

(19)
(12)

(KR)
(B1)

(51) 。 Int. Cl.7
H01L 21/8239

(45)
(11)
(24)

2003 11 20
10-0406536
2003 11 10

(21) 10-2001-0016153
(22) 2001 03 28

(65)
(43)

2002-0076369
2002 10 11

(73) 136-1

(72) 809-505

(74)
:

(54)

가

가

2 1

,

1

3

, 2

가

5

, , Ir, ,

1 1

1

FeRAM

2

3

FeRAM

4

FeRAM

5

FeRAM

6a 6h FeRAM

* * *

36: 37: Ir
 38: Al_2O_3 39: Si_3N_4
 40: 41:
 42:

(stacked capacitor)
 가

(ferroelectric random access memory, FeRAM) DRAM(dynamic random access memory) (flash memory), SRAM(static random access memory), EEPROM(electrically erasable programmable read only memory) 가 1000

SiO_2 SiON , DRAM 가 가
 (remnant polarization) , FeRAM 가 가

1 1 (WL) 1 FeRAM (BL) (PL) (C)
 , (Tr), 1 (Tr) 2
 (C) 1 가 DRAM
 FeRAM 가 가
 , 1/2 DRAM 가 가
 가 가 2 FeRAM , "a", "c" "1", "0"
 "1" 가 가 "d" 가 가 "0 V"
 가 가 "a" "b" "1" 가 "0 V" "0" "C"
 가 , 가 가 "1" 가 Q₁ 가 ,
 가 가 가 가 가
 "Cb"가 가 가 " Q₁ "
 Q₀ "Cs" 가 1 (Cb) "V1", "V0"가 (C)

V1 = Q₁

V0 = $Q_0 / (C_b + C_s)$
 가 "1" "0" 가 "V1" "V0" 가 가 "V1" 가 "V0" 가

; 10
. ; 1 ; 가
2 ;
3 ;
1 5 ; 4 ;
6 ; 5 가
1 7
; 1 1 ; 8
; 9 ;
10
1 1
2 2 3 가
FeRAM 1 Ir 2
3
5 FeRAM (31) (32),
(33) (34) (30)
1 (35), 1 (35)
(34) (37), Ir (37) (36), (36) Ir
O₃ (38), Al₂O₃ (38) (38) Si₃N₄ (39) Si₃N₄ (40), (41), Ir Al₂O₃
(37), Al₂O₃ (38) (38) (39) (43) FeRAM (4) (4)
2) Ir (37) Ru FeRAM
6a 6a 6h (30) (32), (33)
(35) (34) CMOS (chemical mechanical polishing) (34)
6b (34) (44) Ti TiN (44)
6c (36A)
1 (35) (reactive ion etching)
(44) (36A) (44) 6d
(36)
1500 Ir (37) (36) Ir (37) (35) Ru 1000
6f 100 300 Al₂O₃ (38) 2000
2500 Si₃N₄ (39)
6g RIE (39) 1 (35) Si₃N₄ Si₃
(39) Al₂O₃ (38) Ir (37) (37)
N₄ 1 (35) Al₂O₃ Si₃N₄ (38) (39) Ir (37) Al₂O₃ Si₃N₄ (38)
(39) (35) Si₃N₄ (39) Ir (37) Al₂O₃ Si₃N₄ (38)
(39) Si₃N₄ (35) Si₃N₄ (39) (39) Al₂O₃ (38)
, Si₃N₄ (39) Al₂O₃ (38) 650 W 750 W , 150 W
250 W 가 가 30 sccm 50 sccm Ar 5 sccm
20 sccm CF₄ 가 10 sccm 20 sccm Cl₂ 가 , 2 mTorr 5 mTorr
가

(39) $6h$, Ir (37) , Al_2O_3 (38) Si_3N_4
 (40) $SrBi_2Ta_2O_9$ (SBT) (40) $Pb(Zr,Ti)O_3$ (PZT), (Bi, La) $4Ti_3O_{12}$ (BLT)
 (41) , (41) (41) (42)

가 , 가 , 가 , 가
 3 , 2 2 1 , 1
 가 , 1

(57)

1.

;
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 ;
 ;
 1 2 1 ;
 2 3 2 ;
 1 2 3 ;
 1 2 3 ;

2.

1 ,
 2 ,
 3. ,
 1 ,
 3 ,
 4. ,
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 ;
 ;
 ;

1
2
1

1 ;
;

5.

1 , Ir Ru

6.

4 , Pb(Zr,Ti)O₃ , (Bi, La)₄Ti₃O₁₂ SrBi₂Ta₂O₉

7.

5 ,

8.

1 가 1 ; 2 ; 3 ;

4 ;

5 가 2 3 1 3 2 6 5 ; ; 1

3 2 7 ; 1 2 8

1 1 , 2 3 ; 9 ;

10

9.

8 ,

2 10.

9 ,

3 11.

1 가 1 ; 2 ; 3 ;

4 ;

5 가 1 5 ; ; 1

6 ;

1 7 ; 1 8 ;

9 9 ;

10

12.

8 11 Ir Ru ,

1 13.

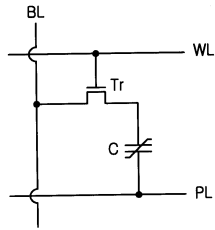
12 , Pb(Zr,Ti)O₃ , (Bi, La)₄Ti₃O₁₂ SrBi₂Ta₂O₉

14.

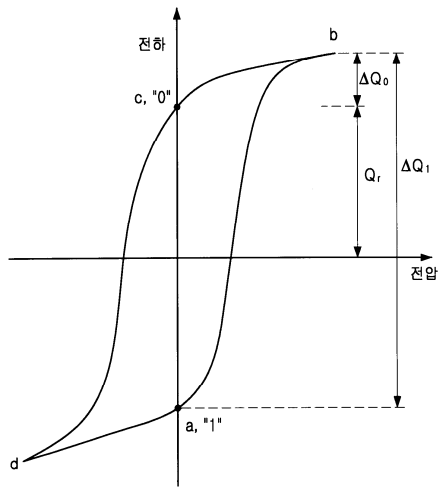
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2 ,

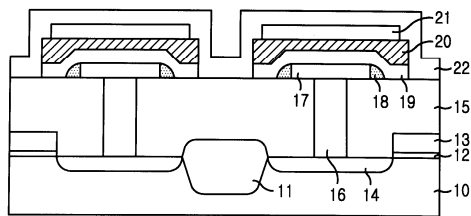
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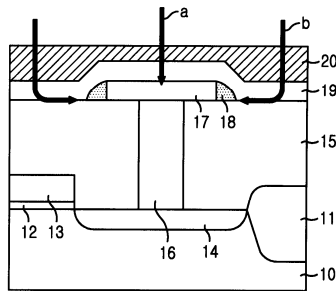
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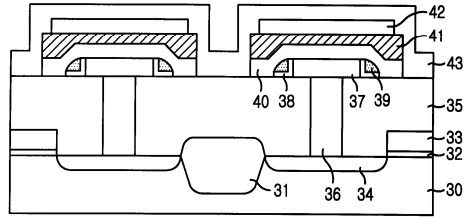
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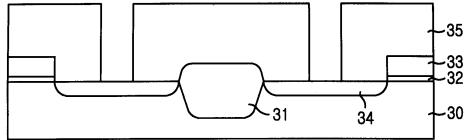
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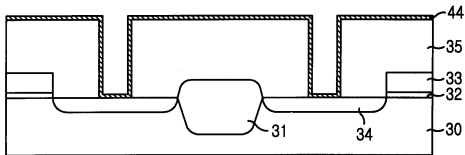
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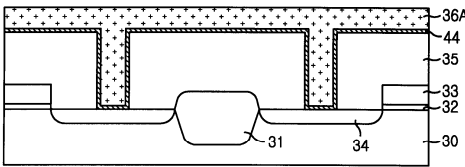
6a



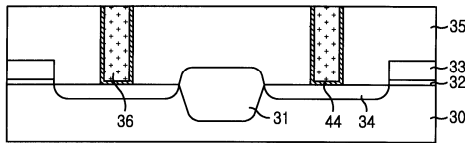
6b



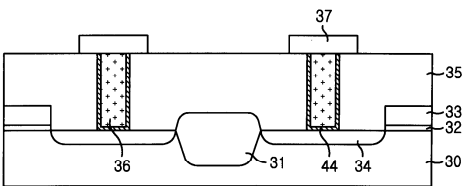
6c



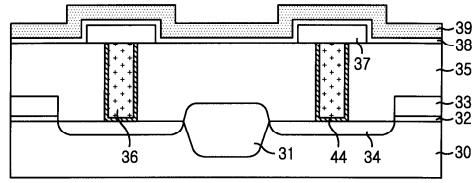
6d



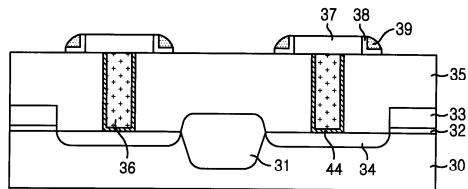
6e



6f



6g



6h

