

(19)
(12)

(KR)
(B1)

(51) 。 Int. Cl.7
H01L 27/105

(45)
(11)
(24)

2003 08 25
10-0395766
2003 08 12

(21) 10-2001-0006813
(22) 2001 02 12

(65)
(43)

2002-0066568
2002 08 19

(73) 3 416

(72) 24

24

(74)

:

(54)

가

가

2

1

2

;

3a

3j

2

*

200:

202:

204: 206a, 206b: ,
 208, 216, 230: 210a, 210b, 218:
 212a: 212b:
 214: 220:
 222: 224:
 226: 228:
 232: 1 234:
 236: 238: 2
 240:

가 ,
 가 (ferroelectric random access memory: 'FRAM') 가 (access) (random)
 , FRAM 가 , 가 (hysteresis)
 가 FRAM , (flash memory) (5V),
 (nsec), 가 가
 DRAM(dynamic random access memory) , FRAM (local interconnection)
 5,119,154 가
 FRAM FRAM FRAM 5,854,104
 5,591,663
 1
 6b) (100) (104) 1 (108) (104)가 (100) (106a), (10) (104)
 (100) (104) 1 (108) (108) (108) 1 (108)
 (114) 1 (108) (106a) (112) 2 (112) (114) 1 (108)
 (119) (108) (112) 2 (114) (114) (119)가 (126)가
 (126) 2 (114) 2 (114) (114) 3 (128) (119)
) (126)가 (106b) (119) 10
 8(4000 6000) 114(3000 5000) (118) 가

1
4가) (124) , (118) (119) (119) (120), (122) (126)

(119) (120) (118) 가 ,

가, 가 , 가 .

(perovskite)

550 .

(contact failure) () , ,

가 , 가 .

()

가 , 가 , 가

가 가

가 1 , 1

가 2

2

1

1 1 1

2 2 2

2 2 2

2 2 2

2 2 2

2 2 2

2 2 2

가

1 1

2 / 2

O₁₂, PbTiO₃ , (IrO₂) 1500 , PZT, PLZT, SBT, SBTN, SBTT, BaTiO₃, SrTiO₃, Bi₄Ti₃ (Ir 1500 300

PZT 1200 , 2000 가
 , 2 ,
 1 3 , 3 1 ,
 2 ,
 (Ti/TiN) / (W) /
 (SiON), (SiN), (Al₂O₃) ,
 100 500 ,
 1 1 , 1 1 , 1 1 ,
 1 1 1 1 1 ,
 1 1 1 1 1 ,
 2 2 2 2 ,
 2 2 2 2 ,
 2 2 2 2 ,
 가 / (Ti/TiN) / (W)
 O₃) 100 500 (SiON), (SiN), (Al₂
 , 2 2 ,
 2 2 ,
 , 2 3 1 , 1 3 ,
 , 3 1 2 ,
 IrO₂) 1500 , 1500 (Ir), 500 (,
 , 2000 가 300 가 PZT 1200 (,
 1 1 2 , 1 1 2 ,
 1 , 2 1 2 ,
 , 2 1 2 ,
 가 가 가 가 ,
 () 가 () 가 ,
 , 가 () 가 ,
 2 , 1 ,
 2 , ,
 2 , ,
 (202) 2 (200) (200) (204)

가 (204) () (206b) ()
 206a) (200) (204) 1 (208) ()
 1 (208) 1 (210a, 210b) 1 (208) (208)
 1 (210a, 210b) (212a) (212b) (212b)가 (212b)가
 1 (208), 2 (216) (226)가 (220), (222) (224)
 2 (218) (220) (212b) (212a) (216) (212b)
) 2 (218) 1 (208) (214) (212b)가 (212b)
 2b) (220) (212b)가 (212b) (212b)
 14) (220) (212b)가 (212b) (212b)
 (230) (226) 2 (216) 3 (230) (230) 3
 1 (232) 3 (230) (230) (230)
 4) (234) (234) 2 (238) (238) (240)
 2 (238) (234) (234) 2 (238) (240)
 (226)가,
 (212b) (220) (208: 1 216: 2)
 (214) (204) (206b) () ()
 214) (212b) (212a) 1 (208) ()
 (118) 1 (208) ((210b: 1 , 210a: 2) , 1
 (218: 3) 2
 (220) (212b) (216) 1 (114, 3000 5
 000) 가 , 1000 2 (216) (220) (206b)
 가 (212b)가 (212a)
 (212b) (220) (214) (SiON), (SiN), (2
 12a) (Al₂O₃) / 100 500 (Ti/TiN) / (W)
 1500 (Ir), 500 (IrO₂) 1500
 , 2000 300 가 PZT 1200 (226)
 (238) 1 (232) 2 (238) (228) , 2
 , 1 (232) (204)
 3a (200) 3a 3j
 (202) (Local Oxidation of Silicon), (Shallow Tr
 ench Isolation) (200)
 () (가)
 (206b) (206a) (204) (200) 1 (208)
 1 (204) CVD (chemical vapor deposition) ,
 4000 6000 , BPSG (borophosphosilicate glass), USG(undoped silic
 ate glass), PE-TEOS(plasma enhance tetraethylorthosilicate glass)
 3c 3b (206b) (206a) 3b

1 (206a) (208) 1 210a 210b가 (206b) 1 210a
 (206b) (206a) (210b, 210a) 1 (208)
 3c (212b) (206a) (206b) (212a)
 (212b) 1 (208) / Ti/TiN 1 (210b)
 (212b) 가 , 가
 3d (212b), (212a) 1 (208)
 (214) (212b) (214)
 (SiON), (SiN), (Al₂O₃) (ALD:atomic layer deposition)
 가 , 100 500
 2 (212a) (216) CVD (214) 2 (216)
 (212b) 1000 (208)
 3e (212b) 2 (218) (216) (214) 1 (210b, 210a)
 (218) (218) (212b)
 가
 3f (222) (224) 2 (218) (224, 222, 220) (220), 3g
 (212b) (Ir), (Rd), (Ru) (Pt) (226)
 (220) (IrO₂)/
 500 가 1,500 가 1,500 가

(222) , PZT(lead zirconium titanate), PLZT(lead lanthanum zirconate titanate), SBT(strontium barium tantanlum), SBTN(strontium barium tantalum nitride), SBTT(strontium barim tantalium tita nate), BaTiO₃, SrTiO₃, Bi₄TiO₁₂, PbTiO₃, PZT가 2000 PZT
 (224) , / 300 가
 , 1,200 가
 가
 (224) / (228)
 (228) , (Al₂O₃)
 가 ,
 가
 1 3i (228) 3
 (230) 1 1

1
 2 (:plate line) 3j 1 (232)
 (234), 2 2 (234) (228) 2 (224)
 (236) 3 (230) (238) (240) 2

가

가,

(206b)

()

가

가,

가

가

, 1 () 2 () 1

가

(overhang)

(57)

1.

1 ;
 1 1 ; 1 ;
 1 ;
 2 1 ;
 2 2 ;
 2 ; 2

2.

1 / (Ti/TiN) / (W)

3.

1 2 1

4.

1 (SiON), (SiN), (Al₂O₃)

5.
 1 ,
 2 2 ;
 2 ;
 ;
 ;

6.
 1 5 ,
 3 2 ;
 3 1 ;
 1 ;
 2

7.
 6 ,

8.
 1 ;
 1 ;
 ;
 2 ;
 2 ;
 , 가

9.
 8 ,
 1 ,
 1 1 ;
 1 1 ;

10.
 9 ,
 2 2 ;
 2 2 ;
 2 2 ;
 ;
 ;

11.
 10 ,
 2 1

12.
 10 ,
 3 2 ;
 3 1 ;

1 ;

2

13.

12 , / (Ti/TiN) / (W)

14.

12 13 , (SiON), (SiN), (Al₂O₃)

15.

14 ,

16.

1 1 ;
1 1 ;

1 ;
2 2 ;
2 1 ,

17.

16 , (SiON), (SiN), (Al₂O₃)

18.

19.

16 ,

20.

16 , 1

21.

1 1 ; 1
1 ; 1
1 2 ;
2 , 2 ;
1 2 ,

22.

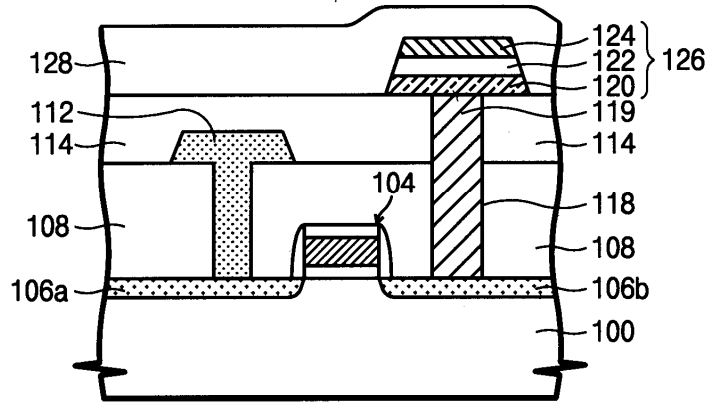
21 , (SiON), (SiN), (Al₂O₃)

23.

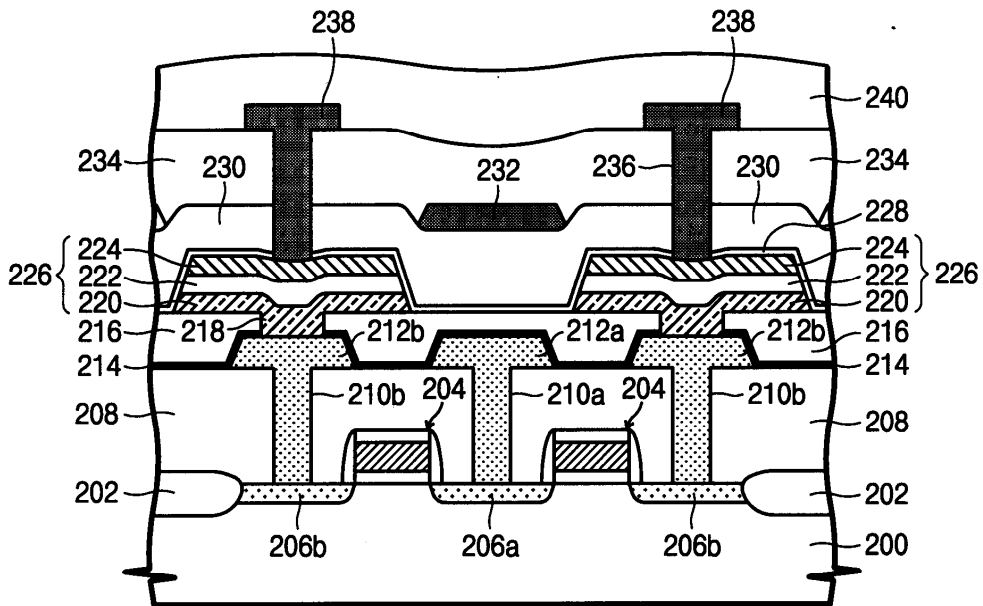
24.

21 ,

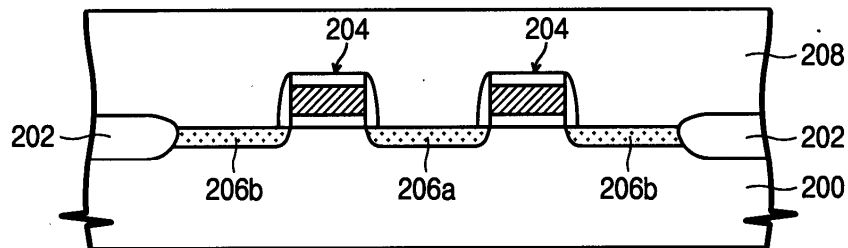
1
(종래 기술)

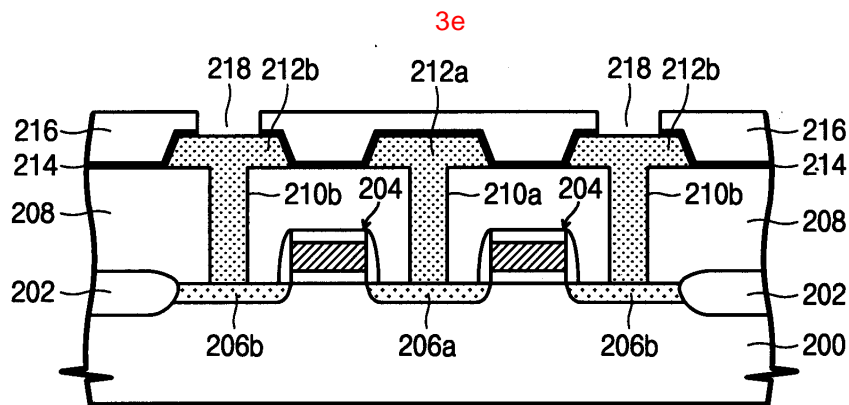
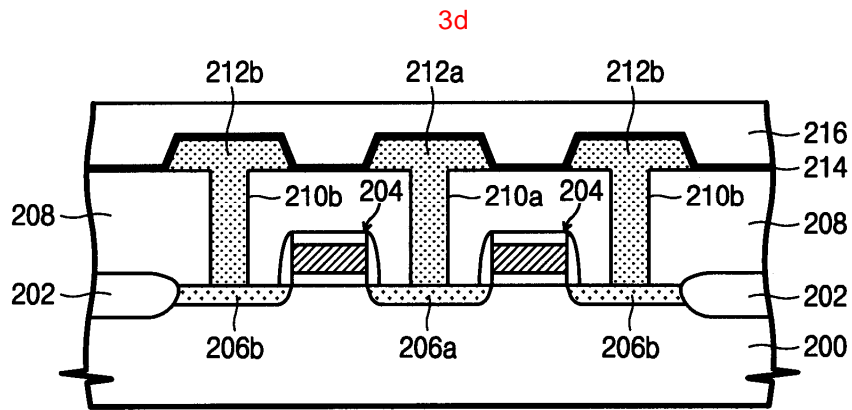
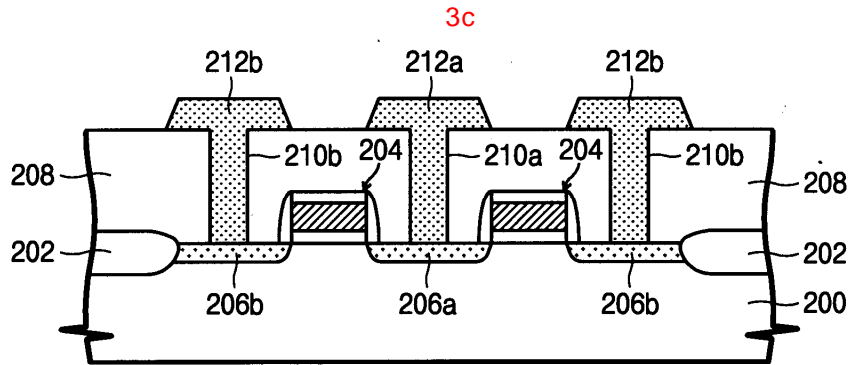
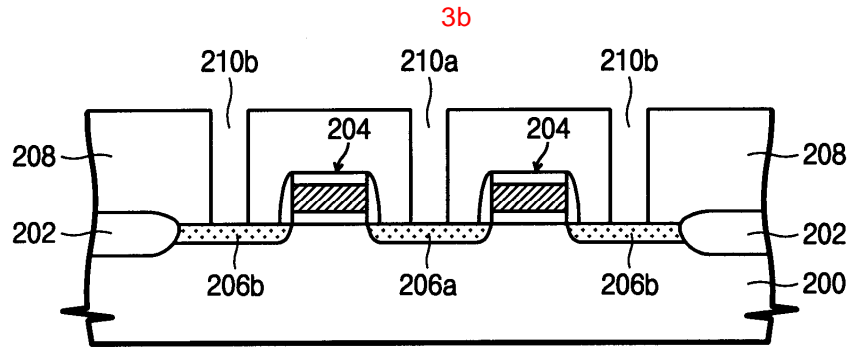


2

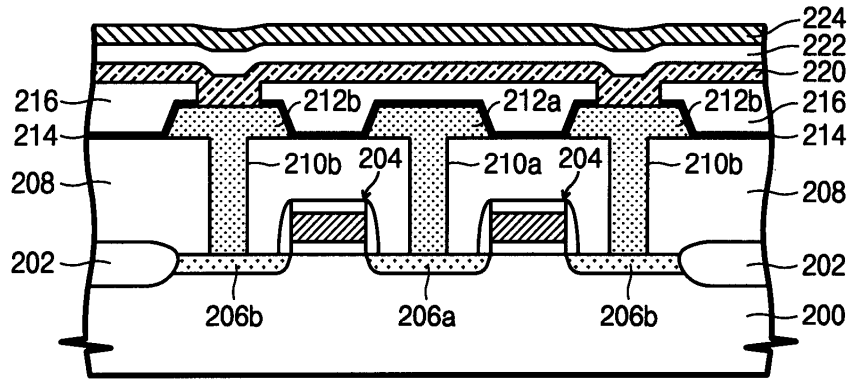


3a

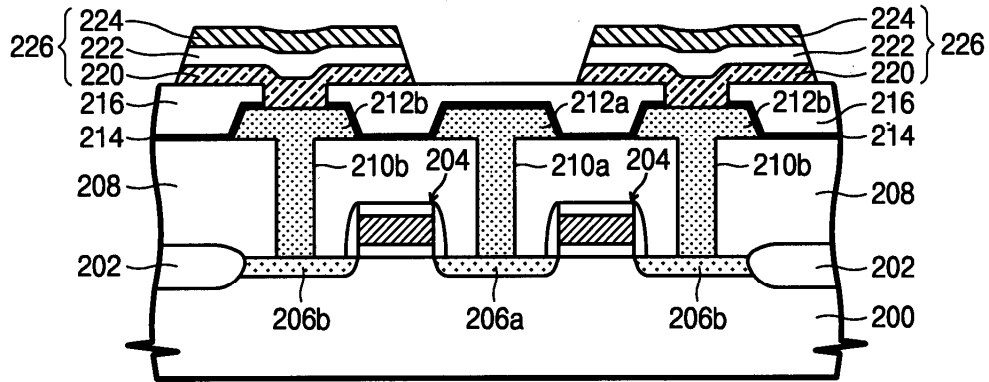




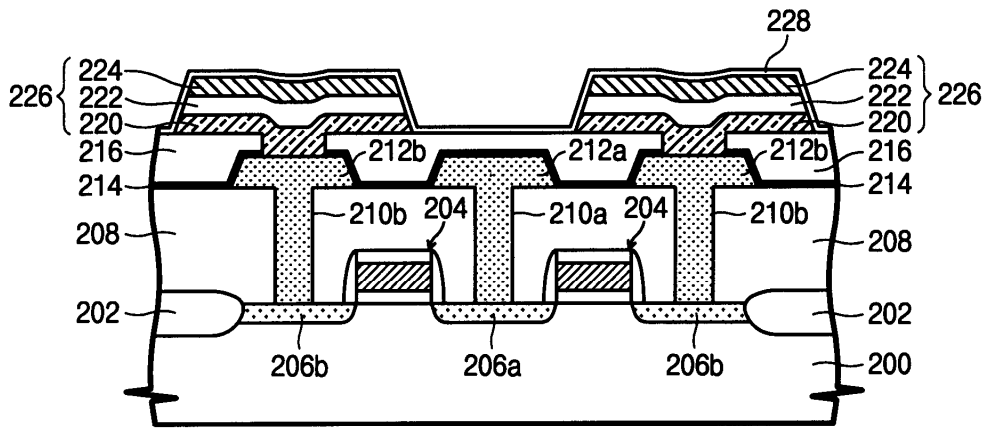
3f



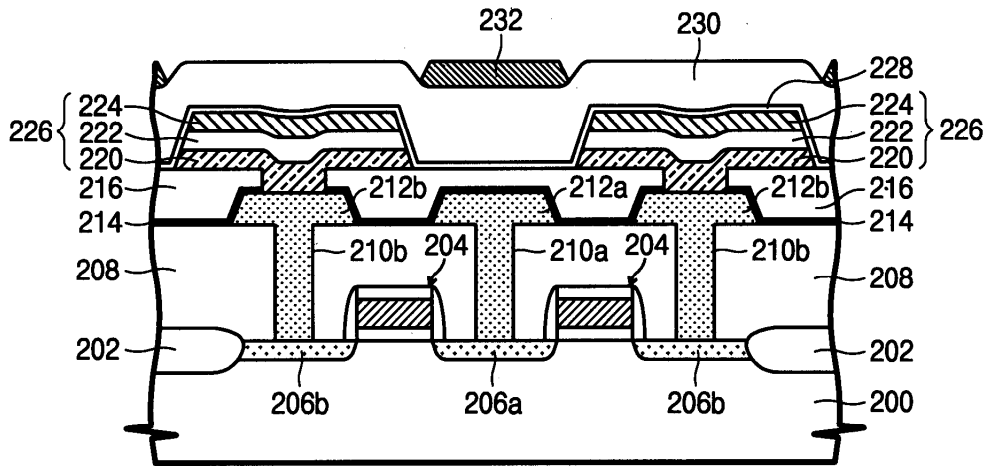
3g



3h



3i



3j

