

(19)  
(12)

(KR)  
(B1)

(51) 。 Int. Cl. <sup>6</sup>  
H01L 27/04

(45)  
(11)  
(24)

2002 09 05  
10 - 0326910  
2002 02 20

(21)  
(22)

10 - 1998 - 0042539  
1998 10 12

(65)  
(43)

1999 - 0037030  
1999 05 25

(30)

285715

1997 10 17

(JP)

(73)

가 가

1 7 12

(72)

1 7 12

가 가

1 7 12

가 가

1 7 12

가 가

(74)

:

(54)

BST

DRAM

,

,

가 ,

(1:2)

,

1a, 1b, 1c, 1d 2a, 2b, 2c, 2d 1  
,

3 1 가 ,

4 5 1 ,

6a, 6b, 6c 9a, 9b, 9c 2 ,

10a, 10b, 10c 11a, 11b, 11c 4  
,

12 .

\* \*

101 : 102,104,111 : SiO<sub>2</sub>

103 : 105 : SiN

106,112 : 107 :

107a,114,115 : 107b :

108 : BST 108a : BST

108b : BST 110 :

113 : 116,117 :

DRAM(Dynamic Random Access Memory) 가 가 .

, BaTiO<sub>3</sub> SrTiO<sub>3</sub> .  
, , .

(1) S.Yamamichi et al., 1995 IEDM Technical Digest, p. 119

(2) K. P. Lee et al., 1995 IEDM Technical Digest, p. 910

(3) 50395/95

(1), (2) ,  $\text{BaTiO}_3$   $\text{SrTiO}_3$  ,  
 가 (giga bit) DRAM .  
 , (3) , 2 ,  $\text{BaTiO}_3$   
 2 ,  
 ,  
 12 DRAM .  
 12 (1201) (1202) , MOS  
 (1203a, 1203b) . , (1201)  
 (1204), SiN (1205), (1206a), Ru,  $\text{RuO}_2$  Pt  
 , (1206b) (1206) (1206)  
 , (1206b) SiN (1205) , (1207) (1208) ,  
 (1208) (1207) , (1209) .  
 (1209) , (1210, 1211) . , (1210) (1203b)  
 (1212) , , (1211) (1208) (1213)  
 .  
 DRAM , (1212) , (1204, 1205, 1207, 1209)  
 .  
 , (1207)  $\text{BaTiO}_3$   $\text{SrTiO}_3$  , (1207) RIE(Reactiv  
 e Ion Etching) , Ba, Sr  
 Ti , 가 ( Cl)  
 (wet etching) ,  $\text{BaTiO}_3$   $\text{SrTiO}_3$  (1207)  
 , 가 DRAM .  
 ,  $\text{BaTiO}_3$  (3)  
 ,  
 ,  
 , DRAM ,  
 .

(a) , (b) , (c) , (d) , (e) (etch rate) 가

가

DRAM

1

1, 1a, 1b, 1c, 1d 5

1a, 1b, 1c, 1d 2a, 2b, 2c, 2d 1 DRAM

(1) , (101) ,  $\text{SiO}_2$  (102) , MOS (103) , (101) , CVD (Chemical Vapor Deposition) , 700 1000nm  $\text{SiO}_2$  , 10 100nm SiN (105) .

06) ,  $\text{SiO}_2$  (104) SiN (105) (photolithography) (107b) , (107a) (107) .

7a) , CVD , Ru,  $\text{RuO}_2$ , Ir,  $\text{IrO}_2$ , Pt 가 20 100nm (107b) (107a) (107) .

06) , CVD , 20 100nm BST (Barium Strontium Titanate: 500 , BST (108) , (107b) , SiN (105) , BST (108a) , SiN (105) BST (108b) ( 1a ) . 500 , (107b) b) BST SiN (105) BST .

(2) , CVD , BST (108) , Ru,  $\text{RuO}_2$ , Ir,  $\text{IrO}_2$ , Pt (109) , 가 30 200nm ( 1b ) .

(3) , (109) (110) ( 1c ) .

(4) , 400 가 . (110) (10  
8b) , (108c) ( 1d ).

3 가 BST (108b) , 3  
 , 가 , BST (108b) X - ( ) .  
3 a , BST (108b) , (110) 가  
 , 3 b , (110) 400 가  
60 .

, (108b) (110) 가 , (110)

(5) , , BST (108b) ( 2a ).  
가 ,  
(ammonium fluoride)(1: 2) .

4 BST (1:2)  
 , (1:2) , .

4 , (1:2)  
 , ( a )가 ( b ) .

5 BST (1:2)  
 , (1:1)

5 , (1:2)  
 , , (108b)  
 , (108c) 3 , (108) 1/3 .

(6) , RIE , SiN (105) ( 2b ).

(7) , CVD , SiO<sub>2</sub> (111) ( 2c ).

(8) , SiO<sub>2</sub> (111) , (112) (113)  
 , (114, 115) (116, 117) .

, SiN (105) (112) ( (6), (8) ),  
(112) , (105) .

, (108b) (110) 가 , (110)  
 , , (108b)( , (110) (1:2) BST )

, 가 BST , .

2

, 2, 6a, 6b, 6c 7a, 7b, 7c

6a, 6b, 6c 7a, 7b, 7c 2 DRAM

(1), 1 (601), SiO<sub>2</sub> (602), (603), SiO<sub>2</sub> (604) SiN (605), SiO<sub>2</sub> (604) SiN (605) (606), 1 (607a) (607b), (607)

, 1 (607) B ST (608), 1 (609), 1 (608b) 가 BST (608), (609) (608a) (610) (6a).

(2), (608b) 가, (611) (6b).

(3), (608b) (6c), (1:2)

(4), SiN (605), (610) (7a).

(5) CVD, SiO<sub>2</sub> (612) (7b).

(6), SiO<sub>2</sub> (612), (613) (614), (615, 616) (617, 618)

, BST (608b) (610) 가 (609) BST, (1:2) BST (608b)

3

, 3, 8a, 8b, 8c 9a, 9b, 9c

8a, 8b, 8c 9a, 9b, 9c 3 DRAM

(1), 1 2 (801), SiO<sub>2</sub> (802), (803), SiO<sub>2</sub> (804) SiN (805), (804) (805) (806), 1 (807a) (807b), (807)

, CVD, 20 100nm BST (808), 500, BST (808)

- (809) , CVD 가 , BST (808) , Ru, RuO<sub>2</sub>, Ir, IrO<sub>2</sub>, Pt 30 200nm .
- (2) , CVD , SiO<sub>2</sub> (810) ( 8a ).
- (3) , Ar 가 10 20kV, 1 × 10<sup>13</sup> 1 × 10<sup>15</sup> , BST (808) , (808a) ( 8c ).
- (4) , (808a) ( 9a ). , (1:2) 가 .
- (5) RIE , (805) ( 9b ).
- (6) , (812) , SiO<sub>2</sub> (813) , 1 , (813) (814) (815) , (816, 817) (818, 819) ( 9c ).
- , (805) (814) ( 6), (8) ), (814) , (805) (805) 가 .
- , , BST (808) Ar , , (808a) (1:2) . , BST (808) (808a) .
- , 가 BST , .
- 4
- , 4 , 10a, 10b, 10d 11a, 11b, 11c .
- 10a, 10b, 10d 11a, 11b, 11c 4 DRAM .
- (1) , (1003), SiO<sub>2</sub> (1004) (1001) , SiO<sub>2</sub> (1002), SiN (1005) , SiO<sub>2</sub> (1004) (1006) , 1 (1007a) (1007b) , (1007) .
- , 3 BST (1008) . , CVD (1008) , Ru, RuO<sub>2</sub>, Ir, IrO<sub>2</sub>, Pt 가 30 200nm , 1 (1009) .
- , CVD , SiO<sub>2</sub> (1010) ( 10a ).

(2) , , BST (1008) 가 , (1011) ( 10b ).

(3) , , Ar 가 10 20kV,  $1 \times 10^{13}$   $1 \times 10^{15}$  .  
(1008) .

, , (1008) ( 10c ). , ,  
(1:2) .

(4) RIE (1005) ,  $\text{SiO}_2$  (1010) ( 11a ).

(5) ,  $\text{SiO}_2$  (1011) ( 11b ).

(6) ,  $\text{SiO}_2$  (1011) , , (1012) (1013) . ,  
(1014, 1015) (1016, 1017) .

, , BST (1008) Ar , ,  
(1:2) . , ,  
, BST .

(57)

1.

(a) , ,

(b) ,

(c) ,

(d) , ,

(e) , 가 .

2.

1 ,

(b) 가 , (d)

.



3.

2 ,

가 가 .

4.

1 ,

(b) , (d)

,

5.

4 ,

6.

1 ,

(e)

7.

1 ,

(a)

Ru, RuO<sub>2</sub>, Ir, IrO<sub>2</sub>, Pt

8.

1 ,

(b)

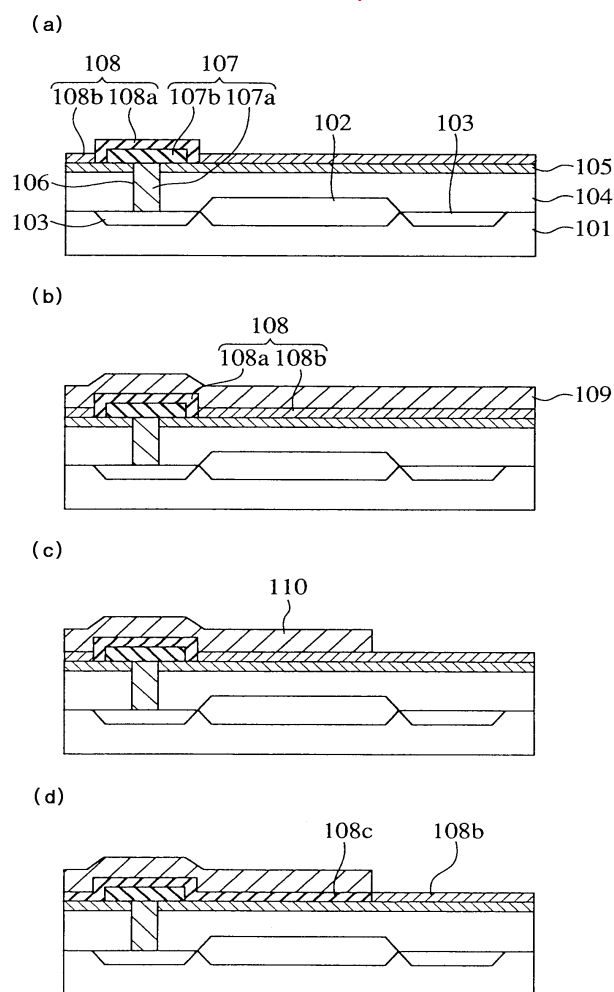
9.

1 ,

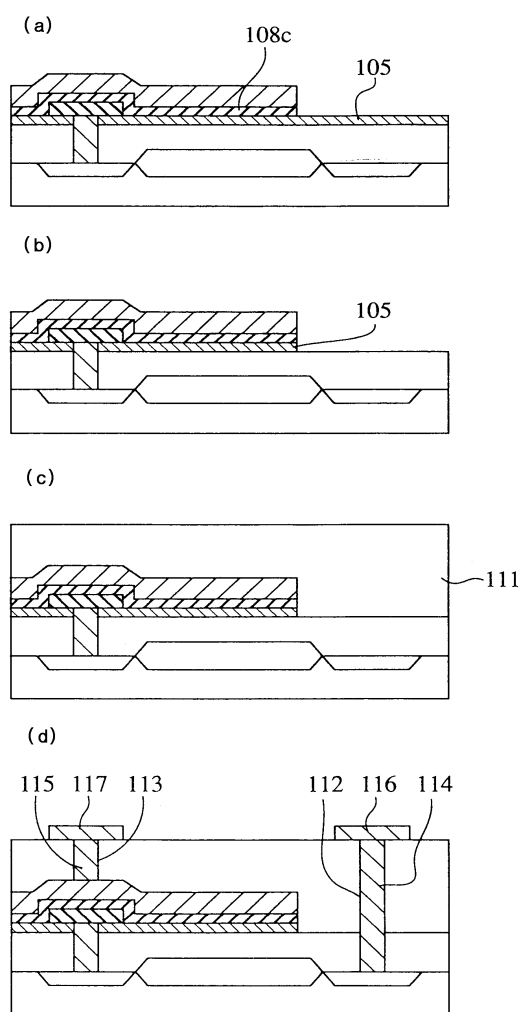
(e)

(1:2)

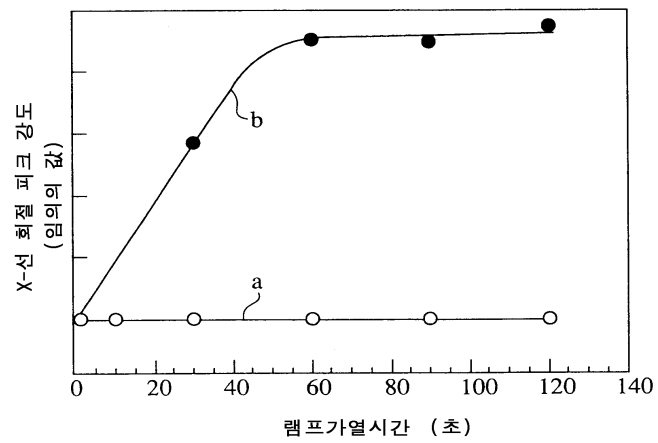
1



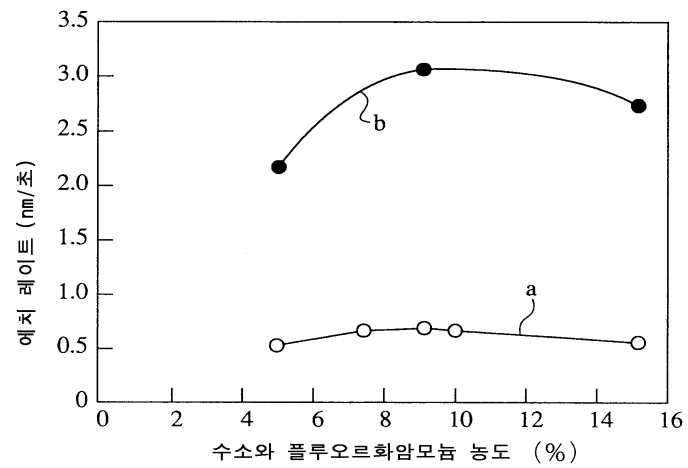
2



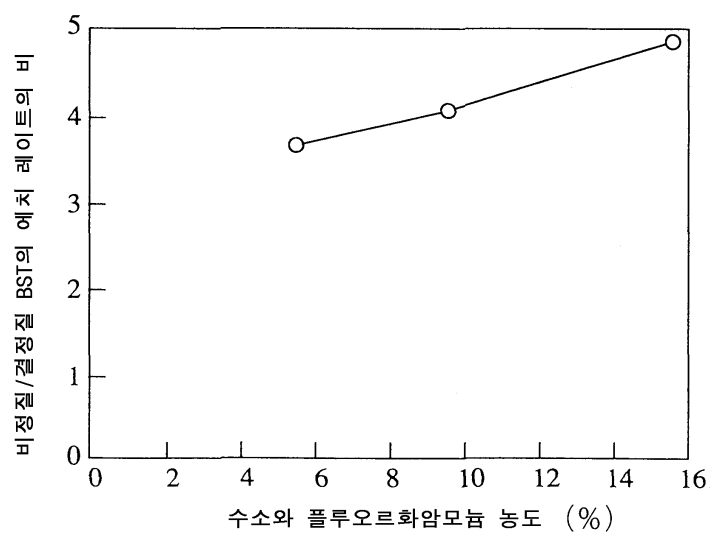
3



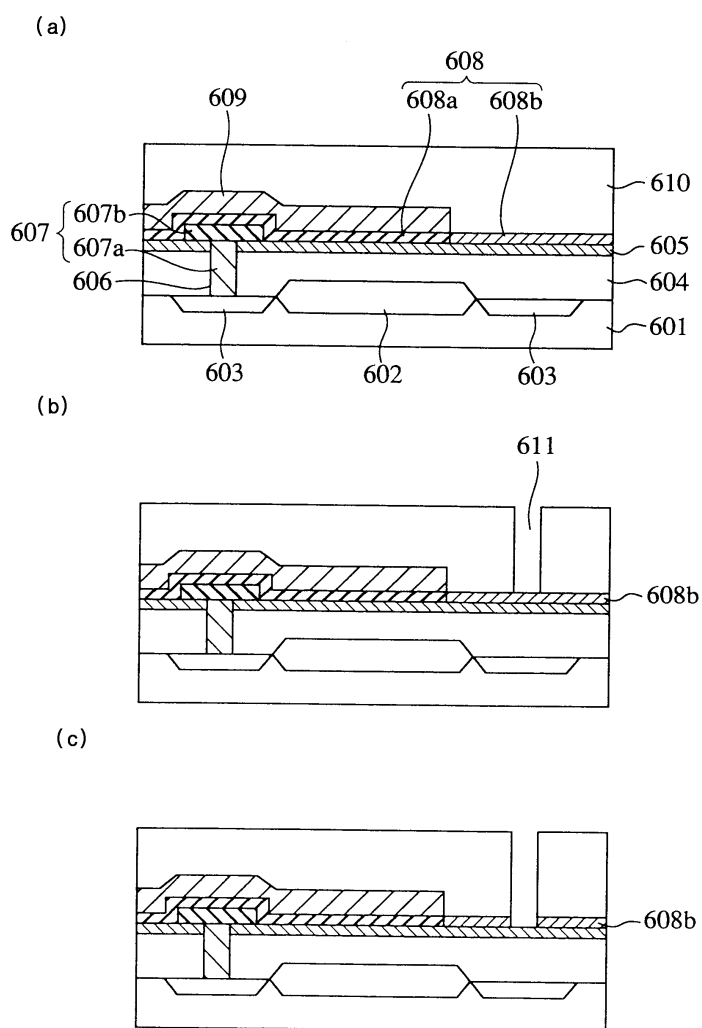
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5

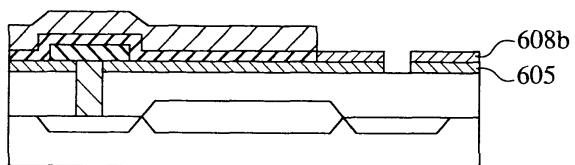


6

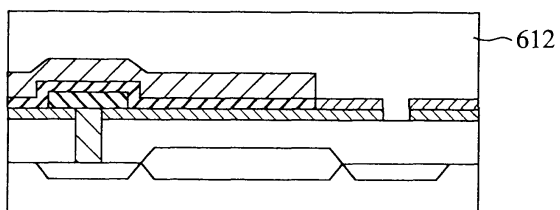


7

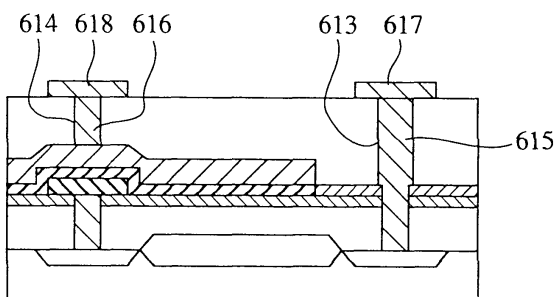
(a)



(b)

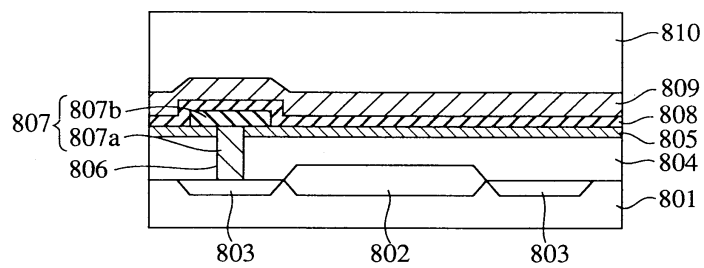


(c)

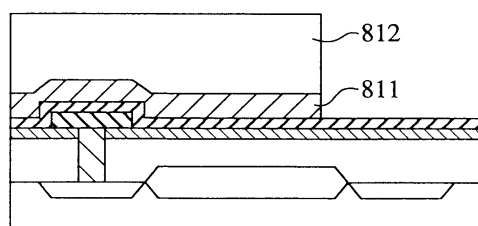


8

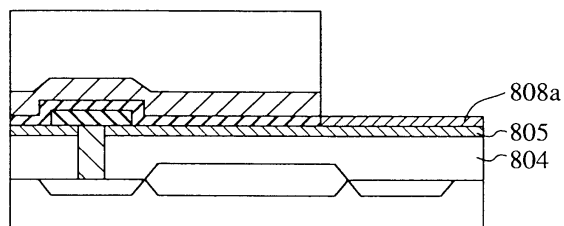
(a)



(b)



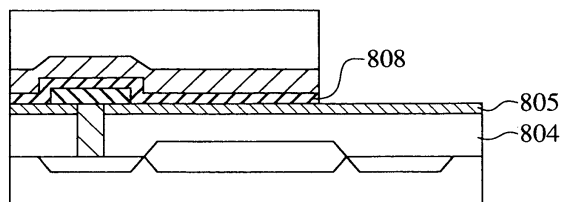
(c)



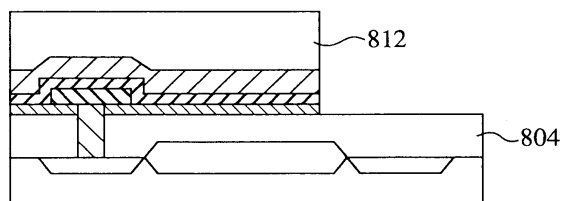


9

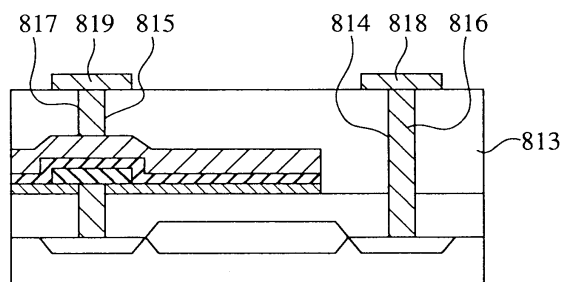
(a)



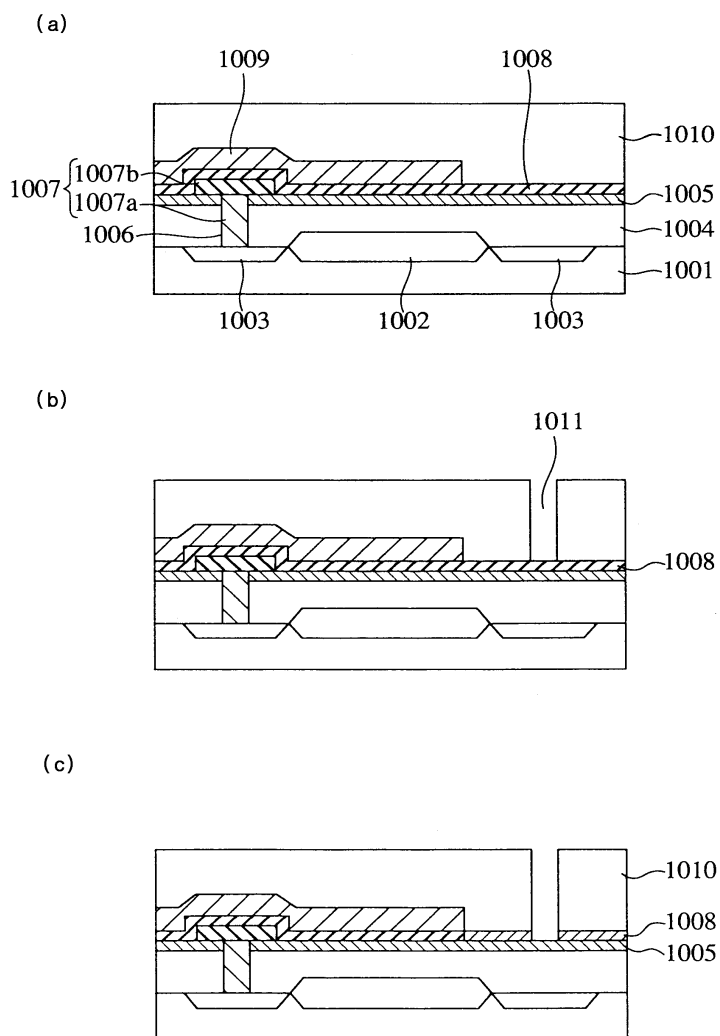
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(c)

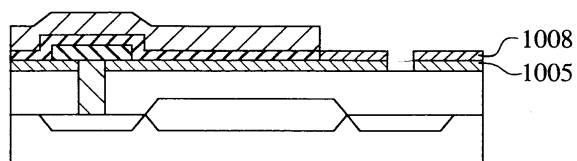


10

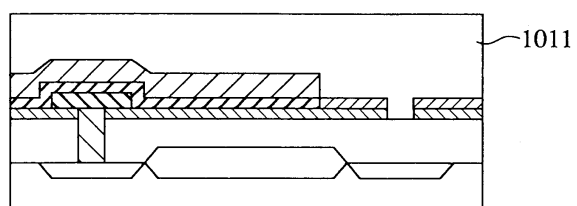


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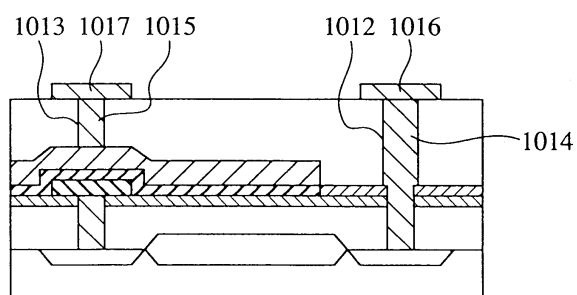
(a)



(b)



(c)



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