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(71) 가 가

가 가 6 7 35

(72)

가	가	6	7	35	가	가
가	가	6	7	35	가	가
가	가	6	7	35	가	가

(74)

:

(54)

가 .

(110), (11, 12) (14, 16) / ,	(青紫色) (80) (18, 19) , (13T, 15F)	(LB) (14, 16) , (18, 19) 가 .	(11, 12) (11, 12) (80) (18) . .
(11, 12, 14, 16)	(13T, 15F)		(19)

1		1		
2	1		1	.
3	1		2	.
4	1	,		
5	1		,	0.2mm
6	1	1	,	404nm
6	1	2	,	0.2mm
6	1	2	,	405nm
7	1		,	0.2mm
7	1	3	,	406nm
8			2	
9	1	가		.
10	8	가		.

< >
 3: , 4: (), 5: , 6: , 8: , 9: 1/4 (/4
), 11: , 12, 14, 16: , 13T, 23T: . , 15F, 25F: . , 18,
 28: 1 , 19, 29: 2 , 27: , 80: , 81: , 82: , 85: ,
 110, 120: , 111, 121: , LA: , LB: , S1~S7: .

가

2000 - 19388 , (色收差)

(CD : Compact Disc)
Digital Video Disc)

780nm , CD
650nm .

가 , DVD(

, 405nm (LD)

450nm , 가 .

가 , 가 .

1

가 .

1

2

가

1

2

1

1

(青紫色)

2

가 .

2

1

2

¹
(介在)

가 .

1

가

1

2

가

1

2

1

1 , ,

2 ,
가 ,
,
1
2 , 가 .

2 , , 1 ,
2 , , 2 , 1 ,
가 .

2 , ,
1 2 , ,
, ,
가 .

,

(110)

1 1
(110) (11) (12, 14, 16) , 1 (18) , 2 (19) ,
(15F) , . (13T) 가 .
(11) (12) , , 1 (18)

(NA) (14, 16) , 2 (19)
0.85 .

(11, 12, 14, 16) 1 2 (18, 19)

1 (18) 2 (19) . 1 (18) (13A,
15A)

(13A) , (13A) (13T) , (11, 12, 14, 16) 가 (13B) (80) (13T) 가 ()

(15A) , (15A) (15F) , (11, 12, 14, 16) 가 (15B) (80) (15F) 가
가 .

. (15F) . . (13T) . , 2 . 가
 . (12) (LB) , (S2) . (11) (S1) . (LB) , . (11) (S1) .
 . (11) (S1) . (12) (S2) . (14) (S4) . (12) (S2)
 , (12) (S2) . (14) (S4) . (16) (S6) . (S3)
 . (14) (S4) . (16) (S6) . (S5) .
 . (16) (S6) . (80) (85) . (85) . (110) (S7) . (LB)
 (80) (85) .
 . (80) , . DVD (81, 82) , (85) 1 . (81) 2 . (82)
 . 1 2 . (82) , , (PC) , (n) 1.6
 . 2 .
 . 1 . (81) . (16) . (S7) . 0.1mm . 2 . (82) .
 . 1 . 1.2mm . (80) . (82) .
 0.151mm .
 .
 2 3 1 (11, 12, 14, 16)
 .
 . , (S1) . . 가 . (LA) . (S1) , (S1) . (S2) . (S2)
 . (S3) .
 .
 (S1) 12.527mm . - 1 .
 .
 . (S4~S6) R, K, A~G . 1 (非球面式)
 . , E - 2 10⁻² . , E - 3 10⁻³ . , E - 6 10⁻⁶
 .
 [1]
 X = Y² / [R + R { 1 - (1 + K) (Y/R)² }^{1/2}] + AY⁴ + BY⁶ + CY⁸ + DY¹⁰ + EY¹² + FY¹⁴ + GY¹⁶
 .
 . K 1 , X . Y . R (近軸)
 . K (定數)
 .
 A Y⁴ . B Y⁶
 .
 C Y⁸ . D Y¹⁰
 .
 E Y¹² . F Y¹⁴

G Y¹⁶

4 1 (110) (11, 12) (14, 16)

0.022 rms () 0.009 rms . , 0.2mm
rms ,5~7 (11, 12) (14, 16) , 0.2mm
404nm 406nm ,1 , (14, 16) , (LB) 404nm, 405nm 406nm 1 : 1 :
가 (14, 16) 0.051 rms nm nm 가
가 ,

, (14, 16) (11, 12)

(110) (11, 12) (14, 16)
(18, 19) , (11, 12) (14, 16) 가
가 ,19 , (110) 가 (稼動部) (11, 12) , (14, 16) , (18,
15T) (13A, 15A) 500mg , 가 , (14, 16) , (18,
(13T,
(120)8 2
(120) (11) , (12, 14, 16) , 1 (28) , 2 (29) ,
(25F) , (23T) , (27) 가 , , 8 (120) ,
1 (110)
(11) (12) , , 1 (28)(NA) (14, 16) , 2 (29)
0.85 .1 (28) , , (27) 가
4) (27) , , , (12) (S3) (14) (S
/ , , (27) (28, 29) /

1 (28) , (23A)

2 (29) , (25A)

(23A) , (3A) (23T) (23B) (23T) 가

(25A) , (25A) (25F) (25B) (25F) 가

(25F) (23T) , 2 가

(12) (LB) (S2) (11) (S1) (LB) (11) (S1) 405nm (11) (S1) 405nm

(11) (S1) (12) (S2)

, (12) (S2) (14) (S4) (S3)

(14) (S4) (16) (S6) (S5)

(16) (S6) (80) (85) (S7) (120) (LB)

(80) (85)

8 (29) (120) , (11, 12) (28) , (14, 16)

, (11, 12, 14, 16)

(25F) (14, 16) , (11, 12, 14, 16)

가

(111)

9 가 1

(6) (111) (8) (4) , (110) 가 (5) , (110) (3) , 1/4 (/4) (9) , 1~7

,

(4) (SL) (5) (4) (3)

	(3)	(5)	1/4	(9)	(110)
16)	(110)	,	(11, 12)	1/4	(9)
	.	(14, 16)		(11, 12)	(14, (80)
	,		(4)		
/	,	(110)	.	(13T)	(,)
)가			가	
/	,	(110)	.	(15F)	(,)
)가			가	
,	(110)	(80)	1/4	(9)	(3)
	(3)	(110)	()	,	
(6)	.			,	
	(6)	(3)	(8)	,	()
	.			,	
	(8)	(6)		(SA)	(8) ,
	, 4				
	(111)	(110)		(18, 19)	
	,		,	가	,
가	.				
	(121)				
10		가	2		
(6)	(121)	(4),	(5),	(3), 1/4	(/4)(9) ,
	,	(8),	(120) 가	,	8
	,	.	.	,	
	(4)	(SL)		,	
	(5)			,	
	,			,	
	(5)	(4)			(3)
	,				
	(3)	(5)	1/4	(9)	(120)
	,	(11, 12)	1/4	(9)	(14, (80)
16)	.	(14, 16)		(11, 12)	
	,		(4)		
/	,	(120)	.	(23T)	()
)가			가	
	,			,	

, (120) . (25F) ()
 /)가 가 .

, (120) (80) 1/4 (9) (3)
 (3) (120) () ,
 (6)

(6) (3) (8) , ()
 .

(8) (6) (SA) (8) ,
 , 4

(121) , (120) , ဂ ,
 가 .

(121) , (120) 가 (28) , (29) ဂ
 , , ဂ .

, (120) (28, 29) (軸棒) , (28)
 , (28, 29) ဂ ,
 (29) ဂ

, (110, 120) (14) (12) ဂ , (12) (11)
 , (11) (14) ဂ ,
 ဂ ဂ .

,

, ဂ , ဂ

(57)

1.

/

가

2.

1 ,

1 ,

2 가 ,

1 2

3.

1 ,

(青紫色)

4.

,
,

1 ,

2

가

5.

4 ,

1 ,

2 ,

1 2 (介在)

가

6.

4 ,

7.

,

,

가

,

,

,

,

/

가

.

8.

7

,

1

,

2

가

,

1 2

9.

7

,

10.

,

,

가 , .

, .

1 , .

2

가 .

11.

10 , .

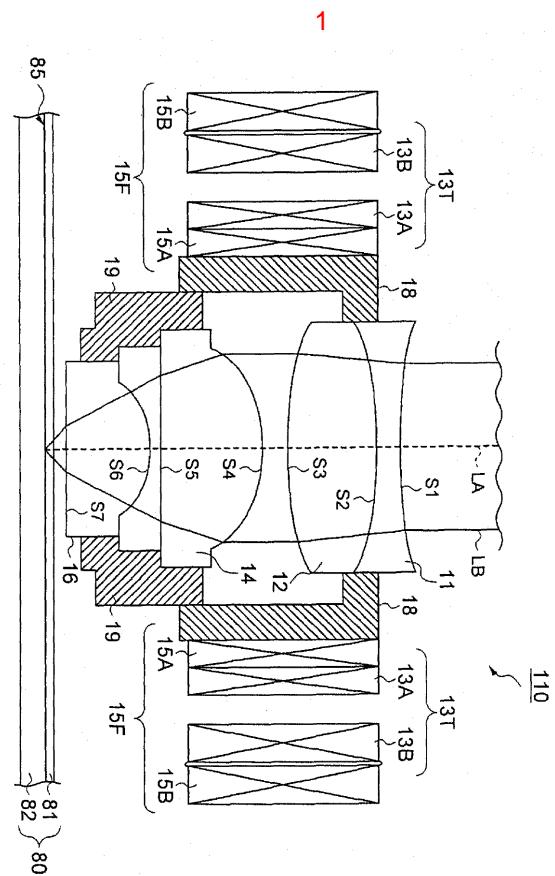
1 , .

2 , .

1 2 가 .

12.

10 , .



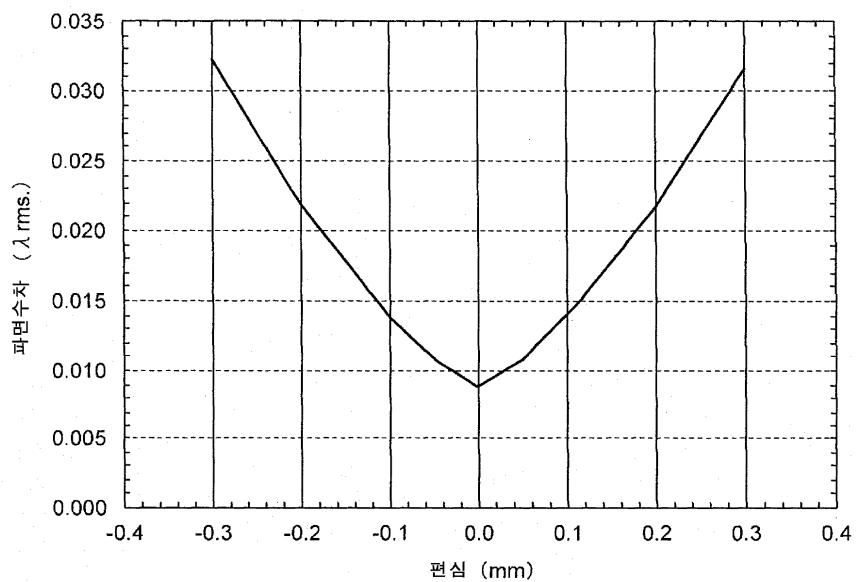
2

대물렌즈 NA/초점거리/입사동공 ϕ (0.85/1.61mm/2.74mm)			파장 $\lambda = 405\text{nm}$	
면	곡률 반경 [mm]	축상 간격 [mm]	유리 재료	405nm 에서의 글절률 n
S1	-12.527	0.6	S-TIH4_OHARA	1.806362
S2	9.72447	1.2		
S3	-5.81152	0.2	S-FPL51_OHARA	1.507170
S4 (STO)	R: 1.68783 K: -0.667189 A: 0.406199 $\times 10^{-2}$ B: -0.257314 $\times 10^{-3}$	C: 0.882582 $\times 10^{-4}$ D: -0.135952 $\times 10^{-3}$ E: 0.901189 $\times 10^{-6}$ F: 0.149379 $\times 10^{-4}$ G: -0.470536 $\times 10^{-5}$	1.70000	
S5	R: 22.81189 K: -9.484633 A: -0.724296 $\times 10^{-3}$ B: -0.145391 $\times 10^{-2}$	C: 0.991385 $\times 10^{-3}$ D: -0.404631 $\times 10^{-4}$ E: 0.0 F: 0.0	0.431922	FCD1_HOYA 1.505327
S6	R: 1.1587 K: -0.168812 A: -0.621577 $\times 10^{-2}$ B: -0.238516 $\times 10^{-2}$	C: -0.706222 $\times 10^{-3}$ D: -0.838563 $\times 10^{-2}$ E: 0.0 F: 0.0	1.184974	BACD5_HOYA 1.605256
S7	∞	—		

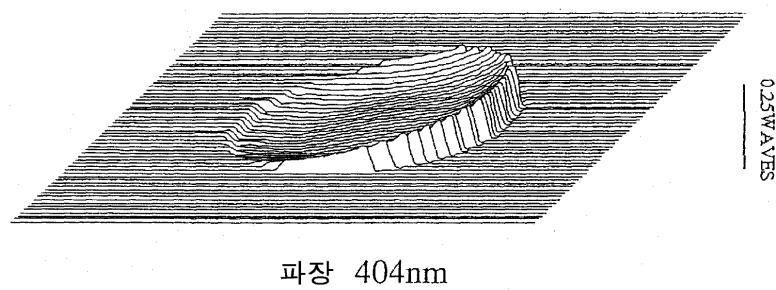
3

유리 재료	파장 406 [nm]	파장 405 [nm]	파장 404 [nm]
S-TIH4_OHARA	1.805801	1.806362	1.806928
S-FPL51_OHARA	1.507074	1.507170	1.507267
FCD1_HOYA	1.505234	1.505327	1.505421
BACD5_HOYA	1.605102	1.605256	1.605412
PC	1.6	1.6	1.6

4

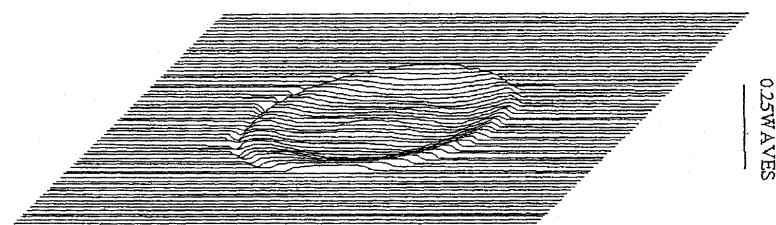


5



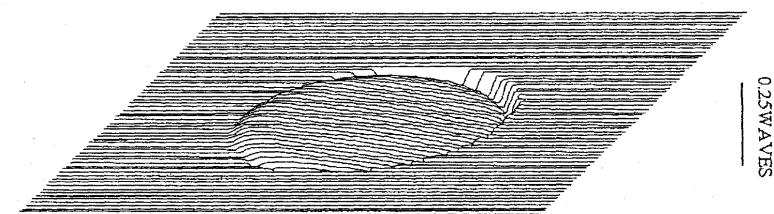
파장 404nm

6



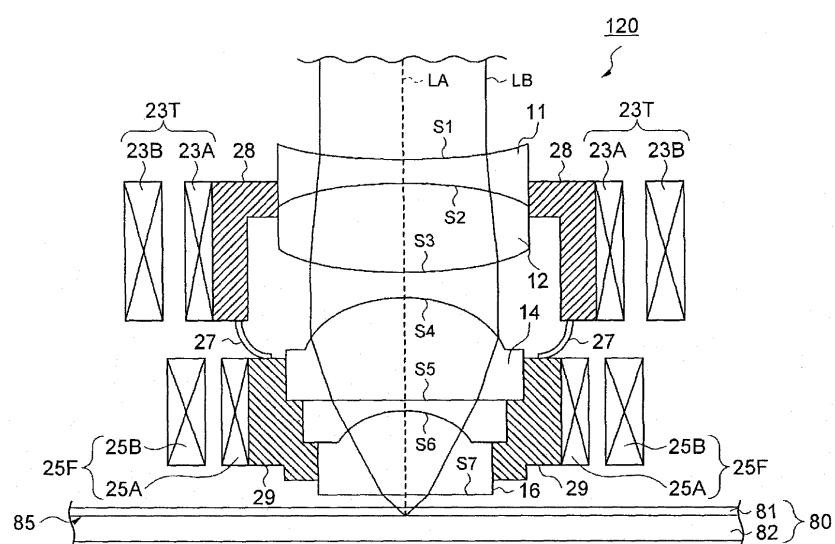
파장 405nm

7

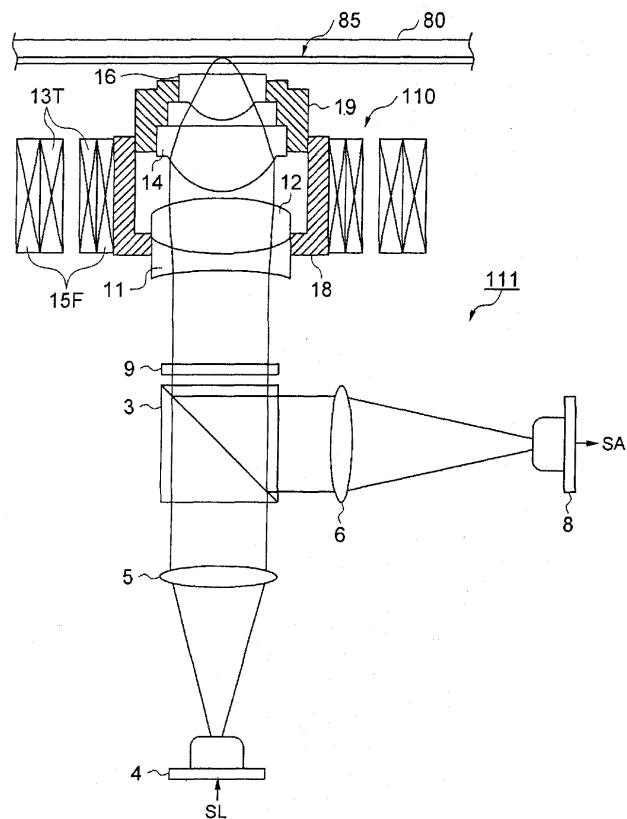


파장 406nm

8



9



10

