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(12) (A)

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(43) 2002 08 28

(21) 10 - 2001 - 0008955
(22) 2001 02 22

(71) () 374 - 2
 (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)

:

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

(10 -) (2 - - 8 -)

1

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

1 (OLEDs)

2 (10 -) (BeBq₂) (2 - - 8 -) (B
eMq₂) (BM) - 가 ,

3 BeBq₂ , BeMq₂ BM ,

4a 4h N,N' - - N,N' - (3 -) - 1,1' - - 4,4' - , BeBq , BeMq₂
BM AFM(Atomic Force Microscope) ,

5 BeBq₂ , BeMq₂ BM

,

6 BeBq₂ , BeMq₂ BM OLEDs -

,

7 BeBq₂ , BeMq₂ BM OLEDs -

,

8 BeBq₂ , BeMq₂ BM OLEDs

,

9 BeBq₂ , BeMq₂ BM OLEDs -

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11: 12:

13: 14: /

15:

가 , (Organic Light - Emitting Devices : OLEDs)

1987, 10 V 가 OLEDs 가 [Tang, Van Slyke, Appl. Phys. Lett. 51, 913 (1987)]. 1988 (Holmes) (p-) (PPV) (Photoluminescence), PPV
가 , 가 . [J.H. B. .
yrroughes et al., Nature, 347, 539 (1990)]. , (ITO) 1992 6 (Nature)
OLEDs PPV [2 - - 5 - (2' -) - 1,4 -
] (MEH-PPV) . , PPV

가 OLEDs 가 가 OLEDs , 가 OLEDs

가

OLEDs

zno[h]quinolinato)beryllium](BeBq₂)(2 - 8 -) [bis(10 - hydroxybe
hydroxyquinolinato) beryllium](BeMq₂) [bis(2 - methyl - 8 -) OL
EDs .

BeBq₂ BeMg₂ OLEDs .

eBq₂ BeMq₂

B

, BeBq₂ BeMq₂ 가 1:5 5:1 , 3:1

OLEDs

가
OLEDs

OLEDs

가 BeBq₂ BeMq₂

" " 가

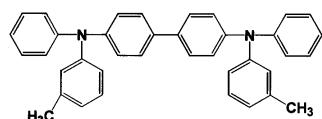
/ /

(13), / OLEDs , 1 (14) , , / (11) (14) (12),
 (15) .

(12) (Au) (ITO)

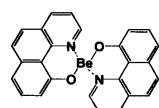
(13) (13) 1 N,N' - - N,N' - (3 -) - 1,1' - - - 4,4' -
 (TPD) TPD C₃₈H₃₂N₂ 가

1

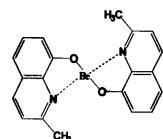


(14) BeBq₂ (2) BeMq₂ (3) . BeBq₂ BeMq₂ 가
 / (14) (14) 50 nm 200 nm (14) (14) 가

2



3



/ (14) 1:5 5:1 . , , BeBq₂ BeMq₂ 가 3:1 가 . BeBq₂ BeMq₂

(15) Al, Ca, Mg, In , Mg/Al

가 OLEDs (12)
 (15) 가 , (15) (12) (-) (12) ()
 (15) / (14) . (14) / (14) (14) (14)
 13) (exciton) , 가 .
 가 .

/ (14) BeBq₂ BeMq₂, BeBq₂, BeMq₂ 가 (morphology) 가 , OLEDs

OLEDs

$$, \text{ITO} \quad (11) \quad , \text{ITO} \quad (12)$$

(Organic Molecular Deposition: OMD)

$$\text{가 1:5} \quad \text{OMD} \quad , \quad \text{BeBq}_2 \quad \text{BeMq}_2 \quad \text{BeBq}_2 \quad \text{BeMq}_2$$

$$(13) \quad 5:1 \quad / \quad (14) \quad , \quad / \quad (14)$$

, (Physical Vapor Deposition: PVD) Al, Ca, Mg, In, Mg/ Al (15) OLEDs .

가 ,

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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

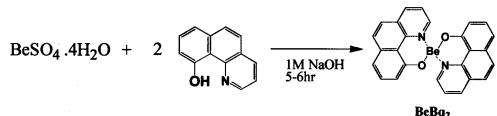
1 - 2 - 2. BeBq₂

BeBq₂ (BeSO₄ · 4H₂O) 10 -
 (10 - hydroxy - benzo[h] quinoline),
 TCI

BeSO ₄ · 4H ₂ O 0.45g	50Mℓ 가	1:1	20Mℓ	10 -
1g	1M	/	pH 10	2
5 6	(stirring)		(filtering)	
(NaHCO ₃)	3 ,	2		

1

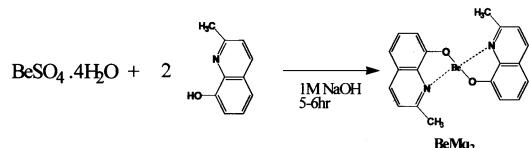
1

1 - 2 - 3. BeMq₂

BeMq₂ TCI (BeSO₄ · 4H₂O) 2 - 8
 (2 - methyl - 8 - hydroxyquinoline)

BeSO ₄ · 4H ₂ O 0.5g	50Mℓ	12 -	1g	75Mℓ
, 1M	, pH 6	- 8 -		
6	2 ,		3 ,	
2				

2



1 - 3. OLEDs

BeBq₂ BeMq₂ / (BM)
 ITO (= 15 /) TPD , BM

1 - 3 - 1. TPD BM /

OMD ITO , OMD (cell) TPD ITO 400 가 10
 -⁶ torr , 가 TPD ITO 400 TPD ()
 1 12)

BeBq₂ BeMq₂ 가 1:0, 1:1, 1:3, 1:5, 5:1, 3:1, 0:1 / (1 14)
 BeBq₂ BeMq₂ 7 TPD

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 BeBq₂ BeMq₂

, 2 BeBq₂ BeMq₂
 BM

1 - 3 - 2. Al

Al PVD

OLEDs

Al

1 15)

1

OLEDs

(

< 2: - 가 >

1 - 3 - 1

(Hewlett - Packard) 8425A

BeBq₂ BeMq₂

(spectrometer)

BM

- 가

- 가
(maximum peak) 420 nm

2

. BeBq₂(optical absorption)
(edge) 가 465 nm
q₂ BeMq₂ BeMq₂
(edge) 가 444 nm . BM 380 nm - 가
가 . (hoping) BeB

2 - 가

. 465 nm

2.67eV

. BeBq₂

(Eg)

3

- 가

(edge)

[1]

	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

(Photoluminescence: PL)

3

BeBq₂BeMq₂

가

500 nm

, BM

BeMq₂

가

가

, BeBq₂

가

500 nm

가

BeBq₂BeMq₂ 가BeBq₂

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: V

5

각 박막의 이온화 에너지 및 전화 친화도 특성값

	BeBq ₂	B5M1	B3M1	B1M1	B1M3	B1M5	BeMq ₂
$E_{\text{onset}}^{\text{ox}} (\text{V})$	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
$E_{\text{onset}}^{\text{red}} (\text{V})$	-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 PL
1:5 0:1 EA

3·1 가

5. [View](#) [Edit](#) [Delete](#) [Details](#)

< 6: OLEDs

>

(threshold voltage) B3M1 3.5 V, B5M1 4 V,
7 V B3M1, 3.5 V가 가 가
(luminance) 가 가 B3M1 가 가
가

7: OLEDs

7

1 - 3 - 2	OLEDs	가 7		
,			가	. B3M1 B5M1
가			. BeMq ₂	
가	가	BeMq ₂		
가	가	가	(quenching site)	(quenching)
BeBq ₂	19 V	3000 cd/m ²	, BeBq ₂	BeMq ₂
B3M1	가 17 V	6000 cd/m ²	2	가 3:1

8: OLEDs

(Electroluminescence, EL)

7

1 - 3 - 2 7가 OLEDs . 가 8
(EL) (PL)

B3M1, 가 가 10 nm, 5 nm . PL EL BeBq₂ BeMg₂ BeBq₂ BeMg₂

< 9: OLEDs

(Luminous efficiency) - (J)

>

(Luminance efficiency; lm/w)

1

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

L	sr · cd/m ²	, J	A/m ²	, V	.
9
.	n	.	n	.	J ^{-1/n}
B5M1	가	가	B3M1	가	.
B3M1	가	.	9	,	BM
가	.	.	.	/	.

BeBq₂ BeMq₂ OLEDs 가 , . 가
BeBq₂ BeMq₂ 가 가 가 , 가 가

, BeBq_2 BeMq_2 가 3:1 3.5 V(at 1 cd/m²) , 17 V 가
 $5,990 \text{ cd/m}^2$, 541 mA/cm²

(57)

1.

2.

$$1 \quad , \quad (10 -) \quad (2 - - 8 -)$$

.)

가 1:5 5:1

3.

2 , 3:1

4.

1 ,

5.

4

,

,

6.

(10 -) (2 - - 8 -)

7.

6

,

(10 -)

()

(2 - - 8 -)

(2 - - 8 -)

)

)

가 1:5

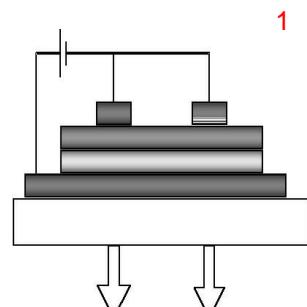
5:1

8.

7

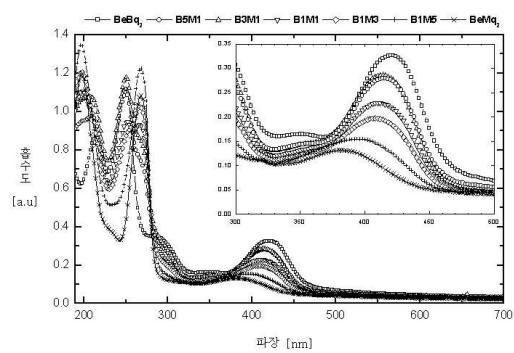
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가 3:1

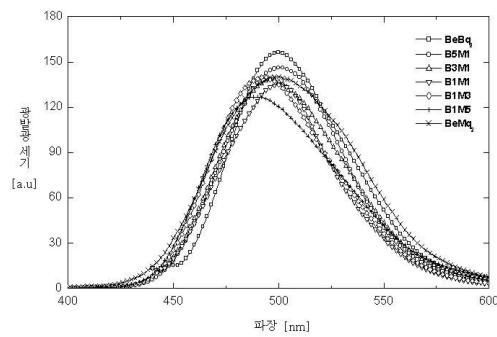


발 광

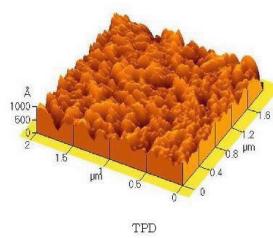
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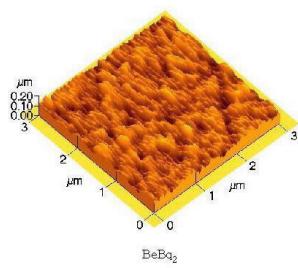
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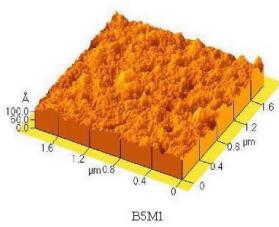
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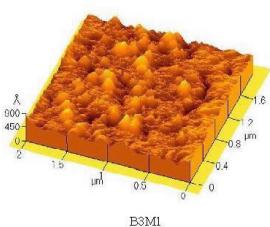
4b



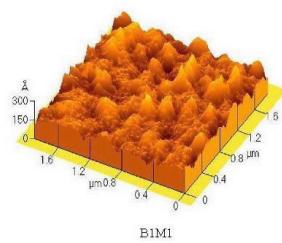
4c



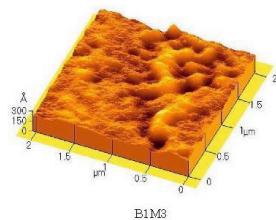
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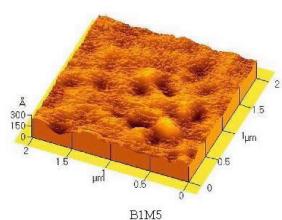
4e



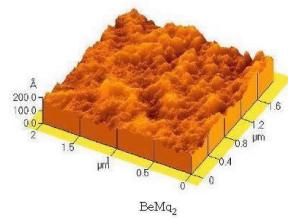
4f



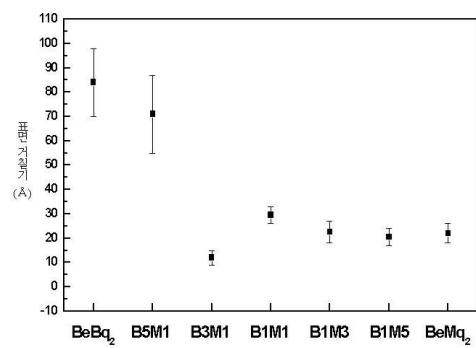
4g



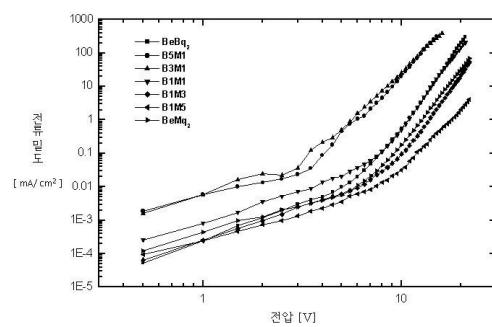
4h



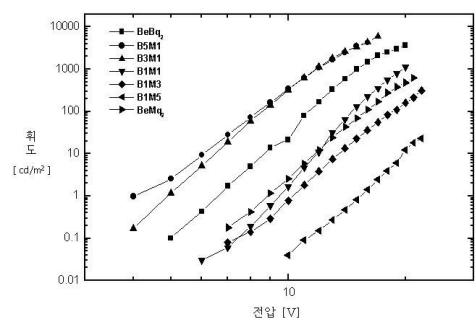
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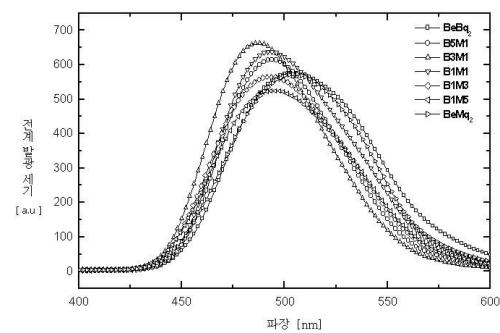
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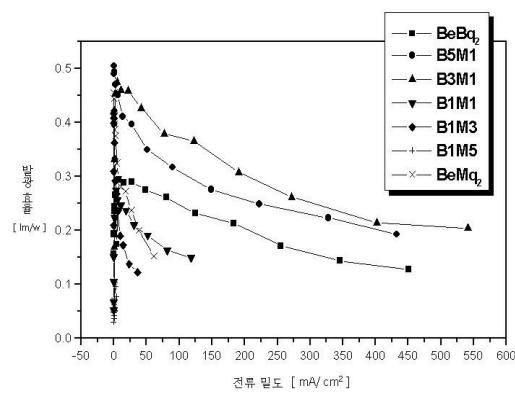
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8



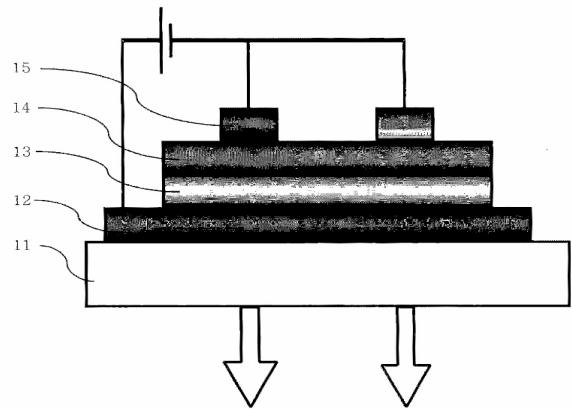
9



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	KR1020020068713A	公开(公告)日	2002-08-28
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	KR100406463B1		
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