小，氟原子数 (F) 与氢原子总和与氟原子总数的比值 $F / (H + F)$ 为0至0.9。2 指数方面 有机电致发光器件，显示器件，发光亮度，寿命，低功耗

