



1

2a 2c

3

4a 4c 1

5a 5b 1

6a 6c 2

7a 7c 1

<

1 :

2 :

3, 3a :

4 :

5 :

6 :

7 :

, DRAM(Dynamic Random Access Memory)

SRAM(Static Random Access Memory)

( , MOS ).

MOS

MOS

MOS

MOS

, EEPROM(Electrically Erasable Programmable ROM) MOS 가 MOS MOS

1 , MOS (102) (101) (103) (101) (102) (active) (103) (104) (103) (103)

05) , (105) (102) MOS (101)

7) (105) (106) (106) (107) (108) (105) (10) (105)

, 2a 2c (105) (103)

가 (102) 2a , LOCOS(Local Oxidation of Silicon) P (101)

(109) (101)

10)가 2b , (110) (1)

(109a) 2b (buffered hydrofluoric acid) (111)

, (110)가 (101) 2c (105) (101) (109a)

, 1 (106) (107) (103) (107) (109a)

, 1 MOS (105) MOS (103)

, (105) 2b (101) (111) (micro - roughness)가 (101)

(109)

(101)

2c  
(102)

(102) (112)  
(withdrawal or recession)가

(105)

가

가

1

1 1 2

2 1 2

1 1 2 2

1 1 2 2

2

2

2 - 가

2 2 (over - eching) 2

가

가

, SRAM DRAM

가

MOS

( 1 )

3 5 , 1 가

3 30 1 , 1

, 31 1 , 1

1 , 1 , 1 , 1 1 5nm

가

, 1

49%

1:30

, 2 32 , 1 , 4nm 1 2

, 2 , 49%

1:100

, 2 1

, 1 20nm/min 2 3nm/min

, 1 1 1 1

0.5nm

, 1 2 - 0.2nm

, 1 2 , 1 1

가

2 , 2 33 ,

, 4 5 1

4a , (1) (1) (3) (2) ,

, (4)가 (3) (4) (5) 2nm 3 (3a)

, (4)가 , 4c (1)

4c , (1) (3a) (5) (4) 4b

, 4c (1) (5) 3 2 5a (1) (6)

a , 3 40 (3a) 3nm (5) , 5

, 5b 10nm (7)

, 1 , (106) (107) , (103)

, (107) MOS (103) 1 MOS

( 2 )

, 6 7 2 가 , 1

6a , (2) (1) (8) , (1) 15nm 1

9) , (4) 1 (9) 1

1 (8) (4) 3 (5)  
 1 6b 가 4nm  
 (9) 6c (4)가 (5) 1  
 6c (1) (5) , 3  
 70 (5)  
 7a (6)  
 7b (6) 2 (10)  
 2 (10) (10) 6nm  
 1 (9) (11)  
 2 (10) (11) (polycide)  
 7c (10) 2 (12)  
 가 1 (8) (1) 가 2  
 (10) 가 MOS 가  
 1 - 가 , 2 ( , ) 가  
 가 DRAM

(57)

1.

1 ;

1 2 1 1 -; 2

2 ; 2

2.

1 ,

1 1 , 2 2 ,

2 1 .

3.

2 ,

1 1 , 2 2

;

1 1 , 2 2

4.

3 , 2

5.

1 , 2 - (micro - roughness)

6.

1 ,

7.

;

;

;

;

;

8.

7 ,

;

9.

7 ,

10.

7 ,

11.

,

1

;

1

1

;

1

;

;

;

2

;

2

2

12.

11 , 1 2

13.

11 ,

DRAM

14.

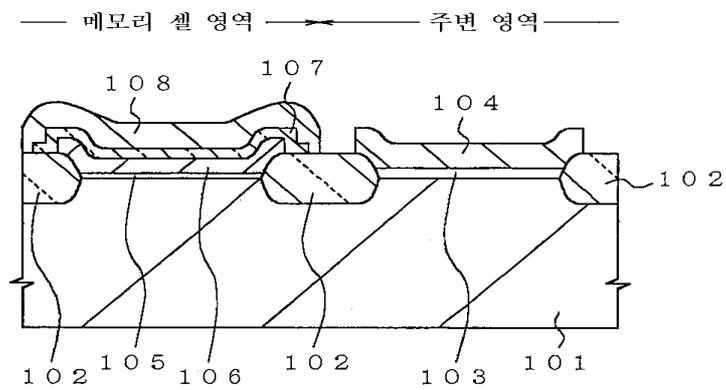
11 ,

15.

11 , 1

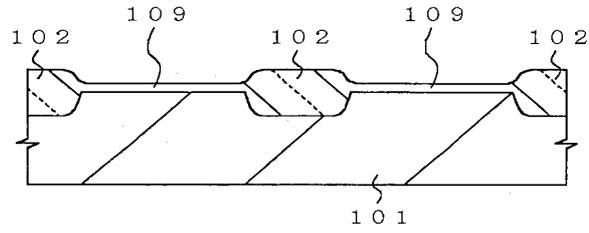
1

(종래 기술)



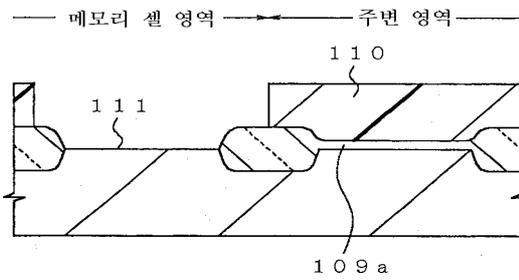
2a

(종래 기술)



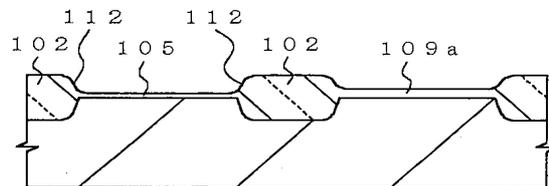
2b

(종래 기술)

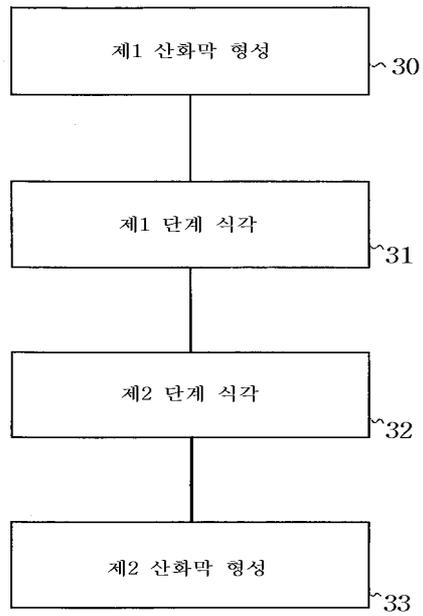


2c

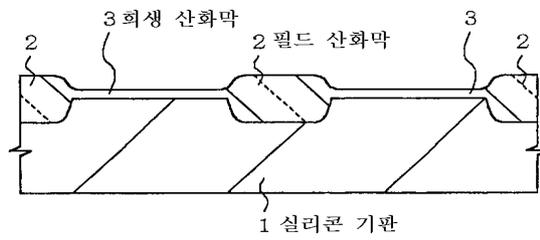
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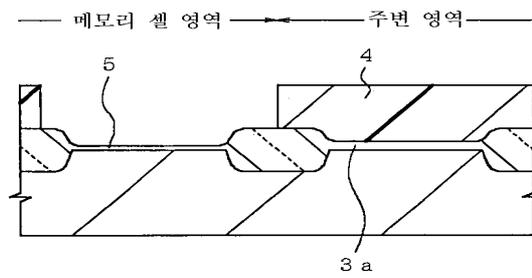
3



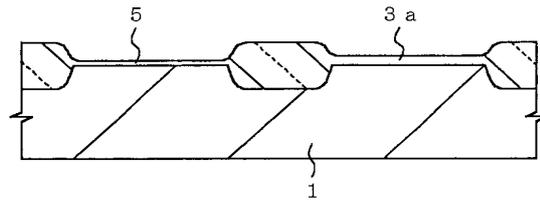
4a



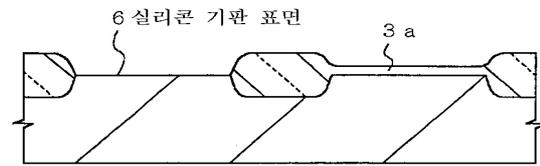
4b



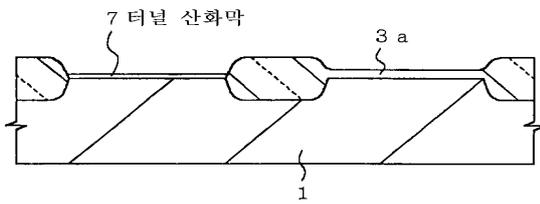
4c



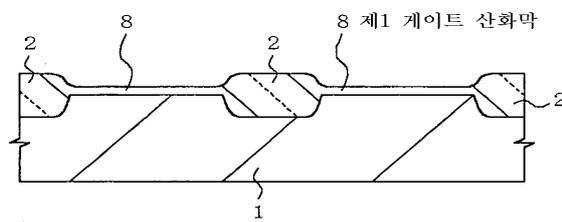
5a



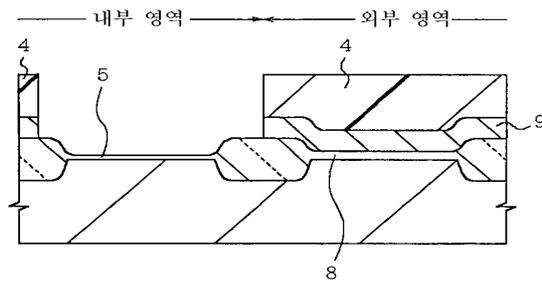
5b



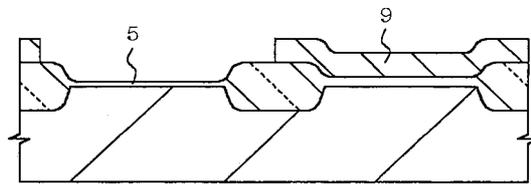
6a



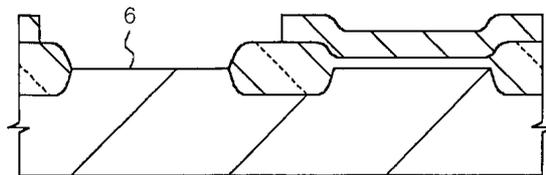
6b



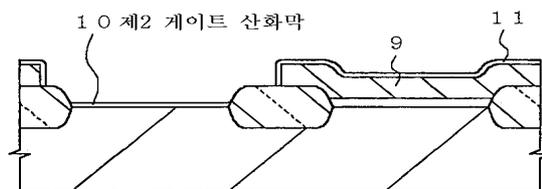
6c



7a



7b



7c

