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10 - 0346984
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(73)

575

(72)

101 - 306
206 - 1306
1206 - 2406
85 - 11203

(74)

:

(54)

(9H,9 -
3' - bicarbazy]

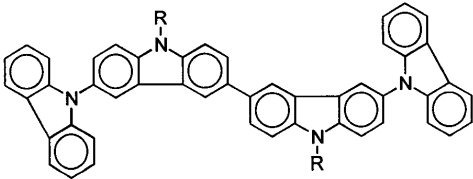
) - N,N' -
- 3,3' -

[6,6' - bis(9H,9 - carbazoly]

(1)

,
6,6' -
- N,N' - disubstituted - 3,
:

1



4 R H, 가 1 12 , 가 , 가 4 1
(aromatic group) , 1 가

1

1

2 BCDC[6,6' - bis(9H,9 - carbazoyl) - N,N' - disubstituted - 3,3' - bicarbazy] ¹H - NMR

3 BCDC FT - IR

4 BCDC UV - Vis

5 BCDC (Photoluminescence Spectrum)

6 BCDC TGA

7 BCDC DSC

8

9 BCDC [ITO/CuPc/BCDC/Alq₃/LiF/Al] [ITO/CuPc/BCDC/Alq₃ + (1.5% coumaline6)/Alq₃/LiF/Al]

10 BCDC [ITO/CuPc/BCDC/Alq₃/LiF/Al] [ITO/CuPc/BCDC/Alq₃ + (1.5% coumaline6)/Alq₃/LiF/Al] (cd/A)

가 , 6,6' - (9H,9 -
) - N,N' - - 3,3' - [6,6' - bis(9H,9 - carbazoyl) - N,N' - disubstituted - 3,3' - bicarbazy]

photon) (electron) , (optoelectronic device) (p
 electro luminescence display: ELD) 가 (backlight) , 가 가
 가 가 GaN, ZnS SiC 가 가
 200V , (EL device) 가 가 가
 , 1963 Pope (Eastmann Kodak) Tang -
 (alumina - quinone, Alq₃) π - (Green - emitting) 1
 0V 1%, 가 1000 cd/m² 가 가 Red, Green
 Blue (display) (passive matrix) (full color display) 10
 , (thin film transistor) (active matrix) 3
 가 Blue가 20,000 (Indemitsu), Green 50,000 (Kodak), Red가 20,000 (Kodak)
 , Red Blue 가 , (full color)
 transporting layer), (buffer layer), (hole transporting layer), (electron tr
 (hole blocking layer) (multilayer system) 가 가
 (functional layer) , (morphological stability) 가
 TPD[N,N' - bis (3 - methyl - phenyl) - N,N' - diphenyl - (1, 4 - biphenyl) - 4,4' - diamine] NPB [N,N' - bis(naphthalene - 1 - yl) - N,N' - diphenylbenzidine, NPD
) (T_g) 60 96
 , 85
 100 T_g가 T_g
 N,N' - - 3,3' - , 6,6' - (9H,9 -) - 가

(T_g)

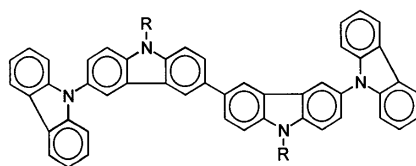
ge carrier) 가 20 가 (major char

e) (electron)가 (mechanism) , (anode) (hole) , (cathod
glet exciton) , 가 (radiative decay) (recombination) (sin
(band gab)

가 (electron transport layer)

- 3,3' - [6,6' - bis(9H,9 - carbazoyl) - N,N' - disubstituted - 3,3' - bicarbazy]) - N,N' -
(1) :

1

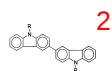


4 R H, 가 1 12 , 가 가 4 1
(aromatic group) , 가

(dicarbazyl) 6,6' (carbazole) (twisted arom
atic ring) 가 (amorphous)

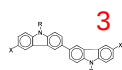
:

() N - - (N,N' - disubstituted - 3,3' - bicarbazyl) (2)



;

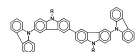
() () (3) N,N' - - 6,6' - - 3,3' - (N,N' - disubstituted - 6,6' - dihalo - 3,3' - bicarbazyl) :



;

() () 6,6' - (9H,9 -) - N,N' - - 3,3' - [6,6' - bis(9H,9 - carbazoyl) - N,N' - disubstituted - 3,3' - bicarbazyl] :

1



;

, (R) H, 가 1 12 , 가
, 가 4 14 (aromatic group) , 1
, (R) (ethyl) (phenyl) 가
, X .
, () 가 Br₂, K
I KIO₃ , .

, () ()
가 () Br₂가 가 ,
() Pd₂dba₃, dppf tert - BuONa ()
KI KIO₃가 가 , () 1,2 - Cu, K₂CO₃ 18 - Crown - 6
.

() 가
, 1 () Br₂ 가 ,
N,N' - - 6,6' - - 3,3' - ,
6,6' - (9H,9 -) - N,N' - - 3,3' - .
() KI KIO₃ , N,N' - - 6,6' - - 3,3' - ,
1,2 - .

6,6' - (9H,9 -) - N,N' - - 3,3' -

(1) N,N' - - 3,3' - (N,N' - Diethyl - 3,3' - bicarbazył)

¹H - NMR (CDCl₃): δ 1.50(t, 6H, 2 - CH₃), 4.45(quartet, 4H, 2 - NCH₂), 7.26 - 8.5(m, 14H, aromatic protons)

(2) N,N' - - 6,6' - - 3,3' - (N,N' - Diethyl - 6,6' - dihalo - 3,3' - bi carbazyl)

OH H₂O . 90 % .
(: /n - = 3/1). ¹H - NMR : ¹H - NMR (CDCl₃): δ 1.46
(t, 6H, 2 - CH₃), 4.34 (quartet, 4H, 2NCH₂), 7.26 - 8.33 (m, 12H, aromatic protons)

B. N,N' - - 6,6' - - 3,3' - (N,N' - Diethyl - 6,6' - diiodo - 3,3' - bicarbazył)

100 mL Schlenk flask N,N' - 3,3' - (N,N' - Diethyl - 3,3' - bicarbaryl) 3 g(7.72 mmol),
 KI 3.46 g(20.85 mmol), KIO₃ 4.96 g(23.2 mmol) 70 80 mL 70 가
 , 20 30 H₂O 1.0 N NaOH(aq) .
 MeOH ,

MeOH H₂O 88 % .
 (: /n - = 4/1). ¹H - NMR : ¹H - NMR (CDCl₃)
 : δ 1.50(t, 6H, 2 - CH₃), 4.38(quartet, 4H, 2 - NCH₂), 7.21 8.5(m, 12H, aromatic protons)

(3) 6,6' - (9H,9 -) - N,N' - 3,3' - [6,6' - bis(9H,9 - carbazoyl) - N,N' - dieth
 yl - 3,3' - bicarbaryl](BCDC)

A. () [Tris(dibenzylideneacetone) dipalladium](Pd₂dba₃) 0.0755 g(8.25 × 10⁻⁵ mol),
 (diphenyl phosphinoferrocene)(dppf) 0.0686 g(1.238 × 10⁻⁵ mol), N,N' -
 - 6,6' - 3,3' - (N,N' - Diethyl - 6,6' - dibromo - 3,3' - bicarbaryl) 1.5 g(2.75 mmol)
 40 50 mL (anhydrous toluene) 20 ,
 (carbazole) 0.92 g(5.50 mmol, EtOH) sodium tert - butoxide 0.817 g(8.25 mmol)
 가 . 15 가 18
 reflux . (transfer) . TLC ,
 (carbazole) 1.0 M HCl(aq) 10 mL 가 5
 MeOH . 90 % , . ¹H - NM
 R (CDCl₃): δ 1.56(t, 6H, 2 - CH₃), 4.51(quartet, 4H, 2 - NCH₂ -), 7.27 8.39(m, 28H, aromatic protons)

B. N,N' - 6,6' - 3,3' - (N,N' - Diethyl - 6,6' - diiodo - 3,3' - bicarbaryl) 2 g(3.12
 mmol), (carbazole) 1.045 g(6.25 mmol, EtOH), Cu(activated Cu) 0.4g(6.25 mm
 ol), 1.76 g(12.48 mmol) 18 - crown - 6 0.25 g(3 mol%) 30 40 mL 1,2 - (1,2
 - dichlorobenzene) 180 2 3 . (transfer)
 . TLC , (carbazole) MeOH
 . 95 % , . ¹H - NMR (CDC
 l₃): δ 1.56(t, 6H, 2 - CH₃), 4.51(quartet, 4H, 2 - NCH₂ -), 7.27 8.39(m, 28H, aromatic protons)

2: 6,6' - (9H,9 -) - N,N' - 3,3' - [6,6' - bis(9H ,9 - carbazoyl) - N,N' -
 diphenyl - 3,3' - bicarbaryl]

(1) N,N' - 3,3' - (N,N' - Diphenyl - 3,3' - bicarbaryl)

250 mL Schlenk flask N - (N - phenylcarbazole) 4.85 g(19.93 mmol) 75 mL
 , 4.0 eq FeCl₃ 12.93 g(79.7 mmol) 80 mL ,
 . dark green .
 24 MeOH , MeOH H₂O MeO
 ().
 H . 93 % . (:
 /n - = 4/1). ¹H - NMR : ¹H - NMR (CDCl₃): δ 7.34 8.48(m, 24H,
 aromatic protons)

(2) N,N' - 6,6' - 3,3' - (N,N' - Diphenyl - 6,6' - dihalo - 3,3' - bicarbaryl)

A. N,N' - 6,6' - 3,3' - (N,N' - Diphenyl - 6,6' - di bromo - 3,3' - bicarbaryl)

100 mL Schlenk flask N,N' - 3,3' - (N,N' - Diphenyl - 3,3' - bicarbazyl) 4.87 g (10 mmol), 50 mL 3.0 eq 5.0 g (31 mmol) 10 mL dark green 40 50 H₂O 1.0 N NaOH(aq) MeOH, MeOH 85 % ¹H - NMR (CDCl₃): δ 7.25 8.38(m, 22H, aromatic protons)

B. N,N' - 6,6' - 3,3' - (N,N' - Diphenyl - 6,6' - diiodo - 3,3' - bicarbazyl)

100 mL Schlenk flask N,N' - 3,3' - (N,N' - Diphenyl - 3,3' - bicarbazyl) 3.76 g (7.72 mmol), KI 3.46 g (20.85 mmol), KIO₃ 4.96 g (23.2 mmol) 70 80 mL 70 H₂O 1.0 N NaOH(aq) MeOH, MeOH 85 % ¹H - NMR (CDCl₃): δ 7.23 8.5(m, 22H, aromatic protons)

(3) 6,6' - (9H,9 -) - N,N' - 3,3' - [6,6' - bis(9H,9 - carbazoyl) - N,N' - diphenyl - 3,3' - bicarbazyl]

A. () [Tris(dibenzylideneacetone) dipalladium] (Pd₂dba₃) 0.0855 g (9.34 × 10⁻⁵ mol), (diphenyl phosphinoferrocene) (dppf) 0.0776 g (1.40 × 10⁻⁴ mol), N,N' - 6,6' - 3,3' - (N,N' - Diphenyl - 6,6' - dibromo - 3,3' - bicarbazyl) 2.0 g (3.11 mmol) 50 mL (anhydrous toluene) 20, (carbazole) 1.04 g (6.22 mmol, EtOH) sodium tert - butoxide 0.898 g (9.34 mmol) 가 20 가 24 reflux (transfer) TLC, (carbazole) 1.0 M HCl aq) 10 mL 가 5 MeOH 91 % ¹H - NMR (CDCl₃): δ 7.26 8.41(m, 38H, aromatic protons).

B. N,N' - 6,6' - 3,3' - (N,N' - Diphenyl - 6,6' - diiodo - 3,3' - bicarbazyl) 2 g (3.12 mmol), (carbazole) 1.045 g (6.25 mmol, EtOH), Cu(activated Cu) 0.4g (6.25 mmol), 1.76 g (12.48 mmol) 18 - crown - 6 0.25g (3 mol%) 30 40 mL 1,2 - (1,2 - dichlorobenzene) 180 2 3 MeOH 90 % ¹H - NMR (CDCl₃): δ 7.26 8.41(m, 38H, aromatic protons).

(EL device)

1 EL device EL device 8

ITO(indium - tin oxide)가 (photoresist resin) (patterning)

IPA 20 (ultrasonication) boiling IPA

UV - (UV - ozone cleaning) 15 CuPc

20 nm (1 /sec) (50 nm, 1 /sec), Al

q₃ (70 nm, 1 /sec) 1.5% coumarin 6(0.015 /sec) Alq₃ (30 nm)(

Alq₃ (40 nm)), LiF(1 nm, 0.1 /sec) A

l(200 nm, 10 /sec) (encapsulation) (N₂ BaO

metal can UV). 1 × 10⁻⁶ torr

(crystal sensor) , 4mm²

(forward bias voltage) . Keithley SMU238 BM7

constant current 10 100 mA/cm² (scan) . ITO/CuPc(

20nm)/BCDC(50nm)/Alq₃ (70nm)/LiF(1nm)/Al(200nm) 100 mA/cm² 3500 cd/m²

11.32 V . ITO/CuPc(20nm)/BCDC(50nm)/Alq₃ + 1.5%C6(30nm)/Alq₃ (40nm)/LiF(1nm)/Al(200nm)

C6 - doped 100 mA/cm² 10290 cd/m² 12.47 V .

(1)

1 PMMA 1:10 (%) (:)

quartz , UV PL (photoluminescence s

pectrum) 4 5 , BCDC UV 238, 293, 306

340 nm , 320 nm PL PL 415 nm .

(2)

TGA(Thermogravimetric analysis) DSC(Differe

ntial Scanning Calorimetry) 10 /min .

6 7 . BCDC 5 % 500 , 600 50

% . DSC , 200 (T_g)가 .

TPD[N,N' - bis(3 - methyl - phenyl) - N,N' - diphenyl - (1,1' - biphenyl) - 4,4' - diam

ine] NPB T_g (T_g 60 96).

(3)

EL device 가 .

ITO/CuPc(20nm)/BCDC(50nm) /Alq₃ (70nm)/LiF(1nm)/Al(200nm) , ITO/CuPc(20

nm)/NPB(50nm)/Alq₃ (70nm)/LiF(1nm)/Al(200nm) . couma

rin 6 (C6) Doped device . ITO/CuPc(20nm)/BCDC(50nm)/A

lq₃ + 1.5% C6(30nm)/Alq₃ (40nm)/LiF(1nm)/Al(200nm) , ITO/CuPc(20nm)/NPB(50

nm)/Alq₃ + 1.5%C6(30nm)/Alq₃ (40nm)/LiF(1nm)/Al(200nm) . 8

Alq₃ coumarin 6

(exciplex) .

9 , 10

(cd/A) . L - I efficiency , (low current density)

BCDC (4.0 cd/A)가 NPB (3.9 cd/A) ,

(high current density) BCDC coumarin 6 (3.5 cd/A)가 NPB (4.1 cd/A)
 BCDC (11.3 cd/A)가 NPB (11.0 cd/A)
 L - I BCDC (10.3 cd/A)가 NPB
 (11.1 cd/A) BCDC 가
 BCDC

6,6' - (9H,9 -) - N,N' - - 3,3' -
 가 ,

가

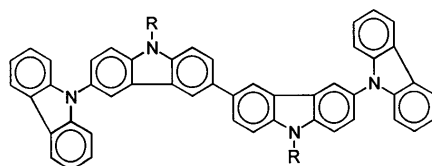
가

(57)

1.

6,6' - (9H,9 -) - N,N' - - 3,3' - [6,6' - bis(9H,9 - carbazoyl) - N,N' - disubstitu
 ted - 3,3' - bicarbazyl] (1)
 :

1

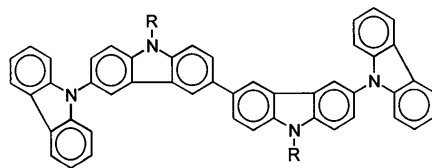


4 R H, 가 1 12 , 가 , 가 4 1
 (aromatic group) , 1 가

2.

/ / / , / / / / / , / / / / / , /
 / / / / , / / / / / / / / /
 / / / / , 6,6' - (9H,9 -
) - N,N' - - 3,3' - [6,6' - bis(9H,9 - carbazoyl) - N,N' - disubstitu
 ted - 3,3' - bicarbazyl] (1)
 :

1



4 R H, 가 1 12 , 가 1 , 가 4 1 가 .

3.

2 , CuPc(copper phthalocyanine), m - MTDATA, (polyaniline), (polyacetylene), (polypyrrole) (polythiophene), (PPV) .

4.

2 , LiF MgF₂ .

5.

2 , (Indium oxide), (Tin oxide), (Zinc oxide) , PET, (Polycarbonate) (Polyimide) (Flexible) .

6.

() N - - , (2)
N,N' - - 3,3' - (N,N' - disubstituted - 3,3' - bicarbazyl) :

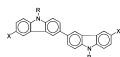
2



;

() () (3) N,N' - - 6,6' - - 3,
3' - (N,N' - disubstituted - 6,6' - dihalo - 3,3' - bicarbazyl) :

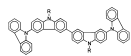
3



;

() () (1)
 6,6' - (9H,9 -) - N,N' - - 3,3' - [6,6' - bis(9H,9 - carbazoyl) - N,N' - disubs
 tituted - 3,3' - bicarbazyll] :

1



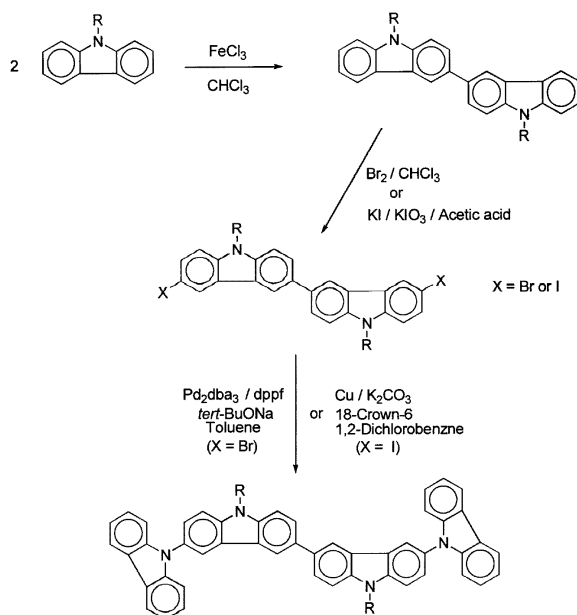
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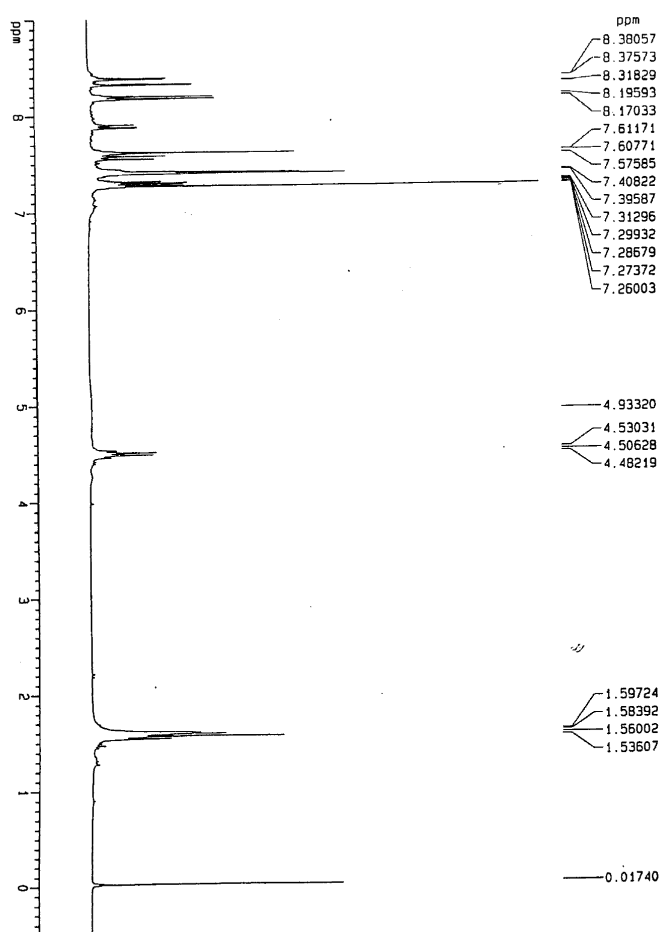
4 R H, 가 1 12 , 가 , 가 4 1
 (aromatic group) , 1
 , X . 가

1

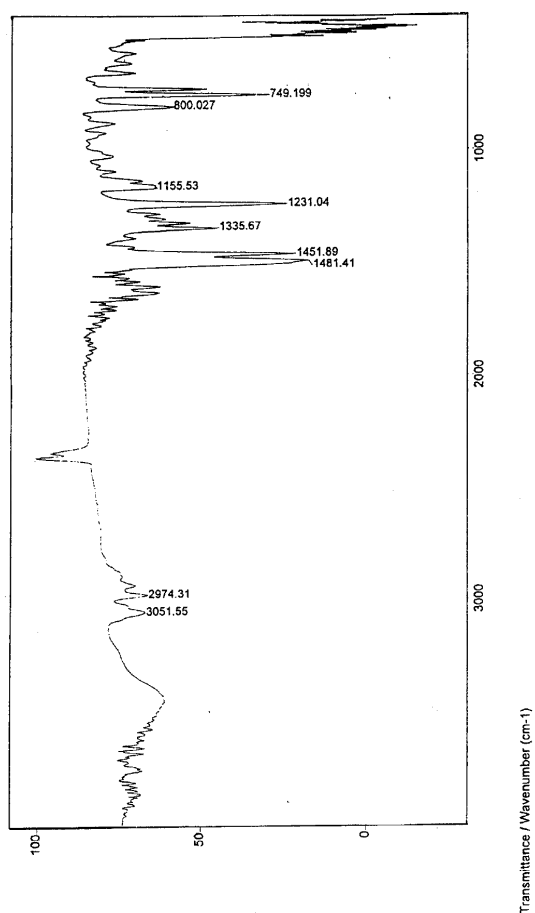
Scheme 1



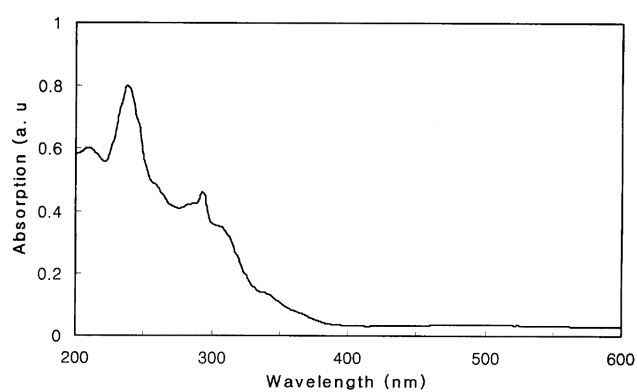
2



3

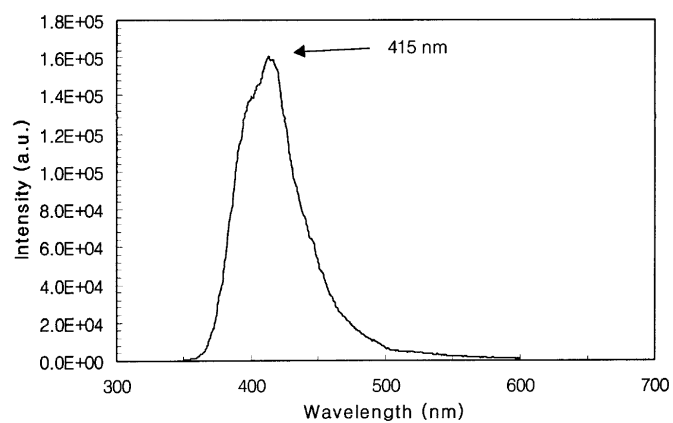


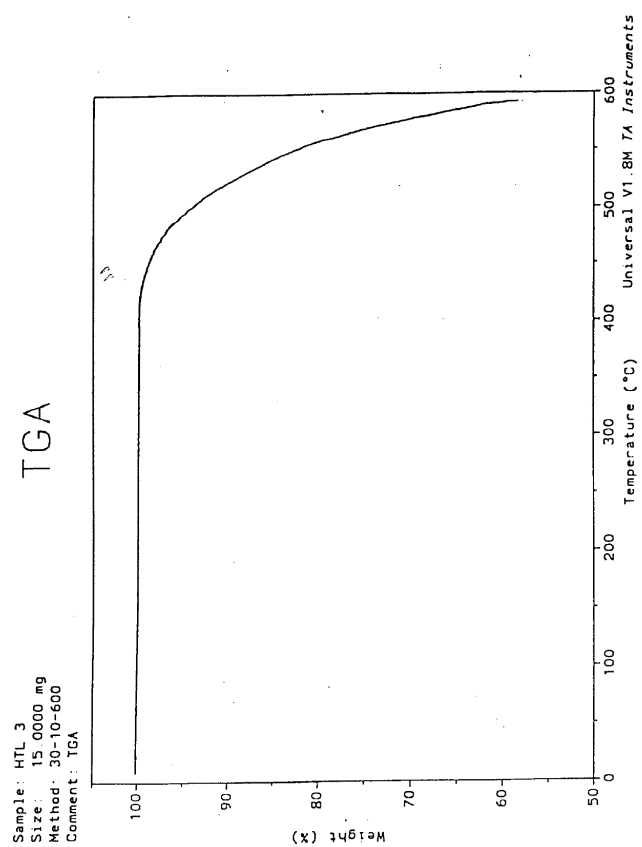
4



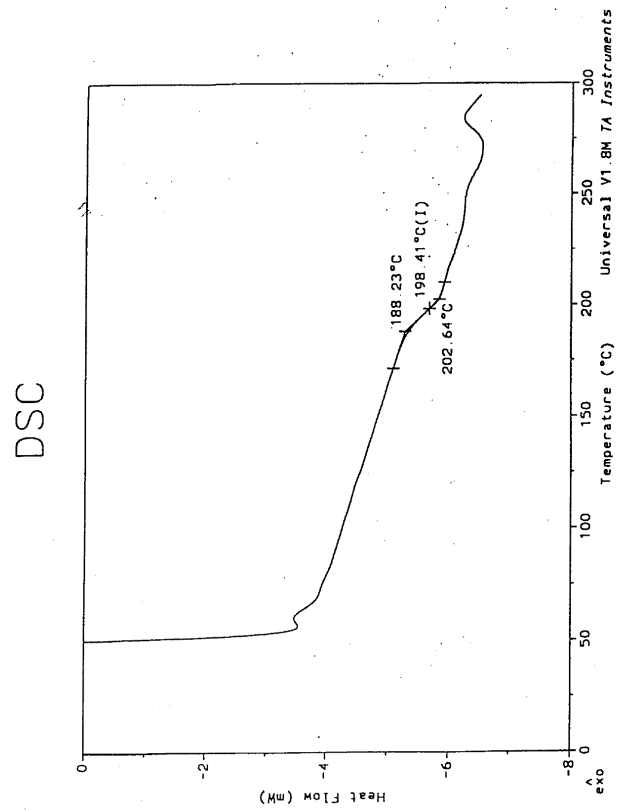
5

PL Spectrum

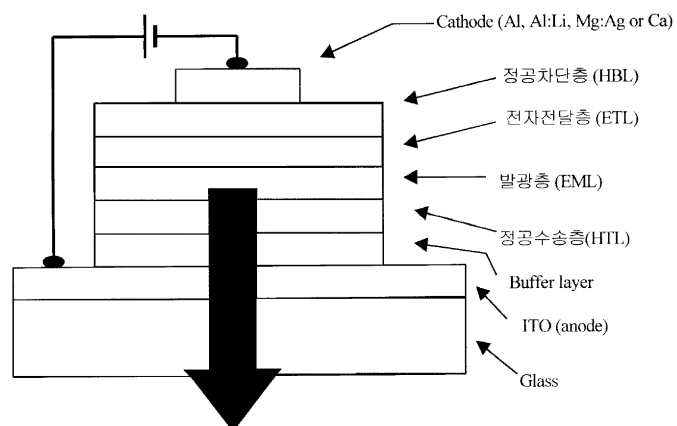




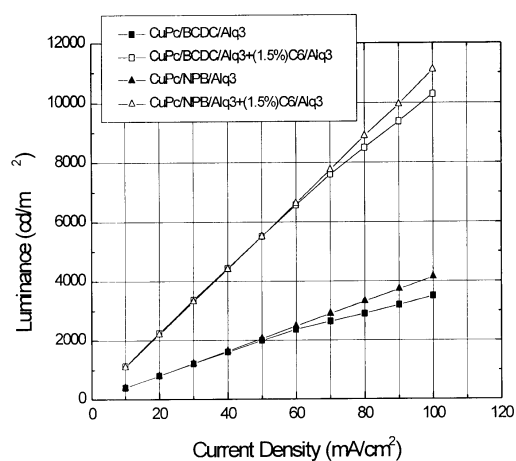
7



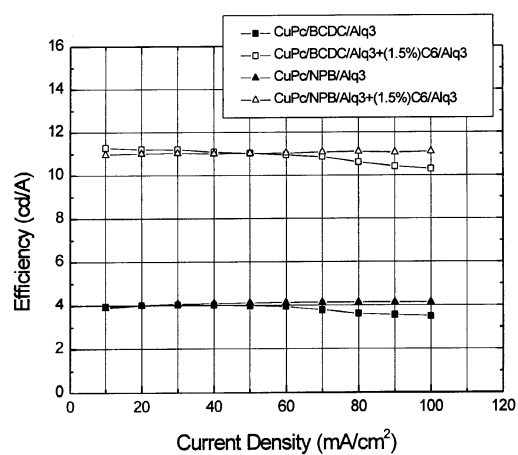
8



9



10



专利名称(译)	用于具有优异热稳定性的有机电致发光器件的空穴传输化合物及其制备方法		
公开(公告)号	KR100346984B1	公开(公告)日	2002-07-31
申请号	KR1020000005814	申请日	2000-02-08
申请(专利权)人(译)	三星SD眼有限公司		
当前申请(专利权)人(译)	三星SD眼有限公司		
[标]发明人	LEE JIHOON 이지훈 KEE INSEO 기인서 CHO SUNGWOO 조성우 CHAE BYUNGHOON 채병훈		
发明人	이지훈 기인서 조성우 채병훈		
IPC分类号	C09K11/06		
代理人(译)	CHOI , DUK KYU		
其他公开文献	KR1020010077773A		

摘要(译)

本发明涉及用于有机电致发光器件的空穴传输化合物及其制备方法，更具体地说，本发明涉及一种空穴-（9），9'-咔唑基-N，N'-二取代-3,3'-二咔唑基]作为基本分子骨架并具有空穴传输性式中的化合物 $\text{R}^1\text{-Ar-R}^2$ - 1 - 其中R是H，具有1至12个碳原子的脂族烷基，支链烷基或环状烷基，或具有4至14个碳原子的芳族基团，其中芳族基团具有一个上述烷氧基或胺可以被取代。 1

