

(19)
(12)(KR)
(A)(51) 。 Int. Cl. ⁷
G03F 1/08(11)
(43)2002 - 0052941
2002 07 04(21) 10 - 2001 - 0081310
(22) 2001 12 19

(30) JP - P - 2000 - 00391795 2000 12 25 (JP)

(71) 가 가
가 가 4 6(72) , 2 - 502 - 204
, 가 3 - 90 - 103
, 2 - 12 - 29
, 가 3 - 780 - 1
, 가 1290 - 1

(74)

:

(54)

KrF

， ，

1 .

2 KrF .

3 .

4 .

< >

3s: 6n: n

6p: p 7:

8,9: 10: nMISQn

11: pMISQp 12:

13L: 13R:

14: HLD() 15:

16L1: 1 101:

102: Cr103:

104: 105:

106: 107:

108: 109:

110: 11: 가

112: 113:

， ， ， TFT，
， .

가

(Cr)

가

가

(描畵)

가

가

가

4 - 136854

가 0 가

가

가

가

가

(phase shifter)

0

가

0

1/2

0

가

가

20

40

5 - 289307

Cr

ArF

(193 nm)

가 가

KrF

가

()

ArF

0.1 μm 193 nm 1 % 가 .
 0.01 % 가 0.3 μm ArF K
 rF (248 nm) (0.3
 1.0 μm) 30 % KrF

Cr
 KrF KrF
 KrF KrF

(248 nm) 30 % (0.3 1.0 μm) KrF
 KrF KrF
 KrF KrF

Cr KrF
 KrF
 Cr 가 KrF

KrF

(1) Cr KrF , 1 8

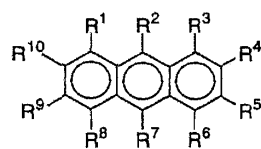
1

" "

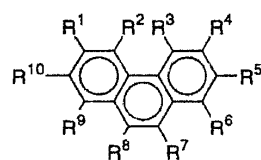
,

,

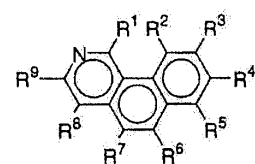
1



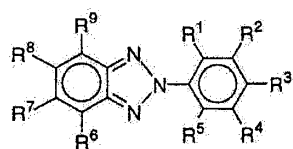
2



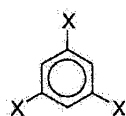
3



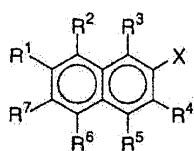
4



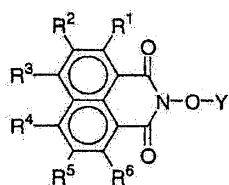
5



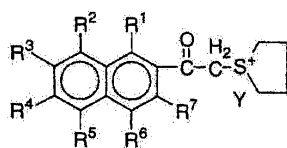
6



7



8



4 R^1 R^{10} , 1 4 , , , , 1
, R^1 R^{10} , , X
, Y ,
.
, 9 - , 9 - , 1 - - 9,10 - , 2 -
, 2 - , 9 - , 2 - - 6,7 - , 1 -
- 4 - - 2 - , 1,3,5 - () , 3 - , 3 -
7 - - 1,4 - - 2 - .

1 %, 0.5 % 가 KrF

(2) KrF

KrF 2 % 16 % , 4 % 9 % 가
 , π , 3π KrF

(3) 가 가 가 , 가 , .
가 , (1) .
가 , (HMMM)
1 3 , m -
, p - , 1,3,5 - , 2 - - 5 - - 1,3 - , 3,5,3',5' -
- 4,4' - , (3',5' - - 4' -) , 2,2 - (3',5' -
- 4' -) , 1,4 - (2 - (3',5' - - 4' -)) , 1,3 - (2 -
- 2 -) , 1,3 - (3 - - 3 -) , 1,3 - (2 - - 2 -) - 5 - ,
5 - - 1,3 - (2 - - 2 -) , 5 - - 1,3 - (2 - - 2 -) , 1,4 -
(2 - - 2 -) , 1,4 - (3 - - 3 -) , 1,4 - (2 - - 2 -) - 2,3,5,6
- , 2 - - 1,4 - (2 - - 2 -) , 2 - - 1,4 - (2 - - 2 -
) , 1,3,5 - (2 - - 2 -) , 1,3,5 - (3 - - 3 -) , 1,5 - (2 -
- 2 -) , 1,4 - (2 - - 2 -) , 9,10 - (2 - - 2 -)
 , - t - , p - - o - ,
() , () ,
(2,3 -) .

(4) KrF 가 , 가 .
가 KrF .

(1)

(5) (3) 가

,

가 .

,

가

가

.

가 .

가

.

(6) 0.5 % , KrF 1 % ,

(7)

Diagram illustrating a complex relationship involving various variables and their derivatives, likely related to a physical or chemical process. The diagram includes terms such as LSI , KrF , Cr , and their derivatives (e.g., LSI' , KrF' , Cr'). It also includes numerical values like 20, 40, and 1. The diagram is organized into several interconnected parts, with some terms appearing multiple times.

(8) $\text{ArF} \rightarrow \text{KrF} \rightarrow \text{K}$

(1)

가 (TPPA1100 - 3C (가 가 가)): 100, 가 (HMMM): 10, : 10, 0.2 μm 9 - : 30, 가 100 2 0.32 μm (가 30 kV) 40 6.0 $\mu\text{C}/\text{cm}^2$ 가 (2.38 %) 1 mm 100 10 가, 248 nm κ 0.28 κ , d λ T, $k = -\lambda \cdot \ln(T)/(4\pi \cdot d)$

(2)

1 9 - 30 15 , 가
 248 nm κ 0.12 .
 (3)
 TPPA - 1000 - P (가가 가 가) 9 -
 가 , 가
 (2.38 %) 82 nm/s , (4 -)
 2 - 3 가 3
 가 3 p -
 1,4 - : 100 , 0.2 μm
 3 : 4 2 - , 10
 0 5 가 (가 30 kV) , 100
 2 (2.38 %) 30
 7.0 $\mu\text{C}/\text{cm}^2$
 248 nm κ 0.26 .

(1)
 1 가 KrF
 2(a) (e) KrF
 2(a) Cr
 , (101) , (102)
 (blank) 2(b) 1
 가 , 100 가 0.5 μm
 (103) 2(c) (charge up)
 (104)
 (105) , 2(d) (106) 가
 50 kV, 6 $\mu\text{C}/\text{cm}^2$. 100
 10 가 , 2.38 % 40
 , 2(e) 가 (107) 0.8
 μm 0.16 μm 가 KrF
 0.3 % 가 KrF 248 nm
 가 Cr 가
 가 ,

363.8 nm Ar

KrF

40 %

가
가

가 () 가

가

Cr

Cr (660 nm) Cr KrF 가

가 KrF 0.3 % 가 1 % 가 1 % 가 0.5 %

(2)

2 1 가 248 nm 8.5 % 1.9 K
0.41 μm 가 248 nm
3 π 100 J/cm² 가 가 KrF

3 " "

가 KrF Cr 2 가 가
 $\pm 10^\circ$ 가 3 π 가 9-

- (3)
 1 1 3
 1 1
 50 kV 12 $\mu\text{C}/\text{cm}^2$, 100 10
 (103) 2.38 % 60
 KrF 가 0.5 μm , 1.0 μm 0.2 μm 가
 248 nm 0.4 %
 248 nm 8.5 %
 9 - 16 % 16 % 2 %
 . 2 % 가 가
 . 4 % 9 % , 16 %
 1
 (4)
 1 KrF
 (5)
 가 Cr KrF
 가 가 1
 가 3
 (NA 0.6), 1/5 KrF (pellicle)
 KrF
 1 1
 Cr
 (6)
 가 Cr

2 KrF 가 , 가

가 , (NA 0.6), 1/5 KrF KrF

0.2 μm ,

1 2 1

Cr ,

(7)

KrF 가 4

가 ,

가 ,

(8)

1 , 1 가

0.14 μm 가 248 nm 14 % 248 nm

1.9 , π , (

) .

(9)

9 1 . 1 (101) , (107) , (108) (KrF

), (109) , (110) , (111) 가 , (112) , (113)

1 , 2,

3 4 가 (111) ,

W Al , , (112)

SiON ,

(113)

(107), (113)

KrF KrF

가 ,

(112) 가 (111) 가

5 - 289307

ArF

가

가

가

가

(10)

10

CMIS (Complementary MIS)

, 4

4 ,

(3s) ,

n -

Si

n 6n p 6p가

n 6n ,

n

As가

, p 6p ,

p

가

. n p

(3s)

(

).

가

, 4(a)

(3s)

(17)

(18)

(18)

(17)

1

KrF

, KrF

2 μ m

i

KrF

KrF

가

KrF

1

, KrF

1 μ m

(ashing)

(18)

(17)

, 4(b)

(3s)

(19)

(20)

(19)

(20)

KrF

1

KrF

2 μ m

(20)

(19)

(3s)

(1) ,

(7)

(4(c)). ,

LOCOS (Local Oxidization of Silicon)

, LOCOS

(bird's beak)가

가

가

KrF

1

KrF

(7) nMIS Qn pMIS Qp가 . nMIS Qn pMIS Qp
 (8) , , nMIS Qn
 pMIS Qp (9) , CVD KrF
 , KrF
 F 1 (9) , KrF
 2, 3, 4, 8 KrF

nMIS Qn (10) , (9) (9) (3s) , pMIS Qp
 (11) , (9) (9) (3s) (9) ,
 , 가 가 ,

(3s) 4(d) , CVD KrF
 (12) CVD KrF
 (patterning) ,
 (13L) (13R) KrF
 KrF 가 ArF KrF
 가 ArF , KrF
 . ArF
 . ArF

4(e) (12) (14) (3s) , (14) CVD
 (15) KrF (10), (11) (13L) 가 KrF
 8 , KrF

0.18 μm KrF , 0.15 μm
 ArF . KrF 0.15 μm
 가

ering) CVD (3s) (Ti), (TiN) (W) (sputt
 f) 1 KrF (16L1) KrF 1 (16L1)
 2 (pitch)가 0.36 μm K
 rF 0.3 μm ArF

LSI 1 가 가 1
 TAT 가 2 0.35 μm (0.8 μm)
 (0.248 μm) KrF 1

Cr TAT
 KrF 가

KrF

, KrF

가 가 ,

가 .

(57)

1.

KrF

1 %

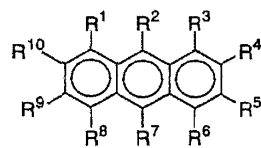
KrF

1

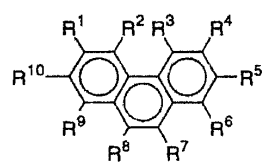
8

1

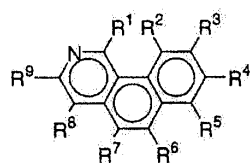
< 1>



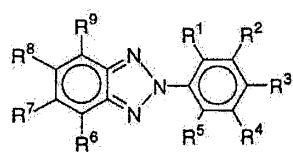
< 2>



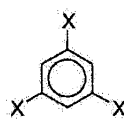
< 3>



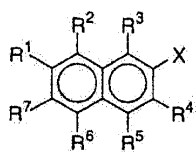
< 4>



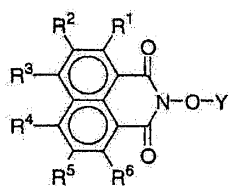
< 5>



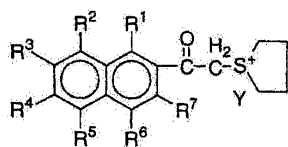
< 6>



< 7>



< 8>



4 R^1 R^{10} , 1 4, 1
 , R^1 R^{10} , X
 , Y

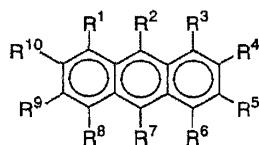
2.

1, KrF 0.5 %

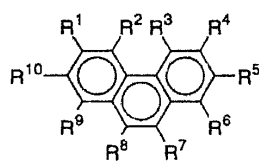
3.

2 % 16 % , KrF
 1 8 1
 , KrF

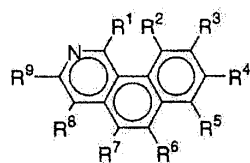
< 1>



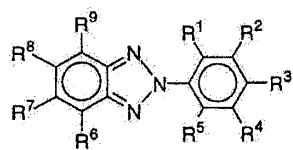
< 2>



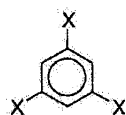
< 3>



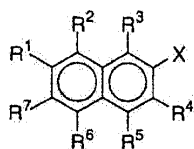
< 4>



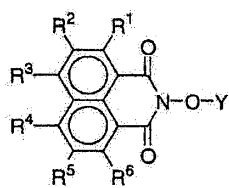
< 5>



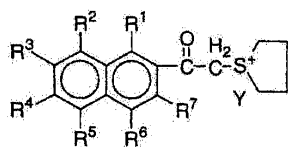
< 6>



< 7>



< 8>



4 R¹ R¹⁰, 1 4, 1
 , R¹ R¹⁰, X
 , Y

4.

3, KrF 4 % 9 %

5.

1 4, 40 %
 가

6.

1 5,

7.

6,

8.

KrF

KrF

1 %

9.

8

KrF

0.5 %

10.

KrF

2 %

KrF

16 %

11.

10

KrF

4 %

9 %

12.

8
가

KrF

180

13.

KrF

40 %

KrF

1 %

KrF

14.

13

KrF

0.5 %

15.

KrF

40 %

KrF

2 %

16 %

KrF

16.

15

KrF

4 %

9 %

17.

13 14 , KrF 180
가

18.

가 , KrF
가 , KrF
KrF 1 % 가 ,

19.

18 , KrF 0.5 %

20.

가 , KrF
가 , KrF
KrF 2 % 16 % 가 ,

21.

20 , KrF 4 % 9 %

22.

가 , KrF
가 , KrF
KrF 1 % , 가
KrF 180 가

23.

22 , KrF 0.5 %

24.

18 23 ,

.

25.

18 23 ,

KrF

, KrF

가 ,

KrF
KrF

1 %

180 , 가

.

26.

25 , KrF

0.5 %

.

27.

가

, , KrF
, 가
가

28.

가

, , 가
, KrF
, 가
가

29.

28 , 가 .

30.

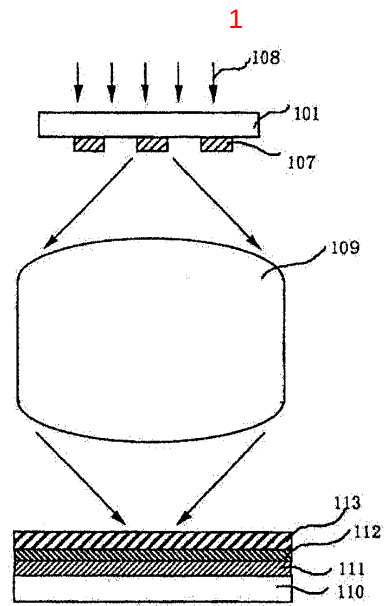
28 29 , KrF 가 가

.

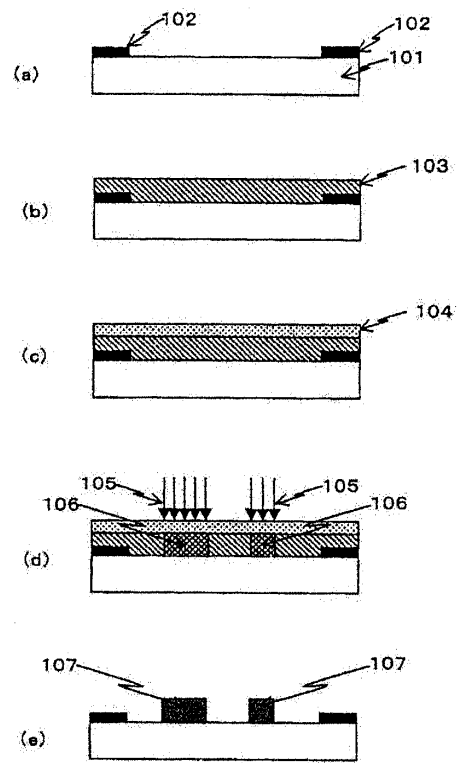
31.

8 9 , KrF

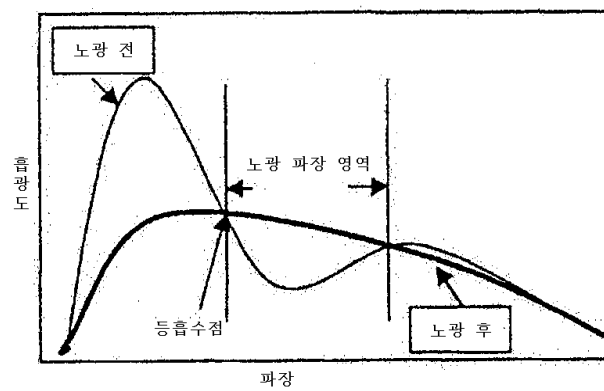
.



2



3



4

