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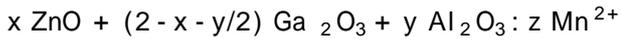
(21) 10 - 2000 - 0056925
(22) 2000 09 28

(71) 가 161

(72) 206 - 402
204 - 1101
101 - 601
119 - 1201
5가1
2가95 - 4
5가1

(74) :

(54) Mn²⁺ zinc gallate 3가 (Ga) 3가 (Al)
가 가 가



$$, 0.8 < x < 1.0, 0 < y < 0.8, 0 < z < 0.1 .$$

FED

6

- 1 $0.98 \text{ ZnO} + (1.02 - y/2) \text{ Ga}_2\text{O}_3 + y \text{ Al}_2\text{O}_3 : 1 \text{ m/o Mn}^{2+}$ y X
- 2 $x \text{ ZnO} + (2 - x) \text{ Ga}_2\text{O}_3 : z \text{ Mn}^{2+}$ (PL)
- 3 $x \text{ ZnO} + (2 - x) \text{ Ga}_2\text{O}_3 : z \text{ Mn}^{2+}$ x z 502nm
- 4 $0.98 \text{ ZnO} + (1.02 - y/2) \text{ Ga}_2\text{O}_3 + y \text{ Al}_2\text{O}_3 : 1 \text{ m/o Mn}^{2+}$ y (PL)
- 5 $0.98 \text{ ZnO} + (1.02 - y/2) \text{ Ga}_2\text{O}_3 + y \text{ Al}_2\text{O}_3 : 2 \text{ m/o Mn}^{2+}$ y (PL)
- 6 $0.98 \text{ ZnO} + 0.62 \text{ Ga}_2\text{O}_3 + 0.8 \text{ Al}_2\text{O}_3 : 1 \text{ m/o Mn}^{2+}$, $0.98 \text{ ZnO} + 1.02 \text{ Ga}_2\text{O}_3 :$
 0.6 m/o Mn²⁺ CRT ZnS: Cu, Al (CL)

(fluorescent display)



(FED ; Field Emission Display)

(anode plate)

가 가 가 10 kV

5 kV 가 , 1 kV 가 FED

가 1 kV , 20 nm 가 가
 FED 가 ,
 가 ZnS : Cu, Al FED
 가 ,
 1 mm FED (FEA: F
 ield Emitter Array)

가 ,

(Ga) 3가 (Al) Mn²⁺ zinc gallate 3가



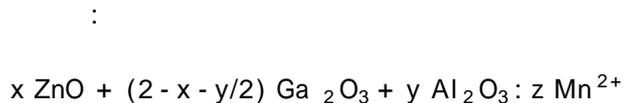
, 0.8 < x < 1.2, 0 < y < 0.8, 0 < z < 0.1 .

가

Al ₂ O ₃ ,		MnO	ZnO ,	Ga ₂ O ₃ ,
1000	1300	4	MnO ₂ ,	MnCl ₂
	800	1000	10	
			0.5	
			5	
			100% : 0%	80% : 20%

zinc gallate

가 ,
 가 (Al) Mn²⁺ zinc gallate 3가 (Ga) 3



, $0.8 < x < 1.2, 0 < y < 0.8, 0 < z < 0.1$.

, x , (2 - x - y/2) , y , z
 가 , x 0.8 1.2
 , x가 (phase)
 0.8 1.0 , y 0 0.8 . 0.
 8 ZnGa₂O₄ ZnAl₂O₄
 z 0 0.1 0.1 (conc
 entration quenching) 가 , (Mn²⁺)
 Zn) (Ga) 1 : 2 , (Al) y 0.1 0.3 , G
 가 0.05 0.15 m/o Al₂O₃ , MnO MnO₂ , MnCl₂
 a₂O₃ , 가 가

1000 1300 4 10
 , 1000 , 1300
 가 가

800 1000 0.5 5
 , 800 1000 , 3 , 0.5
 20% , 80% : 20%

가 가

《 1.》 x = 0.98, y = 0.05, z = 0.01 :
 0.98 ZnO, 0.995 Ga₂O₃, 0.05 Al₂O₃ 1 m/o (=0.01) MnCl₂ 1100
 , 4 , 6 , 900 , 98% : 2%
 1

《 2. 5.》 x = 0.98, 0.1 y 0.8, z = 0.01 :

1, x, y, z 1, 1

[1]

	x	y	z	ZnO	Ga ₂ O ₃	Al ₂ O ₃	Mn ²⁺
2	0.98	0.1	0.01	0.98	0.97	0.1	0.01
3	0.98	0.15	0.01	0.98	0.945	0.15	0.01
4	0.98	0.4	0.01	0.98	0.82	0.4	0.01
5	0.98	0.8	0.01	0.98	0.62	0.8	0.01

《 1.》 x = 0.98, y = 0, z = 0.01 :

1, 1.02 Ga₂O₃, Al₂O₃,
 1
 1 (y) X 5 1 . y가 가 ZnGa₂O₄ ZnAl₂O₄
 O₄
 4 (y) 1 5 (PL) 1 . , y가 0 0.15
 502 nm , y = 0.4
 505 nm , y = 0.8 515 nm
 y = 0.1

《 2.》 x = 0.98, y = 0, z = 0.006 :

1, x, y, z 2, 1

[2]

	x	y	z	ZnO	Ga ₂ O ₃	Al ₂ O ₃	Mn ²⁺
2	0.98	-	0.006	0.98	1.02	-	0.006

2 2 (PL)
 240 nm, 280 nm, 383 nm, 425 nm 452 nm 가
 , 240 nm ZnGa₂O₄ , 280 nm
 Mn²⁺ Mn²⁺ 383 nm, 425 nm 452 nm
 Mn²⁺ 502 nm 가

《 3 13.》 0.88 x 1.12, y = 0, z = 0.03 :

1, x, y, z 3, 1

[3]

	x	y	z	ZnO	Ga ₂ O ₃	Al ₂ O ₃	Mn ²⁺
3	0.88	-	0.003	0.88	1.12	-	0.003
4	0.92	-	0.003	0.92	1.08	-	0.003
5	0.94	-	0.003	0.94	1.06	-	0.003
6	0.96	-	0.003	0.96	1.04	-	0.003
7	0.98	-	0.003	0.98	1.02	-	0.003
8	1.00	-	0.003	1.00	1.00	-	0.003
9	1.02	-	0.003	1.02	0.98	-	0.003
10	1.04	-	0.003	1.04	0.96	-	0.003
11	1.06	-	0.003	1.06	0.94	-	0.003
12	1.08	-	0.003	1.08	0.92	-	0.003
13	1.12	-	0.003	1.12	0.88	-	0.003

《 14 17.》 0.94 x 1.06, y = 0, z = 0.006 :

1 , x, y, z 4 , 1

[4]

	x	y	z	ZnO	Ga ₂ O ₃	Al ₂ O ₃	Mn ²⁺
14	0.94	-	0.006	0.94	1.06	-	0.006
15	0.98	-	0.006	0.98	1.02	-	0.006
16	1.00	-	0.006	1.00	1.00	-	0.006
17	1.06	-	0.006	1.06	0.96	-	0.006

《 18 21.》 0.94 x 1.06, y = 0, z = 0.009 :

1 , x, y, z 5 , 1

[5]

	x	y	z	ZnO	Ga ₂ O ₃	Al ₂ O ₃	Mn ²⁺
18	0.94	-	0.009	0.94	1.06	-	0.009
19	0.98	-	0.009	0.98	1.02	-	0.009
20	1.00	-	0.009	1.00	1.00	-	0.009
21	1.06	-	0.009	1.06	0.96	-	0.009

3 가 3 () 21 . Mn²⁺ 가 , ZnO 가 Mn²⁺ 502 nm ZnO가 ZnO가 . Mn²⁺ 0.3, 0.9 m/o 가 x 가 0.94 . Mn²⁺ 0.6 m/o 가 x 가 0.98 . Zn O 가 0.88 x < 1.0 .

《 6 10.》 x = 0.98, 0 y 0.8, z = 0.02 :

1 , x, y, z 6 , 1

[6]

	x	y	z	ZnO	Ga ₂ O ₃	Al ₂ O ₃	Mn ²⁺
6	0.98	0.05	0.02	0.98	0.995	0.05	0.02
7	0.98	0.1	0.02	0.98	0.97	0.1	0.02
8	0.98	0.15	0.02	0.98	0.945	0.15	0.02
9	0.98	0.4	0.02	0.98	0.82	0.4	0.02
10	0.98	0.8	0.02	0.98	0.62	0.8	0.02

5 6 10 (y)
 (PL) , y가 0 0.15
 502 nm , y = 0.4 505 nm
 , y = 0.8 515 nm
 y = 0.2 가

6 5 15 (CL) CR
 T ZnS : Cu, Al PL 가
 가

zinc gallate

FED

가 가 (; 502 515 nm)가
 FED

FED

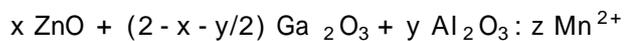
가

가

(57)

1.

Mn²⁺ zinc gallate 3가 (Ga) 3가 (Al) :

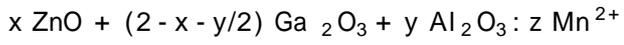


, 0.8 $x < 1.0$, $0 < y < 0.8$, $0 < z < 0.1$.

2.

가

:



, $0.8 < x < 1.0$, $0 < y < 0.8$, $0 < z < 0.1$.

3.

2

MnO, MnO₂, ZnO, MnCl₂, Ga₂O₃, Al₂O₃ .

4.

2

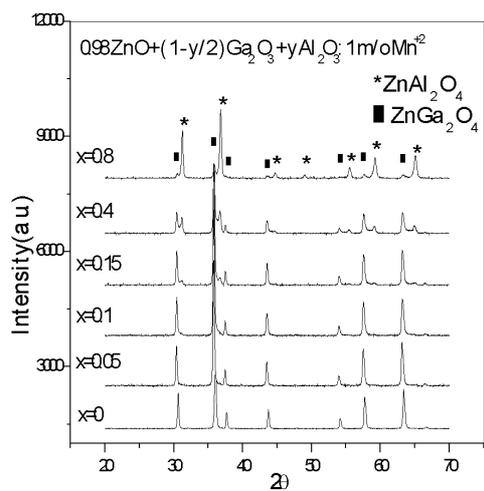
900, 1000, 1000, 1300, 0.5, 5, 4, 10, 100% : 0%, 80% .
: 20%

5.

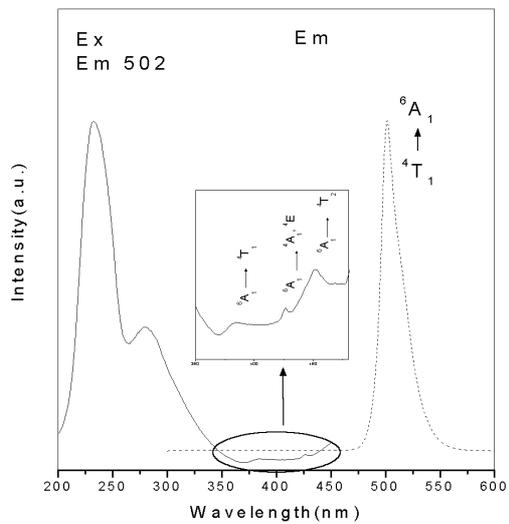
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(Zn) 0.05, (Ga) 0.15 m/o 가 1 : 2, (Al) y 0.1, 0.3, Mn²⁺ 가 N
2 : H₂ 가 100 : 5, 1100, 1300, 10, 900, 1000, 3 .

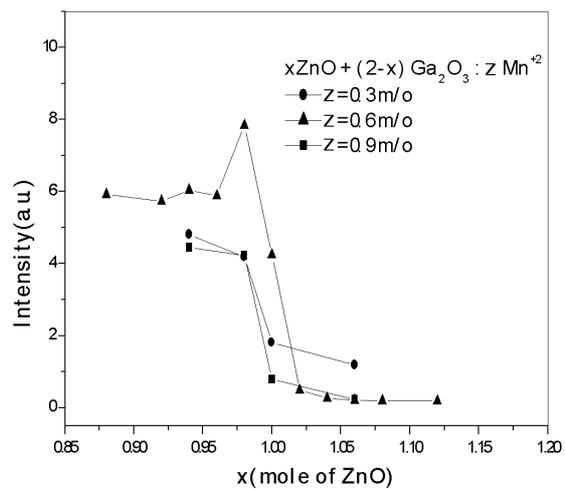
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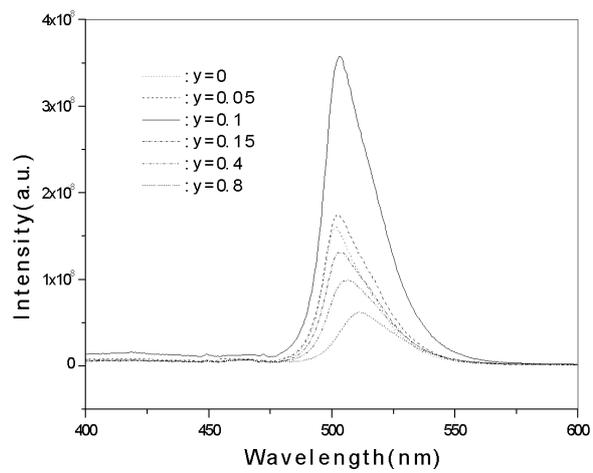
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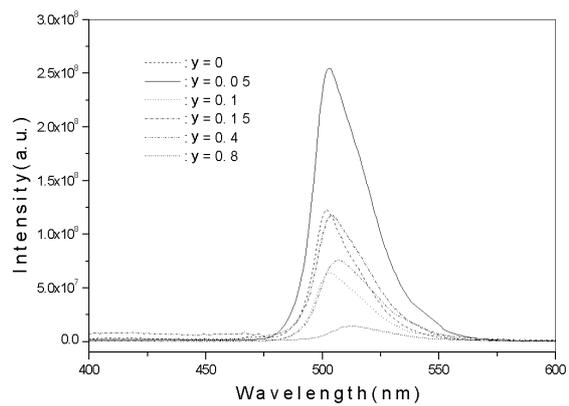
3



4



5



6

