

(19)
(12)

(KR)
(B1)

(51) . Int. Cl.⁷
C09K 11/06

(45) 2003 11 19
(11) 10-0406463
(24) 2003 11 07

(21)	10-2001-0008955	(65)	2002-0068713
(22)	2001 02 22	(43)	2002 08 28

(73) ()
27 284-25

(72) 8 392-27 102

99 101-801

3 480-236 302

1 65 6-304

324-10

97-3 122-104

277-55

(74)

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(54)	(10-)	(2- -8-)	
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(10-)	(2- -8-)	
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, , , (10-) (2- -8-)

1	(OLEDs)							
2	(10- eMq ₂))	(BeBq ₂)		(2- -가	-8-) (B
3	BeBq ₂		, BeMq ₂		BM		,	
4a	4h N,N'- BM		-N,N'-(3- AFM(Atomic Force Microscope))-1,1'- -4,4'-		, BeBq ₂	, BeMq ₂	,
5	BeBq ₂		, BeMq ₂		BM			
6	BeBq ₂		, BeMq ₂		BM	OLEDs	-	
7	BeBq ₂		, BeMq ₂		BM	OLEDs	-	
8	BeBq ₂		, BeMq ₂		BM	OLEDs		
9	BeBq ₂		, BeMq ₂		BM	OLEDs		

< 11: 12: 13: 14: / 15: >

Organic Light-Emitting Devices : OLEDs
 1987, Tang, Van Slyke, Appl. Phys. Lett. 51, 913 (1987).
 10 V, OLEDs, [Tang, Van Slyke, Appl. Phys. Lett. 51, 913 (1987)].
 1988, OLEDs, (Photoluminescence), (Holmes), (p-PPV), PPV
 1990, PPV가 OLEDs, [J.H. Byrroughes et al., Nature, 347, 539 (1990)].
 1992, OLEDs, (ITO), 6, (Nature), (Nature), (1,4-)
 1993, PPV, [2-5-(2'-PPV)], (1,4-)
 1994, OLEDs, OLEDs, (ITO), 6, (Nature), (Nature), (1,4-)
 1995, OLEDs, OLEDs, (ITO), 6, (Nature), (Nature), (1,4-)

가

OLEDs

zo[h]quinolinato)beryllium](BeBq₂)₂, (2-(10-
oxyquinolinato) beryllium](BeMq₂)₂, (10-
(2-
-8-
)₂)₂ [bis(10-hydroxyben
[bis(2-methyl-8-hyd
가 OLED
s

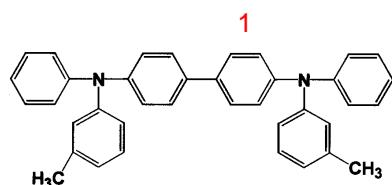
BeBq₂ BeMq₂ OLEDs 1:5 5:1 3:1 가 가

BeBq₂ BeMq₂ OLEDs 1:5 5:1 3:1

OLEDs 가 OLED

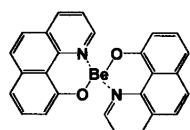
BeMq₂ OLEDs 가 BeBq₂

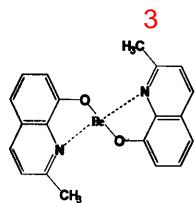
(13), (15) OLEDs 1 (14) (11) (14) (12)
(12) (13) (Au) 1 N,N'- (ITO)
TPD TPD C₃₈H₃₂N₂ -N,N'-(3-
-1,1'- -4,4'- (



(14) BeBq₂ (2) BeMq₂ (3) BeBq₂ BeMq₂ 가
(14) (14) 50 nm 200 nm (14) 가

2





/ (14) $BeBq_2$ $BeMq_2$
 1:5 5:1
 (15) $BeBq_2$, $BeMq_2$, 가 3:1 가
 AI, Ca, Mg, In, Mg/Al
 OLEDs
) (15) (15) (15) (14) (15) (12) (-) (12) (12) (1)
 3) (exciton) / (14) / (14) / (14) / (14) (14) (14)
 가 / (14) $BeBq_2$ $BeMq_2$, $BeBq_2$ (morphology) 가, $BeMq_2$, OLEDs
 2
 OLEDs
 , ITO (11) , ITO (12)
 , (Organic Molecular Deposition: OMD) TPD
 (13) OMD , $BeBq_2$ $BeMq_2$,
 2 1:5 5:1 / (14) / (14) / (14) / (14) (14)
 (13) (Physical Vapor Deposition: PVD) $BeBq_2$ $BeMq_2$
 AI (15) OLEDs
 < 1: >
 1-1. 가
 , 1
 , 5
 , 6
 , 7

[1]

기판의 세정 단계

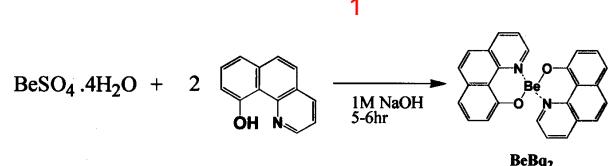
단계	내용
1	증류수로 세척한 후 아세톤으로 다시 세정
2	트리클로로에틸렌(Trichloroethylene)에 넣고 초음파 세정(10분)
3	아세톤에 넣은 후 다시 초음파 세정 (10분)
4	증류수에 넣고 초음파 세정 (10분)
5	이소프로필알코올에 넣고 초음파 세정(10분)
6	증류수로 세척
7	에탄올에 넣어 보관

1-2.
1-2-1. TPD

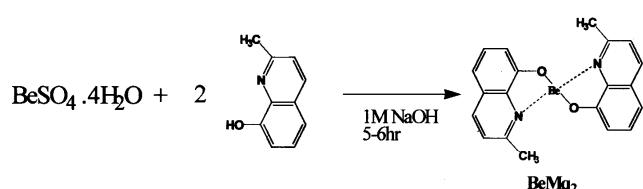
TPD (TCI) 1

1-2-2. $BeBq_2$

BeBq₂ (10-hydroxy-benzo[h] quinoline) (BeSO₄ · 4H₂O) 10-
 TCI
 BeSO₄ · 4H₂O 0.45g 50mℓ 가 1:1 / 20mℓ
 10- 1g 1M pH 10
 2 , 5 6 (stirring) (filtering)
 (NaHCO₃) 3 , 2



1-2-3. BeMq 2
 BeMq 2 - 8 - (2-methyl-8-hydroxyquinoline) BeSO₄ · 4H₂O 0.5g 50Mℓ
 TCI , pH 6 12- - 8 - 1g 75Mℓ
 5 - 6 , 2 , 2 , 3 , -
 2



1 - 3. OLEDs BeBq₂ BeMq₂ / (BM)
 ITO (=15 /) TPD , BM

1-3-1. TPD	BM	/	ITO	, OMD	(cell)	TPD	ITO	400	가 10
OMD - ⁶ torr				가	TPD				TPD (
1 12)		.							
BeBq 2	BeMq 2								가
BeBq 2	BeMq 2								
14) 600	7		TPD		가 1:0, 1:1, 1:3, 1:5, 5:1, 3:1, 0:1			/	(1

[2]

박막 형성 조건

		BeBq ₂ (Å/sec)	BeMq ₂ (Å/sec)	전체증착율 (Å/sec)	증착속도비
1	BeBq ₂	2.0	0.0	2.0	1 : 0
2	B5M1	1.5	0.3	1.8	5 : 1
3	B3M1	1.5	0.5	2.0	3 : 1
4	B1M1	1.0	1.0	2.0	1 : 1
5	B1M3	0.5	1.5	2.0	1 : 3
6	B1M5	0.3	1.5	1.8	1 : 5
7	BeMq ₂	0.0	2.0	2.0	0 : 1

2 6
 , 2
 BM
1-3-2. AI
 AI PVD
 ,
 OLEDs
 AI
 ,
 (1 15)
 < 2: -가
 1-3-1 (Hewlett-Packard) 8425A >
 OLEDs
 BeBq₂ BeMq₂ (spectrometer)
 -가
 n) nm -가 (maximum peak) 420 nm 2 BeBq₂ (optical absorptio
 (edge)가 444 nm , 380 nm (edge)가 465
 BeBq₂ BeMq₂ 가 , BM -가
 -가 (hoping)
 2 -가
 . 465 nm 2.67eV , BeBq₂ (Eg) . 3
 -가

[3]

	BeBq ₂	B5M1	B3M1	B1M1	B1M3	B1M5	BeMq ₂
edge (nm)	465.3	456.5	454.5	454.5	453.9	447.7	444
E _g (eV)	2.67	2.72	2.73	2.73	2.73	2.77	2.79

< 3:
 1-3-1 (Perkin Elmer) LS50B BeBq₂ BeMq₂ BM
 PL 3 BeMq₂ 가 500 nm , BeBq₂ 가
 BeBq₂ 가 500 nm
 가 BeMq₂ 가 BeBq₂ 4

[4]

각 박막의 광 발광 특성 곡선의 위치

	BeBq ₂	B5M1	B3M1	B1M1	B1M3	B1M5	BeMq ₂
최대 피크 파장(nm)	500	500	500	500	493	490	500

< 4: 1-3-1 (Ionization Potential: IP) OLEDs (Electron Affinity: EA) > (Cyclic voltammetry)

5

[5]

각 박막의 이온화 에너지 및 전화 친화도 특성값

	BeBq ₂	B5M1	B3M1	B1M1	B1M3	B1M5	BeMq ₂
E ^{ox} _{onset} (V)	0.9	0.9	0.88	0.9	0.96	0.82	0.83
IP(eV)	5.7	5.7	5.68	5.7	5.76	5.62	5.63
E ^{red} _{onset} (V)	-1.8	-1.83	-1.84	-1.75	-1.81	-1.9	-1.86
EA(eV)	3.0	2.97	2.96	3.05	2.99	2.9	2.94
E _g (eV)	2.7	2.73	2.72	2.65	2.77	2.72	2.69

가 1:1 E_g . BeBq₂ BeMq₂ 가 3:1, 1:5, 0:1 가 IP
L 1:5 0:1 EA

3:1 가
 < 5: >
 1-3-1 TPD BeBq₂, BeMq₂ 2 μm BM AFM
 (Atomic Force Microscope)
 contact 4a TPD 3 (c)
 20 4b 4h BeBq₂ (roughness) 가 BM
 BeMq₂ 4c 4g M1 (4d) (grain) 가 B3
 M1 (4d) 가

가 , B5M1 BeMq 2 . DM BcBq 2
 < 6: OLEDs >
 1-3-2 OLEDs 6 , OLEDs
 (Space Charge Limited Current, SCLC) (Trap
 Charge Limited Current, TCLC)
 (threshold voltage) B3M1 3.5 V , B5M1 4 V ,
 7 V B3M1 3.5 V 가 가 가 가
 (luminance) 가 가 B3M1 가 가 가 가

가 8: OLEDs (Electroluminescence, EL) < 1-3-2 (EL) 7가 OLEDs (PL) > 가 8

< 9: OLEDs (Luminous efficiency) - (J) >
(Luminance efficiency; lm/w) 1

1

$$\eta_{lm/w} = \frac{\pi \cdot L}{J \cdot V}$$

BeBq₂ BeMq₂ OLEDs 가 , .
 BeBq₂ BeMq₂ 가 가 , .
 가 가 .
 , BeBq₂ BeMq₂ 가 3:1 3.5 V(at 1 cd/m²) , 17 V 가
 5,990 cd/m² , 541 mA/cm²

(57)

1.

2.

) 가 1:5 5:1 (10- (10-)) (2- -8- (2- -8-)

3.

2 , 3:1

4.

2 ,

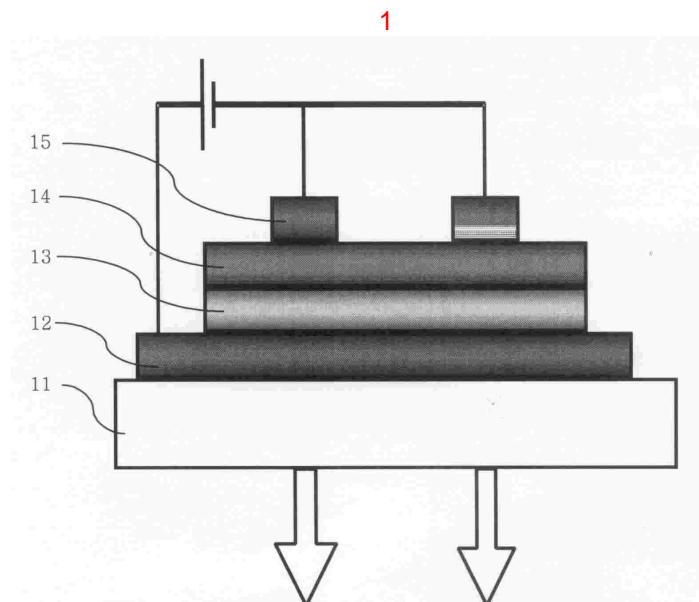
5.

4 ,

6.

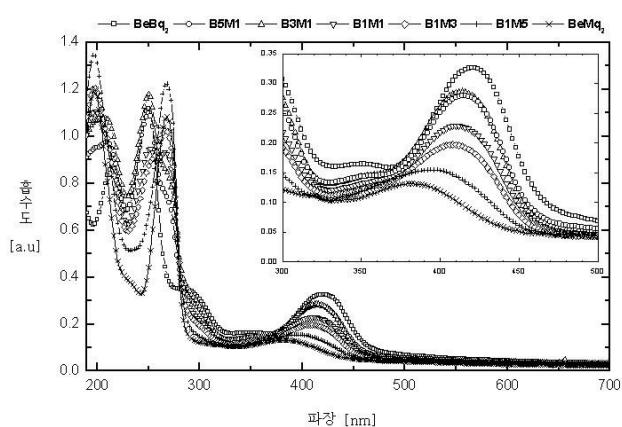
(10-) (2- -8-)

7. , (10- (10- () (2- -8- (2- -8-))
6 가 1:5 5:1) .
7 , 가 3:1
8. .

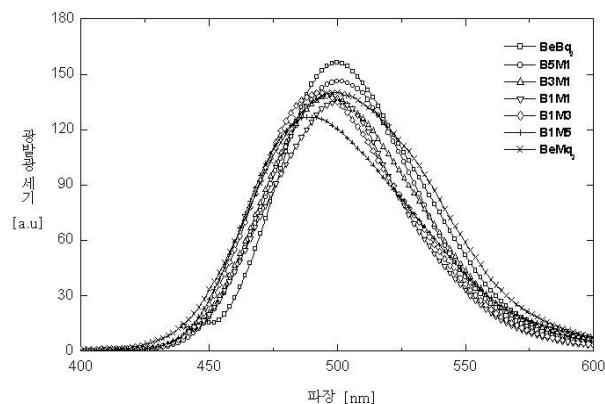


발 광

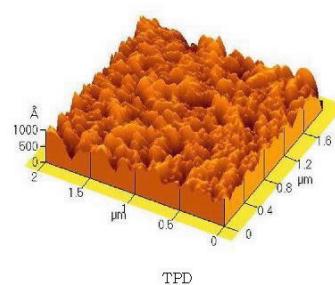
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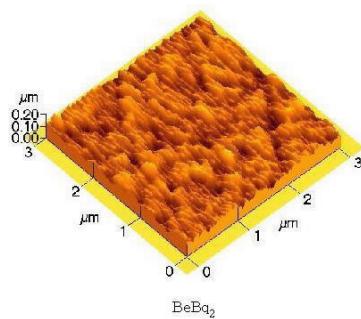
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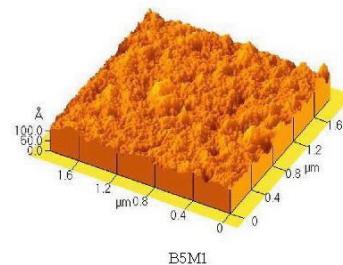
4a



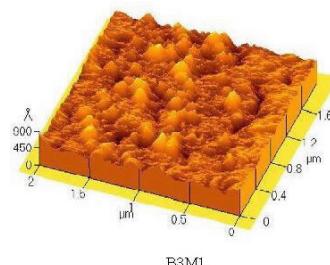
4b



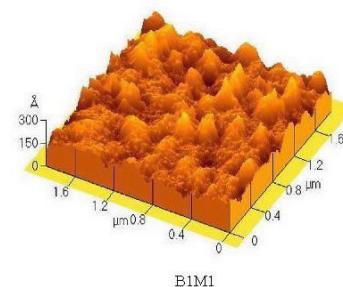
4c



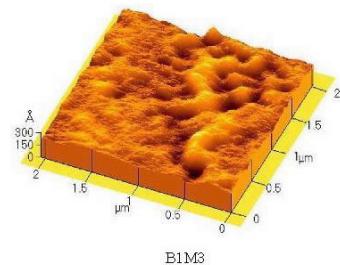
4d



4e

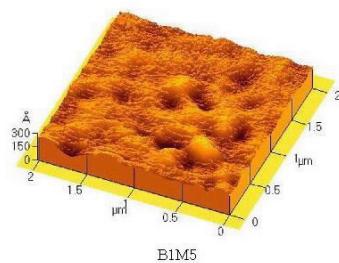


4f



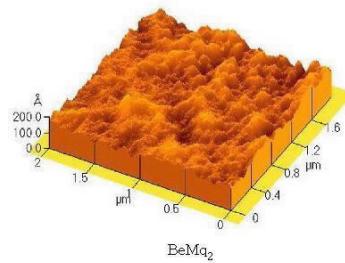
B1M3

4g

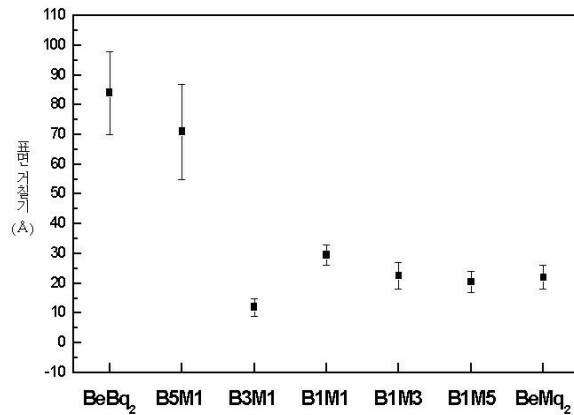


B1M5

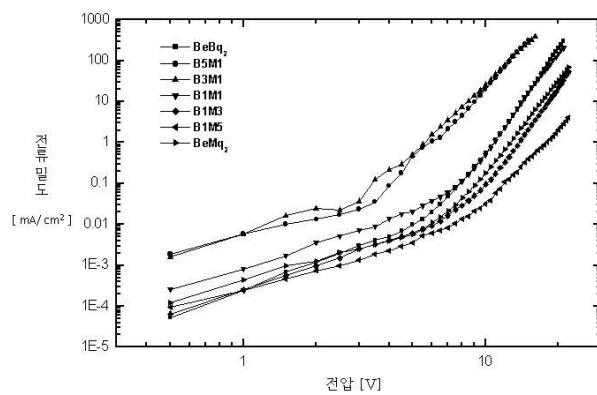
4h

BeMg₂

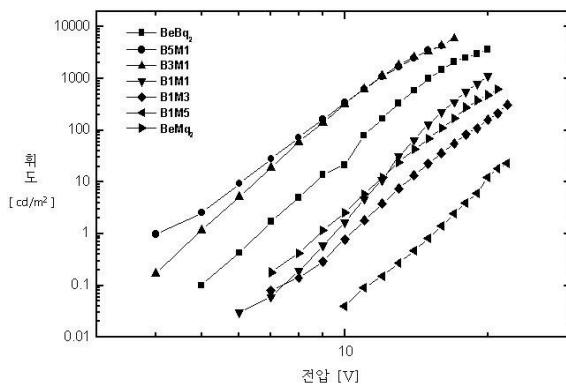
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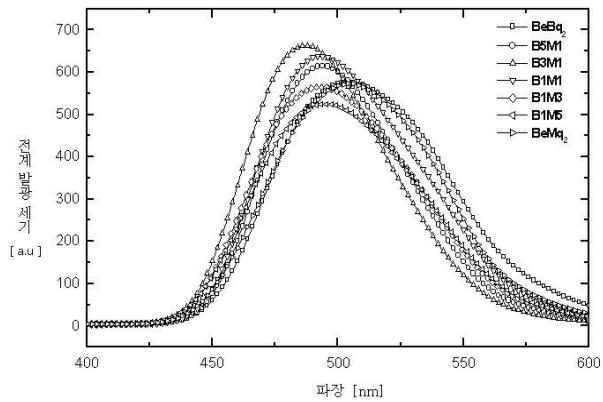
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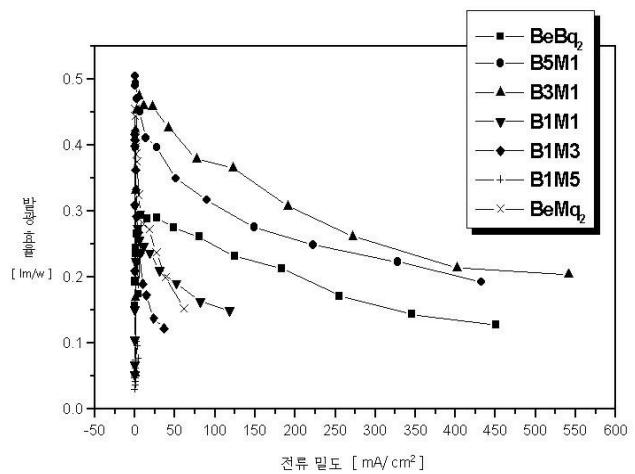
7



8



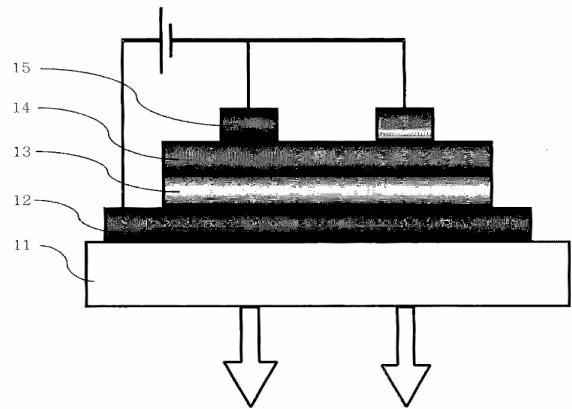
9



专利名称(译)	双 (10-羟基苯并喹啉) 镍和双 (2-甲基-8-羟基喹啉) 的混合物		
公开(公告)号	KR100406463B1	公开(公告)日	2003-11-19
申请号	KR1020010008955	申请日	2001-02-22
申请(专利权)人(译)	宇预支给显示器材料有限公司		
当前申请(专利权)人(译)	宇预支给显示器材料有限公司		
[标]发明人	KIM SUNG MIN 김성민 KIM BONG OK 김봉옥 PARK NO GILL 박노길 KWAK MI YOUNG 곽미영 SHIM JAE HOON 심재훈 KIM YOUNG KWAN 김영관 HA YUN KYOUNG 하윤경		
发明人	김성민 김봉옥 박노길 곽미영 심재훈 김영관 하윤경		
IPC分类号	C09K11/06		
CPC分类号	C09K11/06 C09K2211/186 H01L51/0077 H01L51/5012 H05B33/14 Y10S428/917		
代理人(译)	PARK , IL YOUNG		
其他公开文献	KR1020020068713A		
外部链接	Espacenet		

摘要(译)

本发明涉及有机发光器件，其中双 (2-甲基-8-羟基苯并喹啉合) 镍和双 (10-羟基苯并喹啉) 镍的混合物用作电致发光材料。对于配备有由该混合物组成的发光层的有机发光装置，发光效率优异。有机发光器件，发光层和双 (2-甲基-8-羟基苯并喹啉合) 镍和双 (10-羟基苯并喹啉) 镍的混合物。



발 광