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 (24) 2002 03 06

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(21) 10 - 1997 - 0075496 (65) 1998 - 0064764  
 (22) 1997 12 20 (43) 1998 10 07

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(30) 96 - 341085 1996 12 20 (JP)

(73) 가 가  
 가 22 22

(72) 139 - 1 - 413

(74)

:

(54)

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, (4) (1) (1),  
 . GaP (4) (Al<sub>x</sub> Ga<sub>1-x</sub>)<sub>1-y</sub> In<sub>y</sub> P  
 . (Al<sub>x</sub> Ga<sub>1-x</sub>)<sub>1-y</sub> In<sub>y</sub> P  
 2 , , , ,  
 1 , , , ,

1

1 1 ,  
 2A 2B 1 ,

3                  2                  ,  
 4A        4B                  2                  ,  
 5                  ,  
 6    GaP                  ,  
 7A        7B    GaP                  ,  
 8                  ,  
 9A        9B                  ,  
 10                  ,  
 11                  .

\*

1,11:      2,12:      3,13:

4,14:      6,16:      7,17: n -

8,18: p -

AlGaInP

" AlGaInP      (Al<sub>x</sub> Ga<sub>1-x</sub>)<sub>1-y</sub> In<sub>y</sub> P      x, y ≠ 0    x, y = 1

$(Al_x Ga_{1-x})_{1-y} In_y P$        $In$        $y = 0.51$        $GaAs$       .      가,  $In$   
 $y = 0.51$       ,  $(Al_x Ga_{1-x})_{1-y} In_y P$        $Al$        $x = 0 \quad 0.7$   
,      .      .      .      .      .      .  
,      8  
,      가      ,      n -      GaAs      .      ,      .  
(203),      (206)       $(Al_x Ga_{1-x})_{1-y} In_y P$       (210), p -       $(Al_x Ga_{1-x})_{1-y} In_y P$       (205)      p -  
GaP      (206)      n -      GaAs      (212)      (211), n -       $(Al_x Ga_{1-x})_{1-y} In_y P$       (210)  
,      가      (entrap)      ,      (203, 205)      (210)  
(      (DH)      ), n -      (207)      GaAs      (212)      p -      (208)  
,      (206)      .      In      y      GaAs      y = 0.51  
,      ,       $(Al_x Ga_{1-x})_{1-y} In_y P$       (      (210)      (203, 205))      가  
,      9A      ,      (210)      (      Ec)      가  
(      Ev)      ,      9B      (Ec, Ev)      가  
G(E)       $(P_{10}, P_{20})$       가      (p - n)      가  
 $1-y$        $In_y P$       (210)      .      .      ,  $(Al_x Ga_{1-x})$   
)
.

,      8      ,      GaAs      (212)      1.42 eV  
,      1/2      가      .      GaP, GaAsP, AlGaAs      , Ga  
As      .      .      .      .      .  
,       $(Al_x Ga_{1-x})_{1-y} In_y P$       ,      GaAs      ,      .      .  
(      가      ,      "      "      "      "      )      .  
,      10      ,      GaAs      (311), n -      (DBR)  
,      (313), n -       $(Al_x Ga_{1-x})_{1-y} In_y P$       (303),      n -      GaAs      (311), n -  
 $(Al_x Ga_{1-x})_{1-y} In_y P$       (305)      p -      GaP      (303),       $(Al_x Ga_{1-x})_{1-y} In_y P$       (310), p -  
(GaAs      (301)      n -      (303)      (306)      n -      GaAs      (301)  
GaAs      (301)      DBR      (312)      ,      (310)      2      DBR      (313)  
,      (403),       $(Al_x Ga_{1-x})_{1-y} In_y P$       (410), p -       $(Al_x Ga_{1-x})_{1-y} In_y P$       (405)      p -  
GaP      (406)      GaAs      ,      ,      GaAs  
,      (403)      (      )(420)      GaP      (414;  
2.27 eV)      (Appl. Phys. Lett., vol. 61, No. 15 (1992), pp. 1775 - 1777) 가  
.

,      10      ,      (310)      .      .      .  
,      8      가 DBR      (313)      CaAs      (301)      .      .  
,      11      GaP      (414)      .      .  
,      ,       $(Al_x Ga_{1-x})_{1-y} In_y P$       GaAs       $(Al_x Ga_{1-x})_{1-y} In_y P$   
(650 - 550 nm)      .      ,      .      .  
,      6      ,      GaP      (      2.27 cV)  
 $1-y$        $In_y P$       (103),      (106)       $(Al_x Ga_{1-x})_{1-y} In_y P$       (104), n -       $(Al_x Ga_{1-x})$   
(105)      p -      GaP      n -      GaP      (101)      (110), p -       $(Al_x Ga_{1-x})_{1-y} In_y P$   
.

01)		, 5	, GaP	5.451	(Al <sub>x</sub> Ga <sub>1-x</sub> ) <sub>1-y</sub> In <sub>y</sub> P		
		.	.	, GaP	(Al <sub>x</sub> Ga <sub>1-x</sub> ) <sub>1-y</sub> In <sub>y</sub> P	GaP	(1)
105)		5.451	3.6%	, GaAs	.	, GaAs	5.653 가 GaP
		GaP	(101)	.	(Al <sub>x</sub> Ga <sub>1-x</sub> ) <sub>1-y</sub> In <sub>y</sub> P	(103, 110)	
		(Al <sub>x</sub> Ga <sub>1-x</sub> ) <sub>1-y</sub> In <sub>y</sub> P	(103, 110)	105)		GaInP	(104)
		가 가		가			(misfit dislocation;
가		.	,		가	.	
가		, 7A	,	(110)	가	가	가
가		.	,	meV	가	(Ec)	가
:		.	,	)	가	7B	(Ev)
		.	,	가 (band)	가		(Ec#, Ev#)
		.	,	GaAs	(Ec, Ev)	G(E)	(P <sub>10</sub> , P <sub>20</sub> )
(101)				(Al <sub>x</sub> Ga <sub>1-x</sub> ) <sub>1-y</sub> In <sub>y</sub> P	(103, 110)	105)	GaP
8			2 (2 order)	.	.	.	,
,				,	( )	가	.

( )

GaP (Al<sub>x</sub>Ga<sub>1-x</sub>)<sub>1-y</sub>In<sub>y</sub>P

가

가

가

2

1

2

1

2







1 2

(homojunction type)

가

가

가

가

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가

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가

가

가

가

가

가

가

가

가

가

가

가

가

가

가

가

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가

가

가

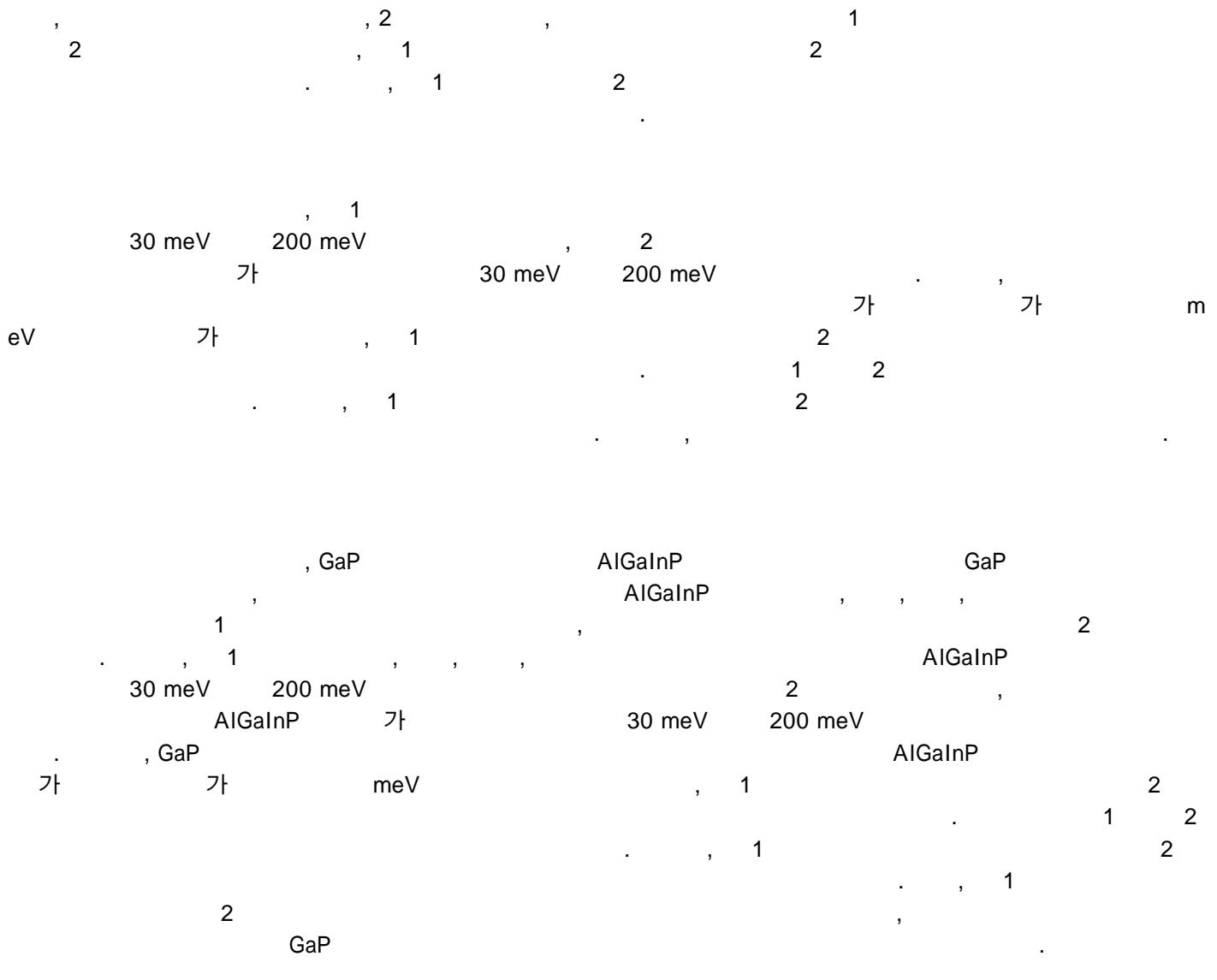
가

가

가

가

가



, ( ) 가 .

(57)

1.

(1,11) (1,11) (4,14) (1,11)

1 200 meV , 2 30 meV 200 meV 30 meV

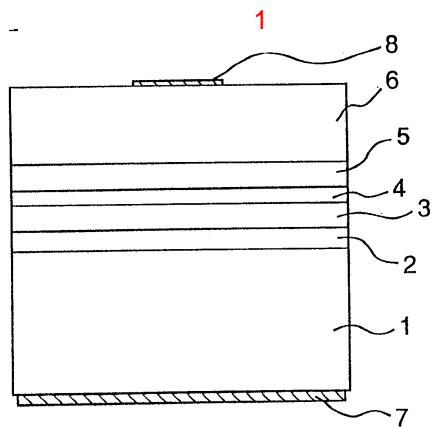
2.

1 , (4,14) 1 2 2

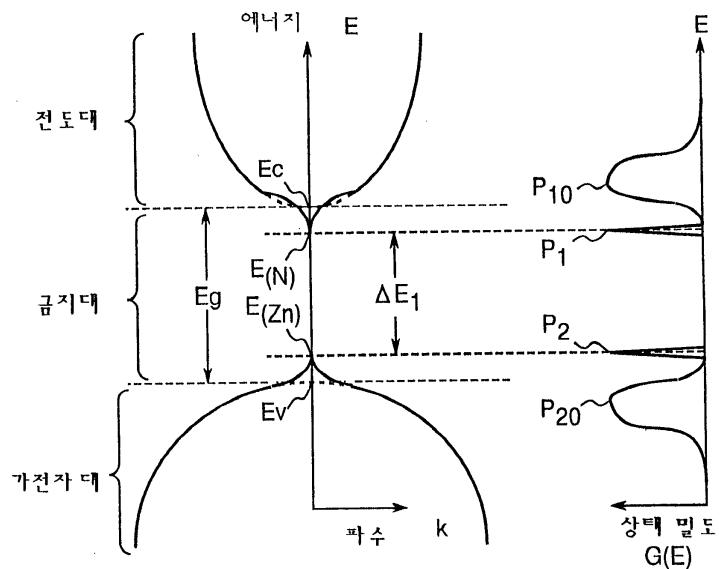
3.

AlGaInP (4,14) GaP (1,11) GaP (1,11)

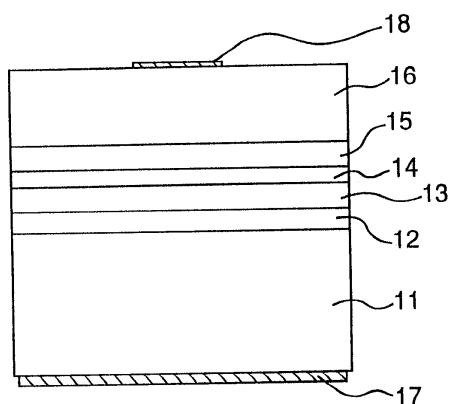
, (4,14) AlGaInP 1 , , , , 2



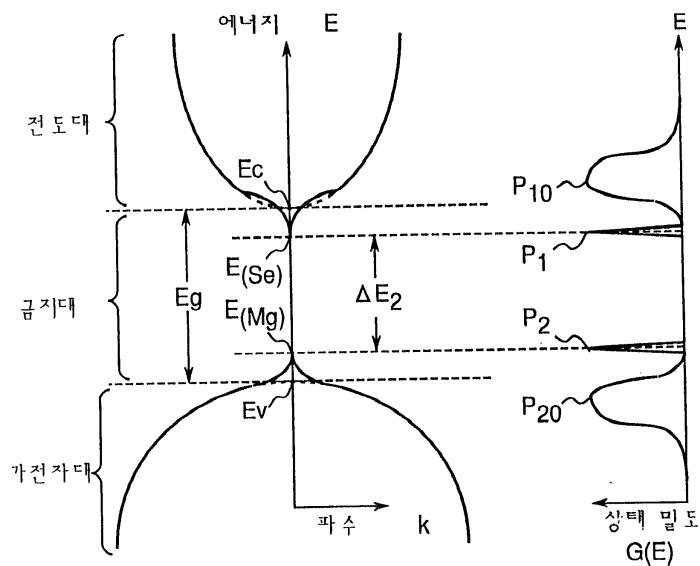
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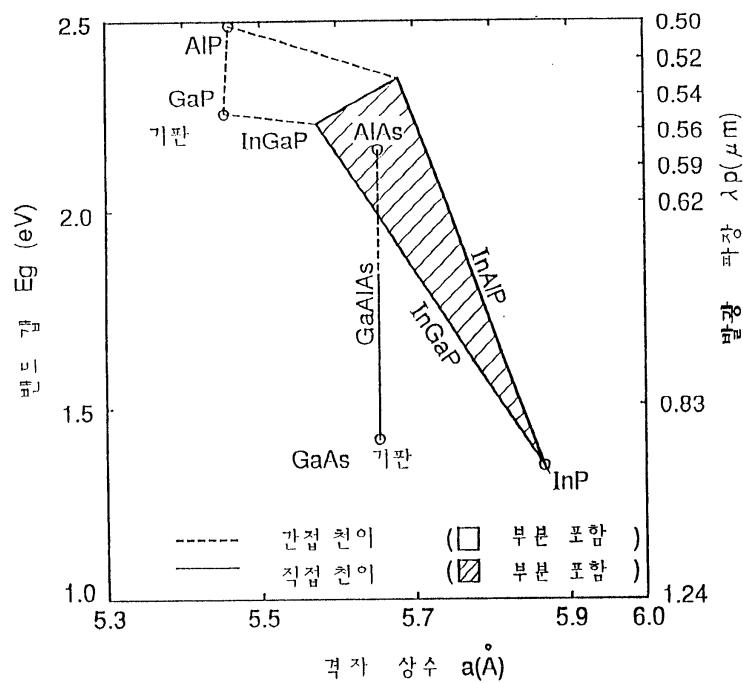
3



4

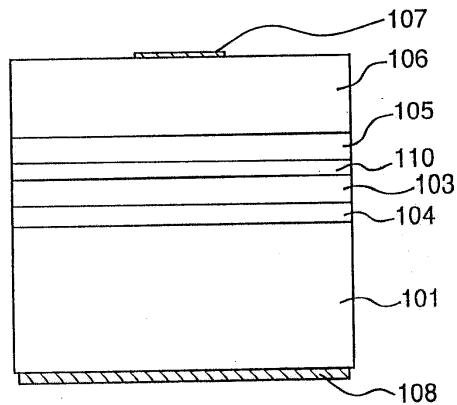


5



6

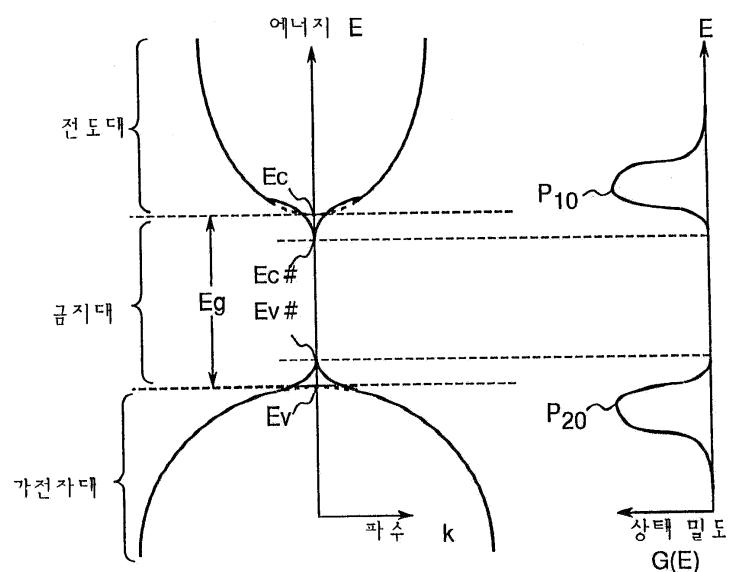
## 종래기술



7

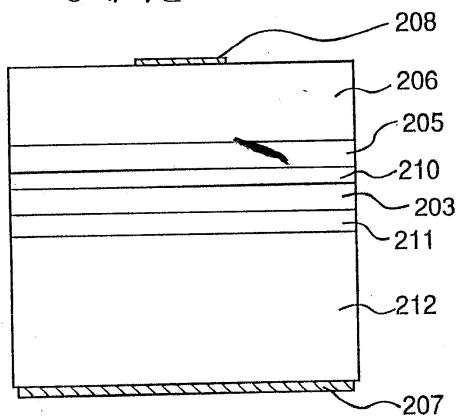
## 종래기술

## 종래기술



8

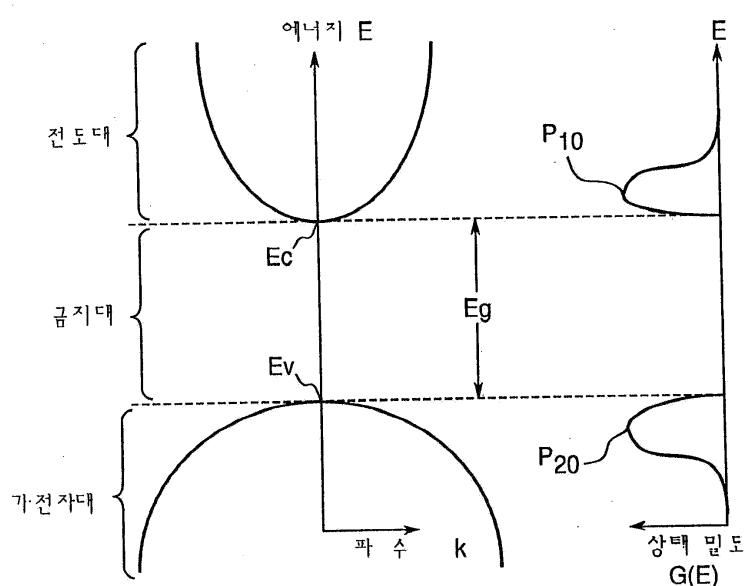
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9

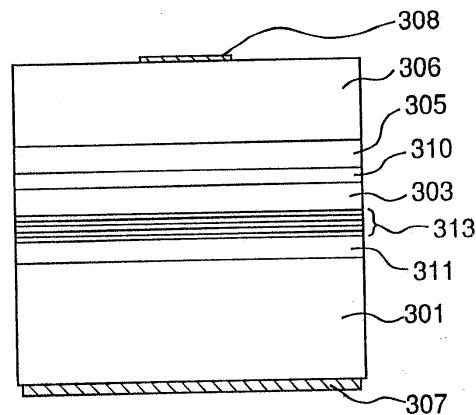
## 종래기술

## 종래기술



10

## 종래 기술



11

## 종래 기술

