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(11)	10 - 0326910
(24)	2002 02 20

(21)	10 - 1998 - 0042539	(65)	1999 - 0037030
(22)	1998 10 12	(43)	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

, , ,
, , ,
, , ,
(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 : SiO₂

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 .

, BaTiO₃ SrTiO₃

,

(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) , BaTiO₃ SrTiO₃,
가 DRAM
가 (giga bit)

, (3) , 2 , BaTiO₃
2 ,
12 DRAM

12 (1201) (1202) , MOS
(1203a, 1203b) (1201)
(1204), SiN (1205), (1206a), Ru, RuO₂ Pt
. , (1206b) (1206)
, (1206b) SiN (1205) (1207) (1208)
(1208) (1207) , (1209) (1209)
(1209) , (1210, 1211) (1210) (1203b)
(1212) , (1211) (1208) (1213)
DRAM , (1212) , (1204, 1205, 1207, 1209)

, (1207) BaTiO₃ SrTiO₃, (1207) RIE(Reactiv
e Ion Etching) Ba, Sr
Ti , 가 (Cl)
(wet etching) , BaTiO₃ SrTiO₃, (1207)
, 가 DRAM
, BaTiO₃ (3)
, DRAM

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

가

1

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

1a. 1b. 1c. 1d. 2a. 2b. 2c. 2d. 1 DRAM

(1) , (101) , SiO₂ (102) , MOS
 (103) . , (101) , CVD(Chemical Vapor Deposition)
 700 1000nm SiO₂ 10 100nm SiN (105)

, SiO₂ (104) SiN (105) (photolithography) (106)
 . , , , CVD , , Ru, RuO₂, Ir, IrO₂, Pt
 7a) () (107b) (107a) (107) 20 100nm
 . , (107b) (107a) (107) .

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

(2) , CVD (109) , 가 30~200nm BST (108) , Ru, RuO₂, Ir, IrO₂, Pt (1b).

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

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

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

60

, (108b) (110) が , (110)

(5) , , BST (108b) (2a).

기

4 BST (1:2)
(1:2)

4 , (a)가 (1:2) , (b) ,

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

5 , (108c) 3 (108) . , (108b)

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

(7) CVD SiO_2 (111) (2c).

$$(8) \quad , \quad \text{SiO}_2 \quad (111) \quad , \quad (112) \quad (113)$$

(114, 115) (116, 117)

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

, , (108b) (110) 가 , (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) , SiO₂ (602),
 603), SiO₂ (604) SiN (605) SiO₂ (604) SiN (60
 5) (606) (607) 1
 (607a) (607b) , (607)

, 1 , (607) B
 ST (608) , 1 (609) (609) , , 1
 가 BST (608) , , , SiO₂ (610) (6a). (608b)

(2) b , (608b) 가 , (611) (6
).

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

(4) , , SiN (605) , (610) (6
 7a).

(5) CVD , , SiO₂ (612) (7b).

(6) , , SiO₂ (612) , (613) (614)

, , (615, 616) (617, 618)
 , , BST (608b) (610) 가 (6
 09) BST , , , , BST (608b) (1:2) (6

3

3

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

8a, 8b, 8c 9a, 9b, 9c 3 DRAM
 (1) , 1 2 , (801) , SiO₂ (802),
 (803), (804) SiN (805) SiO₂ (804) SiN (805)
 (807a) (807b) , (806) (807) 1
 (807)

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

- , CVD
(809) 가 30 200nm BST (808) , Ru, RuO₂, Ir, IrO₂, Pt .
- , CVD , SiO₂ (810) (8a).
- (2) (8b).
- (3) Ar 가 10 20kV, 1 × 10¹³ 1 × 10¹⁵ , BST (808a) (8c).
- (4) , (808a) (9a).
- (5) RIE , (805) (9b).
- (6) , (812) , SiO₂ (813) (814) (815) , (816, 817) , 1 (818, 819) (9c).
- , , (805) (814) (6), (8) (805) (805) (6), (8) , (814)
- , , BST (808) (1:2) Ar , , BST (808a) , BST (808)
- , 가 BST ,
- 4
- , 4 , 10a, 10b, 10d 11a, 11b, 11c 4 DRAM
- . .
- (1) , (1003), SiN (1005) , SiO₂ (1004) (1001) , SiN (1005) (1006) (1002), SiO₂ (1004) , 1 (1007a) (1007b) , (1007)
- , 3 (1008) , Ru, RuO₂, Ir, IrO₂, Pt BST (1008) , , CVD , 30 200nm , (1009)
- , CVD , SiO₂ (1010) (10a).

(2) , BST (1008) 가 , (1011) (10b).

(3) , , Ar 가 10 20kV, 1×10^{-13} 1×10^{15}
 , (1008) .

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

(4) RIE (1005), SiO_2 (1010) (11a).

(5) , SiO₂ (1011) (11b).

$$(6) \quad , \quad \text{SiO}_2 \quad (1011) \quad , \quad , \quad (1012) \quad (1013)$$

, (1014, 1015) (1016, 1017) .

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

(a) ,

(e) ,

(b) 가 , (d)

3.

2

가 가

4.

1

(b)

(d)

5.

4

6.

1

(e)

7.

1

(a)

Ru, RuO₂, Ir, IrO₂, Pt

8.

1 ,

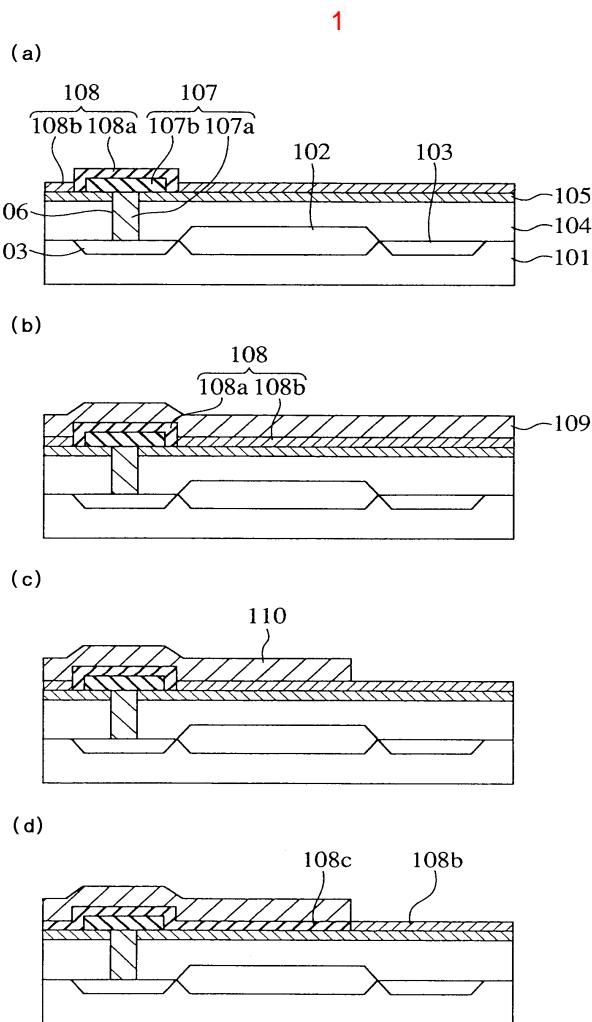
(b)

9.

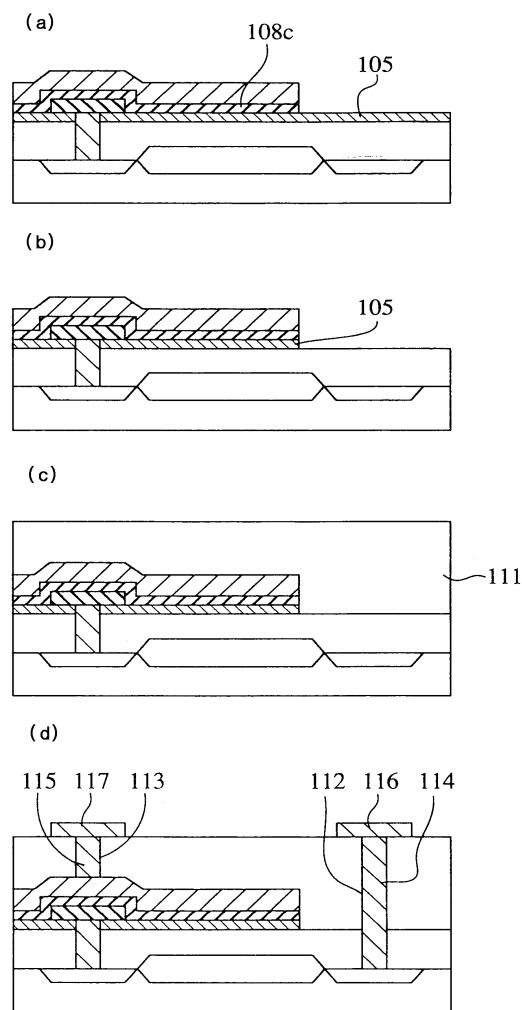
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(e)

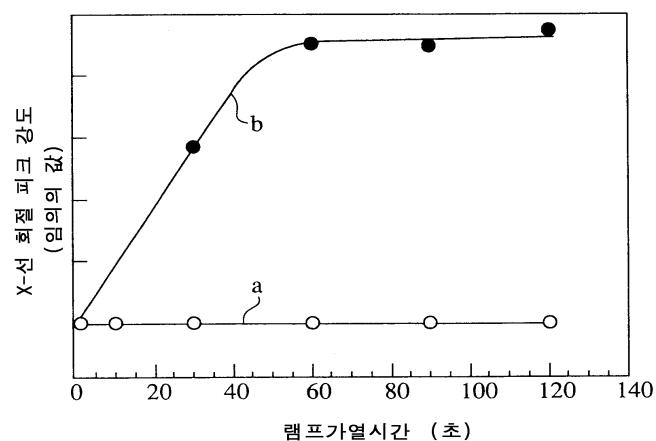
(1:2)



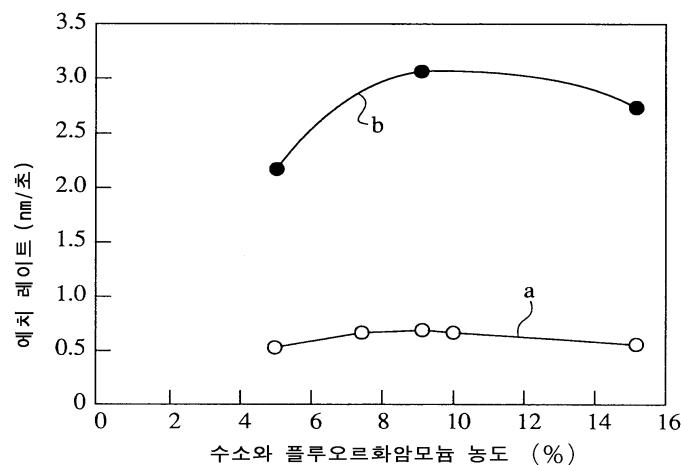
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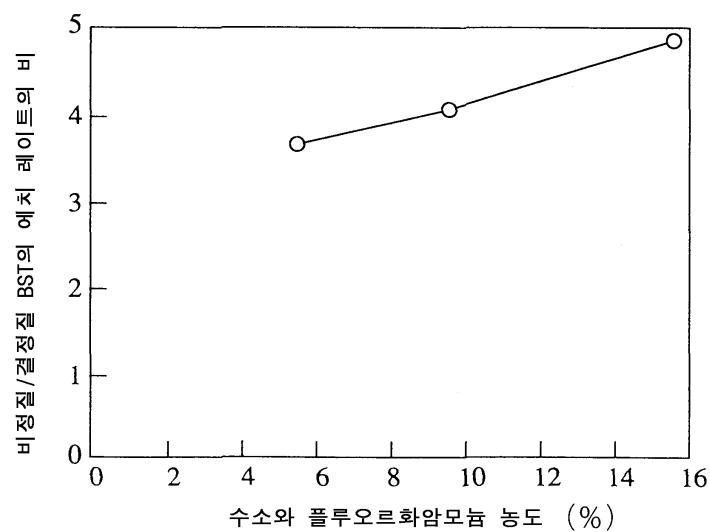
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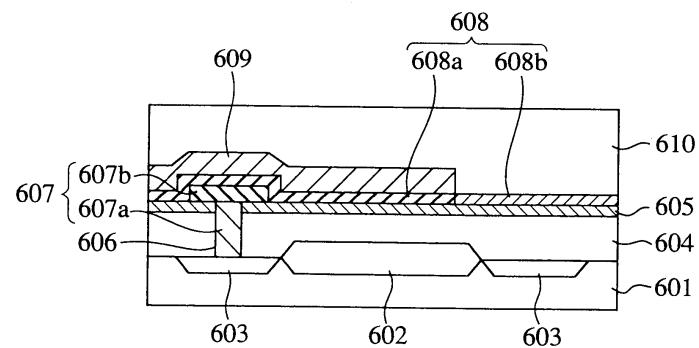


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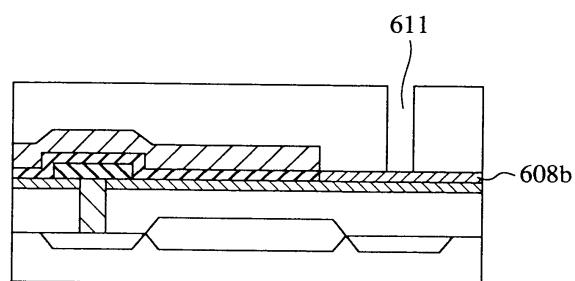


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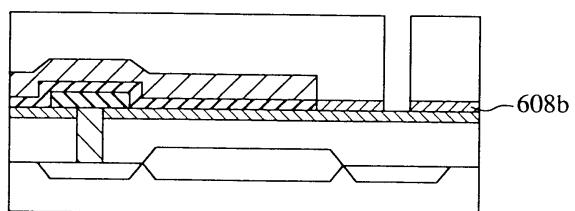
(a)



(b)

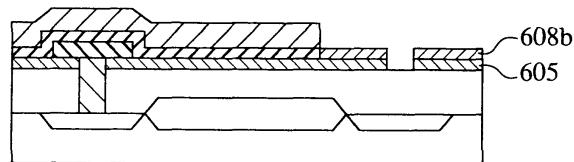


(c)

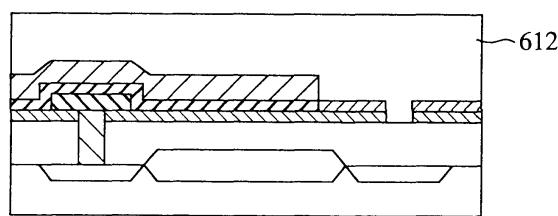


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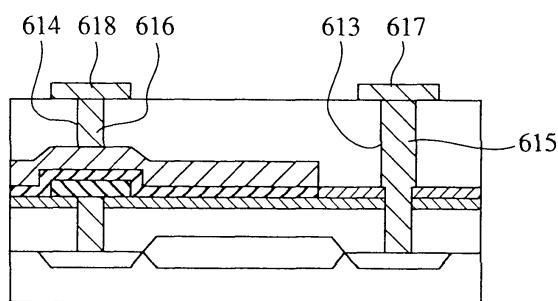
(a)



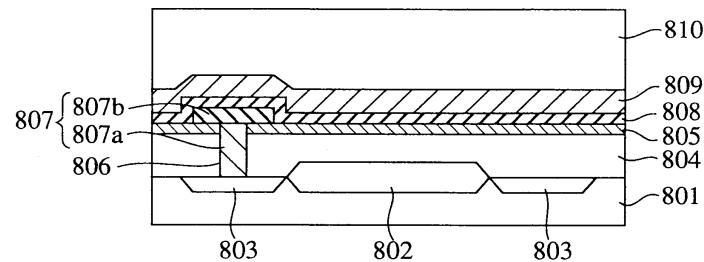
(b)



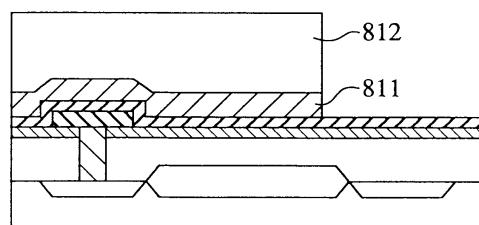
(c)



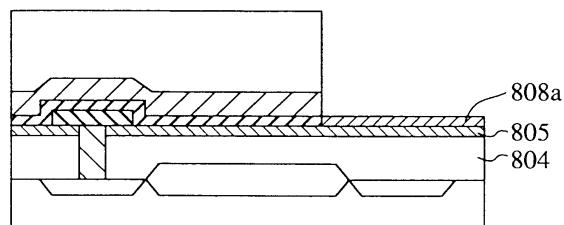
(a)



(b)

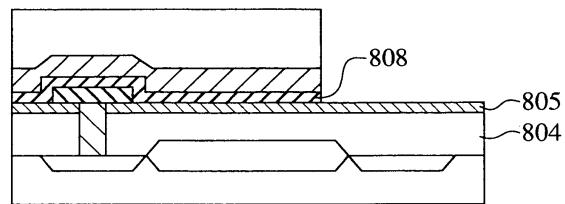


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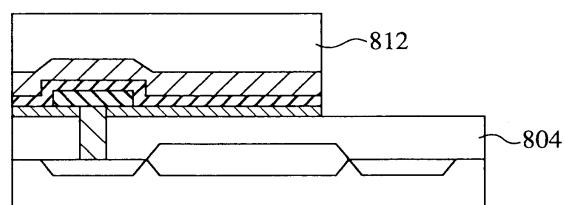


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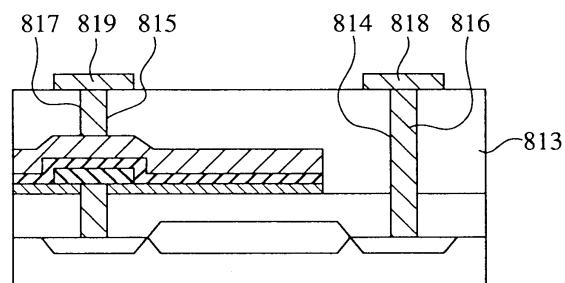
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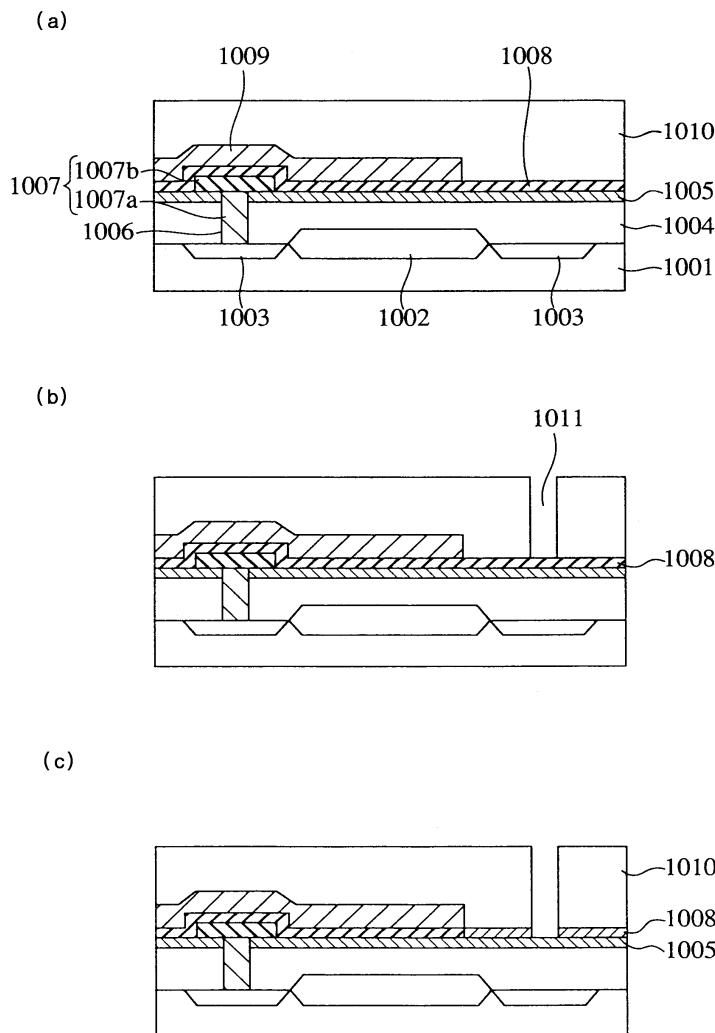
(b)



(c)

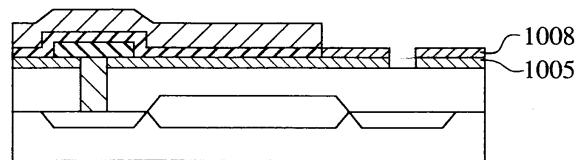


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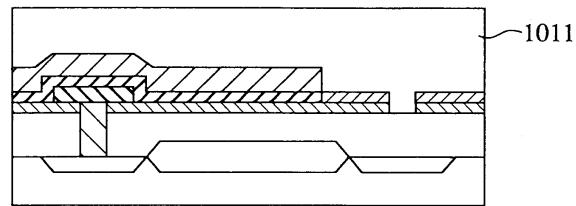


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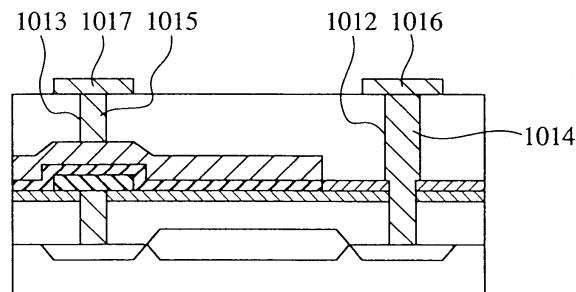
(a)



(b)



(c)



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