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10-0431810
2004 05 06

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(65)
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10-2003-0033248
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(73) 136-1

(72) 157-14 301

(74)

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(54)

(MIM, metal-insulator-metal)

MIM

1 MIM
2 MIM

2i

1a MIM
2a MIM

1j
2i

< >
11, 101 : 13, 103 : 1
15, 105 : 1Ti/TiN 16, 106 : 1Ti/TiN
17, 107 : 1Al 18, 108 : 1Al
19, 109 : 2Ti/TiN 20, 110 : 2Ti/TiN
21 : 22 :

23 : 24 :
 25, 115 : 1 27, 119 : 2
 29, 117 : 2 31 : 3
 33 : 35, 123 :
 37, 125 : 3Ti/TiN 39, 127 : 2Al
 41, 129 : 4Ti/TiN 111 : 1
 112 : 1 113 : 2
 114 : 2 121 : 1
 122 : 2

(multi-layer me
 talization) (micro loading effect)
 MIM
 MIM
 MIM
 1a 1j
 (15) Ti 1 (13) 1Ti/TiN (15) 200 600 (13) 1Ti/TiN
 , TiN
 , 1Ti/TiN (15) 1Al (17) 4000 5000
 , 1Al (17) 2Ti/TiN (19) 300 700 1Ti/TiN (19)
 Ti , TiN
 , 2Ti/TiN (19) (21) (21) SiO_xN_y, Si₃
 N₄ PE-CVD 500 1500
 , (21) (23) (23) Al, Ti/Ti
 N Al Ti/TiN 1000 3000 . (1a)
 , (23) 1 (25)
 . (1b)
 4) , N₂ 가가 (22) , (23) Cl₂/BCl₃ 가 (21) 가 (2)
 (21) C_xF_y 가 가 , CHF₃, O₂ Ar 가 가가 ,
 , 1 (25) . (1c)
 , 2 (27) 2Ti/TiN (19), 1Al (17) 1Ti/TiN (15) . (1d)
 2Ti/TiN (20), 1Al (18) 1Ti/TiN (16) , N₂ 가가
 , Cl₂/BCl₃ 가 가
 , 2 (27) . (1e)
 spin on glass) Fox(flowable oxide) (29) 2 (29) SiO₂, SiO₂₋, SOG(
 , 2 (29) (chemical mechanical polishing, CMP)
 . (1f)
 , 2 (29) 3 (31)
 (1g)

, 3 (31) 2 (29) (33) .
 , C_xF_y (24) .
 , 3 (31) . (1h)
 , (33) (24) (35) . (1i)
 , 3Ti/TiN (), 2Al () 4Ti/TiN (41), 2Al (39) 3Ti/Ti
 N (37) . (1j) MIM
 , ,
 .
 , MIM
 , .
 , MIM
 , 1 , 2
 , MIM
 , MIM
 , 1 2
 1,2 1 2 , , 1
 2 , 1 2
 , 1 2
 , 1 2 MIM
 1 2 , 1
 2 1 2 , 1
 1 2 , 1
 C/O 2 , 2 2 , 1 2 MIM
 , MIM 1 D 가 2 d 2
 , 2a 2i MIM (101) 1 (103) .

N (105) Ti (103) 1Ti/TiN (105) 200 600 , TiN , Ti/Ti

1Ti/TiN (105) 1Al (107) 4000 5000

1Al (107) 2Ti/TiN (109) 300 700

2Ti/TiN (109) Ti , TiN

2Ti/TiN (109) 1 (111) 2 (113) (113) Si₃N₄

1 (111) SiO_xN_y (113) 700 1300

1,2 (111,113) (21) (2a) (115)

(2b)

1 (115) 2 (113), 1 (111), 2Ti/TiN (1 (11

09), 1Al (107) 1Ti/TiN (105) 2 (114) 1 (111), 2Ti/TiN (11

2) 2Ti/TiN (110), 1Al (108) 1Ti/TiN (106)

2 (113) 1 (111) C_xF_y가 Cl₂/BCl₃ 가 가

2Ti/TiN (109), 1Al (107) 1Ti/TiN (105)

2 (114) 1 (112)

1 (115)

MIM (2c)

1 (115) (117) 2 (117) SiO₂ , SiO₂-

, SOG(spin on glass) Fox(flowable oxide) SiO₂- SiO₂

2 (117) (chemical mechanical polishing, CMP) (2d)

2 (117) 2 (119)

2 (119) 2 (d) 1

(D) MIM 2 (d)

1 (D) (D>d) (d)

2 (114) 2 (d) 가

(2e)

2 (119) 2 (117) 1 (121) 2

(122) (d) (micro-loading effect)가 (D) (D>d) 2

가

1 (D) 1 (121) 1 (112) 2 (122)

(114) 2Ti/TiN (110) 2 (d) 2

2 (117), 2 (114) 1 (112) C_xF_y

2 (112)

2 (d) 2 (114) 1 (D)

2 2Ti/TiN (110) (114) C/F

C/O 1 2 (117) 1 (112)

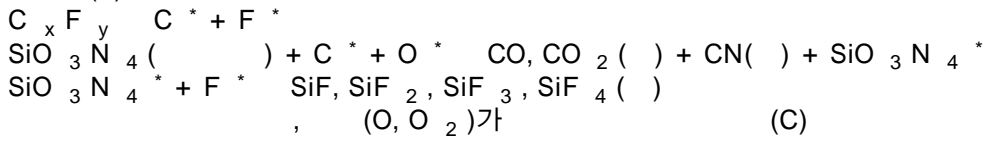
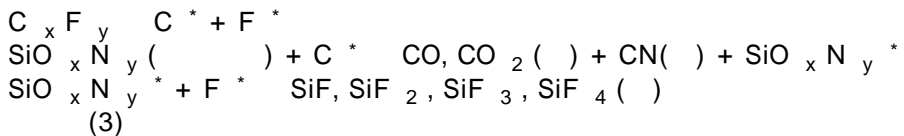
2 (114)

(1) 2 (117)

(2) 1 (112), (3) 2 (114)

(1)
 $C_xF_y = C^* + F^*$
 $SiO_2, SiO_{2-}, SOG, Fox() + C^* = CO, CO_2() + SiO_2^*, SiO_{2-}^*, SOG^*, Fox^*$
 $SiO_2^*, SiO_{2-}^*, SOG^*, Fox^* + F^* = SiF, SiF_2, SiF_3, SiF_4()$

(2)

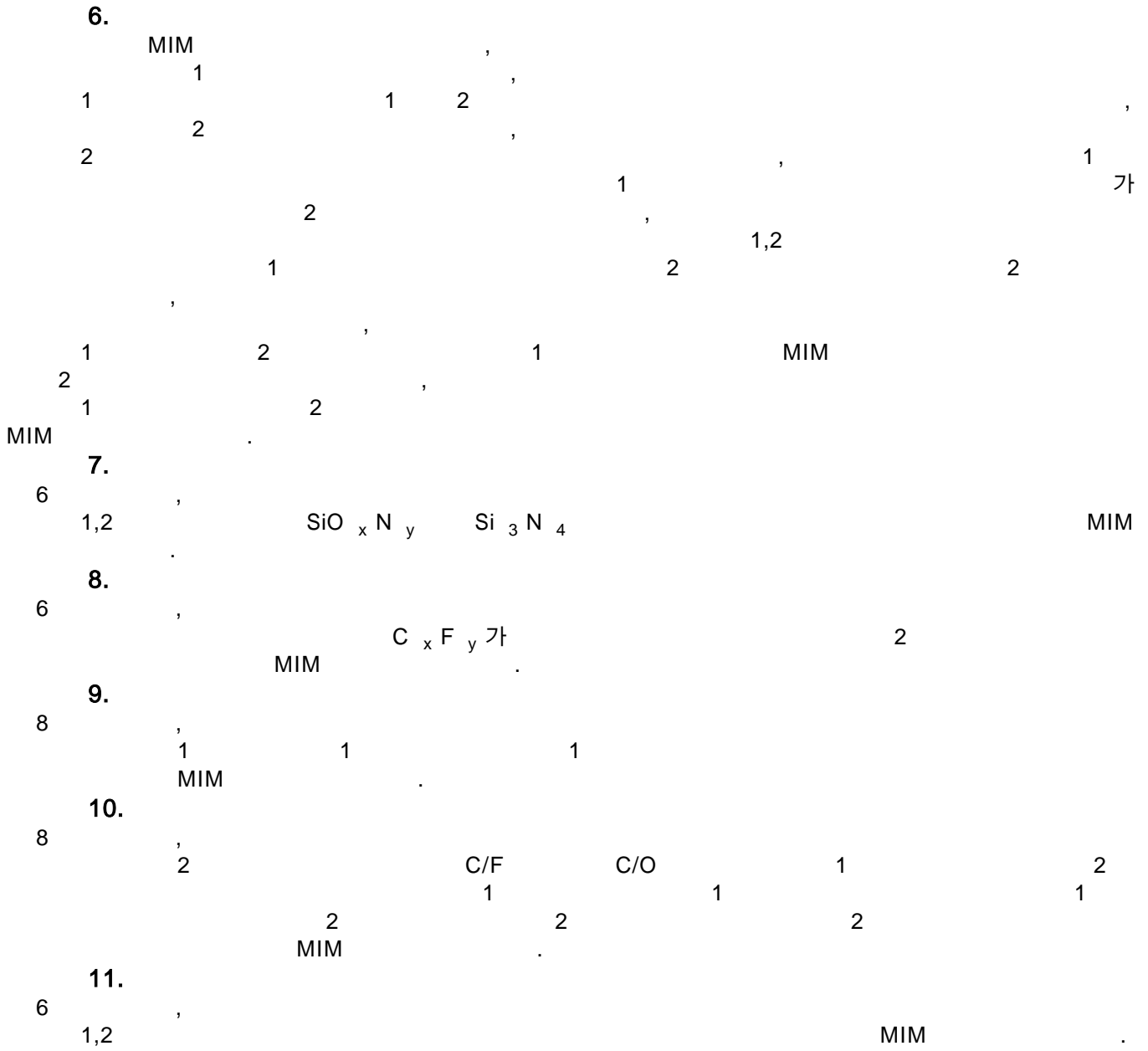


가 (F) (pol ymer)

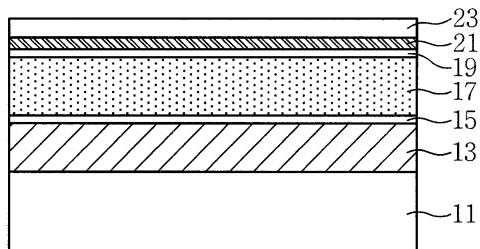
(119) (2f, 2g) CMP (123) (122) (123) MIM (125) 3Ti/TiN (), 2Al (), 4Ti/TiN (), 2Al (127) 3Ti/TiN (112) MIM (114) (108) (108) (123)가 (2i)

(micro-loading effect) MIM MIM

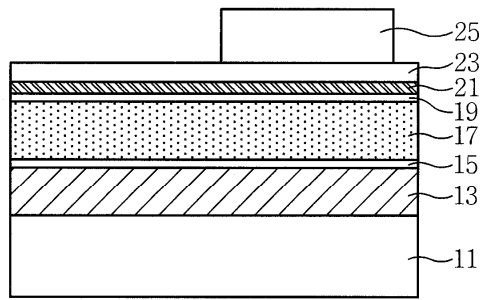
- (57)
1. MIM 1 2
 2. MIM 1 2
 3. SiO_xN_y Si₃N₄
 4. Ti/TiN/Al/Ti/TiN
 5. 2
- (D) 2 (d)



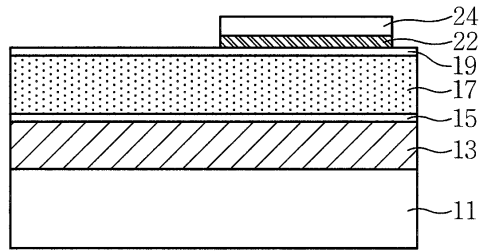
1a



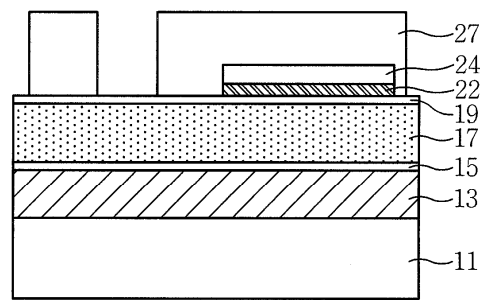
1b



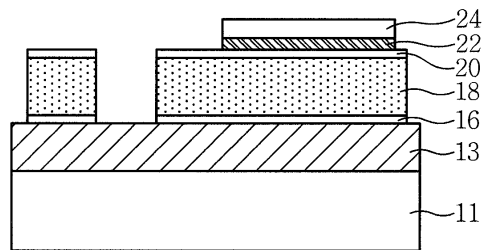
1c



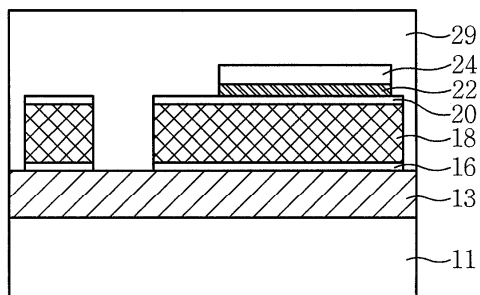
1d



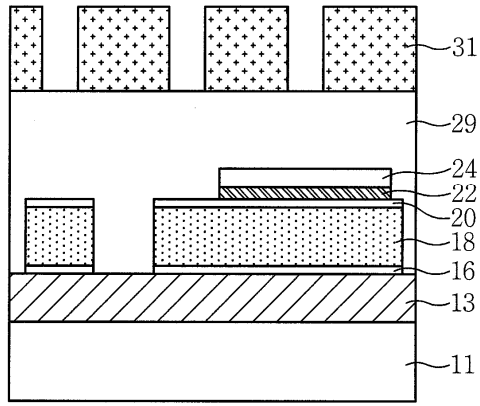
1e



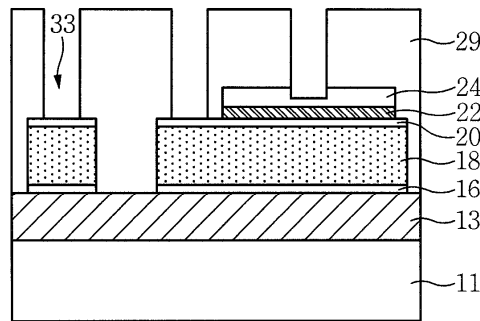
1f



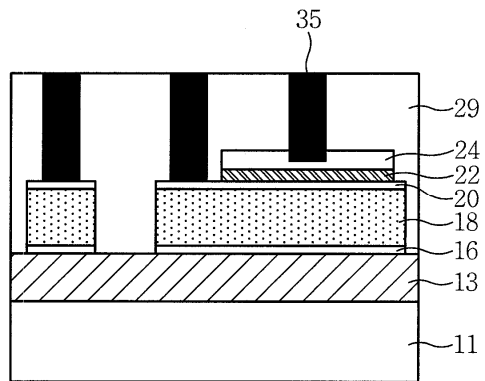
1g



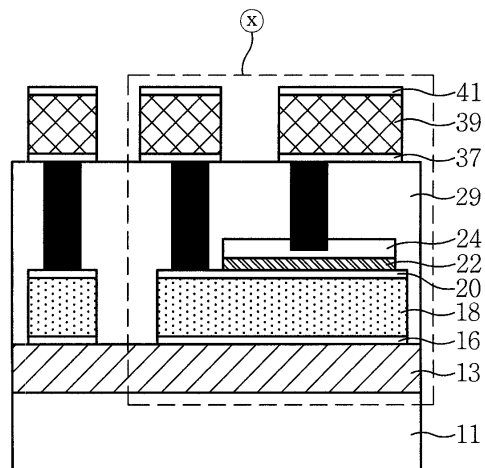
1h



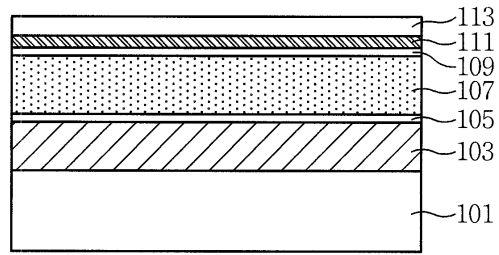
1i



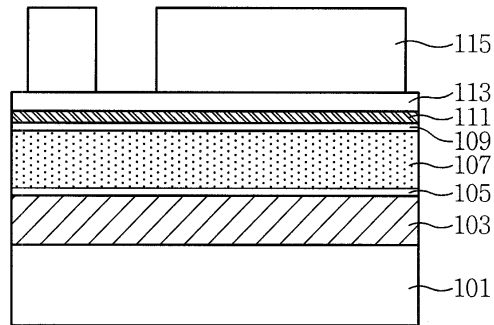
1j



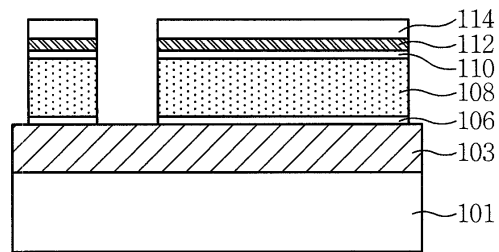
2a



2b



2c



2d

