



, FinFET, - , / , ,

1a 1c - 가  
 2a 2b FinFET  
 3a 3b FinFET  
 4a 4b 3a  
 5a 5b FinFET  
 6a 6d 4  
 7 4  
 8 5  
 9a 9d 1 FinFET  
 10a 10d 2 FinFET  
 11a 11d 3 FinFET  
 12a 12d 4 FinFET  
 13a 13d 5 FinFET

< >  
 2a : SOI 2b :  
 4 : Fin 6 : 1  
 10 : 2 12 :  
 14 : 16 :  
 18 : 20 : 3  
 22 : 24 :  
 26 : 28 :  
 30 : 32 :  
 34 : ( ) 46 :  
 48 :

- FinFET (bulk)  
 , 가 (body)가 Fin  
 T CMOS CPU 가가 FinFE  
 가 CMOS 가가  
 가 CMOS (Short Channel Effect) 가  
 CMOS (bulk)

MOS, 50 nm, 가 30 nm

(Intel) 30 nm CMOS, 30 nm, I-V

가

MOS, 가, 30 nm, 가

SOI(Silicon On Insulator), SOI, 가, 가

가 SOI, (floating), 가

SOI, 25 nm, 가

가, CMOS, 가

가 ( ) ( )

DIBL(Drain Induced Barrier Lowering), 가, (dynamically), on-off

1, 가, 100

(32) ( ,34)

1a, 100, /, 3 (3-D)

1b, 100, (34), (32)가

1c, MOS, 100, (34), 1a, /

2, FinFET, 가

2a, 2a, 2b

1c, ( ) (16), , 6, 10, , 12

1b, 2a SOI, 1c, 가, 가, 가

1b, 가, (34), 100, Si-SiO<sub>2</sub>

1b, (34), (32)가, 가

(34), (32), MEMS(Micro Electro-Mechanical System)

(bonding) etch-back, MOS, 2, (32)가

(34), (32), 1b, (32), 가

20 nm, /, 20 nm, 가, /

32), MOS, , 1c, (34), ( ) ( )

1c, MOS, 'FinFET' SOI, (34), ( 50 nm )

가 (34) 가  
 100 (32)가 / 가 (34)  
 110 100 (primary flat zone) 45 100  
 가 / 가 (1b)  
 (32)가 (34) / 가  
 가 / 가 SiGe  
 가가 SOI (2a) 가 MOS 가  
 , SOI / 가 가 SOI (2a) SOI (10) , (2a) SOI  
 2 가 SOI (2a) SOI (10) , SOI  
 (2a)  
 / 가 Fin 가  
 - FinFET  
 가 , , Fin , Fin  
 , Fin 2 , 2 Fin , Fin  
 , , Fin Fin 1 , 1,2  
 , , - FinFET  
 2 , Fin 2 Fin ,  
 , Fin 1 Fin , 1,2  
 , Fin Fin , - FinFET  
 , ,  
 (2b) ,  
 (4) , (2b) 가 Fin  
 2 (10) (2b) Fin (4) (4) 2 (10) ,  
 Fin (4) (4) (12) , (12) , (6) ,  
 1,2 (6,10) (16) , (4) Fin (4) / ,  
 , (16) (16) (4) (46) (48) ,  
 , 2 (10) 20 nm 800 nm (16) (2b)

(48) (46) Fin (4) (16)

(10) Fin (4) (2b) 가 2

Fin (4) (4)

Fin (4) 900

Fin (4)

3 (16) SiGe,

3a 3b

2 Fin (4) (floating) (2b)

가 가 (2b) SOI (2a) 가 (2b)

SOI 가

4a SOI 가 가 5a 4a

4a / 5a (18) 가 가 4b 5b

4b (16)가 Fin (4) / (contact) 가 5b

Fin (4) /

FinFET / (18)

가 (16) 가 (16)가 10<sup>20</sup> cm<sup>-3</sup> 5 nm 2

(~10<sup>18</sup> cm<sup>-3</sup>) (16) 3 5

Fin (4) Fin

/ Fin (4) (16) (seed) (18)

Fin (4)

(18) (18) SiGe, Ge, SiGe 가

4a 5a Fin (4) /

가 2 (10)

2 (10) (0 nm) / 가 , 0 nm 50

nm , 0 nm -50 nm 가

5a 가 (18)

(16) 5 nm 100 nm (16) /

2 (10) Fin (4) (16) (18) 5

Fin (4)

Fin (4) (16)

nm 100 nm (18) / SiGe (16)

(16) /

6 4a

6a Fin (4) 6b (16)

6c / (46) 6d (48)

7 4

/ Fin (46) (4) (48) Fin 가 (4) /  
 8 5 / Fin (4) (18)  
 가 (B-B' ) Fin (4) (18)  
 / (18) Fin (18) (4) Fin (4) /  
 (46) (48) Fin (4) /  
 9 (16)가 2 FinFET , CMP(Cheical Mechanical Polishing)  
 9a (2b) 1 (6) , 1 (6)  
 (2b) Fin Fin (4)  
 1 (6) 0.5 nm 200 nm , Fin (4) 10 nm  
 1000 nm , 4 nm 100 nm  
 9b 9a 2 (10) 20 nm 1000 nm , 20 nm  
 800 nm CMP  
 9c 9b 2 (10) 10 nm 300 nm  
 2 (10) Fin (4) 5 nm 300 nm 가  
 9d Fin (4) (12) 0.5 nm 10 nm  
 (12) Fin (4) ( damage)  
 가 , ( (p + n + ) SiGe(p + n + )  
 (photolithography) (16)  
 (46) (photolithography) (48)  
 / 10 FinFET , CMP(Cheical Mechanical Polishing)  
 10a (2b) Fin (4) 1 (6) (14)  
 1 (6) (14),  
 (14) CMP etch stopper , 10 nm 200 nm  
 (2b) Fin Fin (4)  
 1 (6) 0.5 nm 200 nm , Fin (4) 10 nm  
 1000 nm  
 10b 10a 2 (10) 20 nm 1000 nm , 20 n  
 800 nm CMP  
 10c 10b 2 (10) 10 nm 300 nm  
 2 (10) Fin (4) 5 nm 300 nm 가  
 10d Fin (4) (12) 0.5 nm 10 nm  
 (12) (14)  
 (12) Fin (4) ( damage)  
 가 , ( (p + n + ) SiGe(p + n + )  
 (photolithography) (16)  
 (46) (photolithography) (48)  
 /

11	FinFET										
11a	Fin	(2b)	가	20 nm	1000 nm	2	(10)				
	2	(10)									
	2	(10)	4 nm	100 nm		10 nm	1000 nm				
					(2b)						
	Fin	(4)	0.5 nm	200 nm	Fin	1	(6)	10 nm	200 nm		
	(14)										
CMP					(14)	1	(6)		11b		
11c	2	(10)	10 nm	300 nm							
	2	(10)	Fin	(4)	5 nm	300 nm	가				
11d		Fin	(4)		(12)						
		(12)	(14)								
		(12)		Fin	(4)					(	
damage)				가							
12		9d	10d	FinFET							CMP
		(28)		(field)	(28)						
		(26)									
12a			Fin	(4)		0.5 nm	200 nm	1			
(6)			10 nm	200 nm		(14)		5 nm	5		
00 nm	3	(20),	3	(20)	1	(6)					
		(14),									
						(2b)		12a			
	Fin	(4)		10 nm	1000 nm						
				(22)	1 nm	50 nm			(24)	5	
nm	100 nm			(26)	5 nm	500 nm					
		(26)									
	Fin	(4)			(6,20,22,26)	(14,24)					
	(2b)										
		(2b)		30 nm	300 nm			12b	가		
		(20,22,26)									
		(28)		30 nm	500 nm		(14,24)		12d		
12d		(28)	Fin	(4)		5 nm	300 nm	가			
					(12)						
	Fin	(12)		Fin	(4)					(	
damage)				가							
13		9d,	10d,	11d	FinFET						
0)		(field)			(28)					(3	
		(30)									
12											
13a			Fin	(4)		0.5 nm	200 nm	1			
(6)			10 nm	200 nm		(14)		5 nm	5		
00 nm	3	(20),	3	(20)	1	(6)					
		(14),									
						(2b)		13a			
	Fin	(4)		10 nm	1000 nm						
				(22)	1 nm	20 nm			(24)	5	
nm	50 nm										
		(30)					5 nm	500 nm			
				(30)가							
	13b			13b	(30)	12b		(26)			

13b (26) (30) (24) (22) , 12b (28)  
 13b (30) (2b) 가 30 nm 300 nm  
 13c (28) 가 30 nm 500 nm (14,24) 13d  
 13d (28) Fin (4) (4) 5 nm 300 nm 가 .  
 damage) Fin (12) (4) Fin (12) (4) ( )  
 가 가 , , 가 Fin 가 /  
 9d, 10d, 11d, 12d .

(57)

1. 가 Fin
2. Fin Fin 2 , 1 ,
- Fin 1,2 Fin Fin / ,
- Fin F i n F E T .
2. 1 , Fin 4 nm 100 nm - F i n F E T
3. 1 2 , Fin 가 10 nm 1000 n F i n F E T .
4. 3 , Fin 가 2 5 nm 300 nm F i n F E T .
5. 1 , - F i n F E T 0.5 nm 10 nm , 1 0.5 nm 200 nm
6. 1 , 2 - 20 nm 800 nm F i n F E T .
7. 1 , - Fin F i n F E T .
8. 1 , / Fin Fin - , Fin F E T .
- 9.





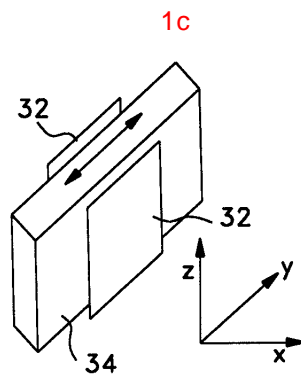
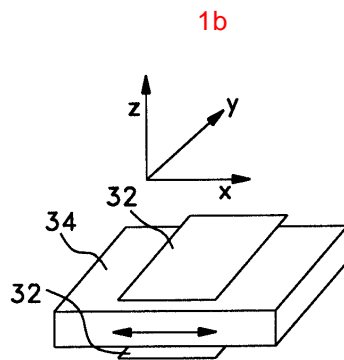
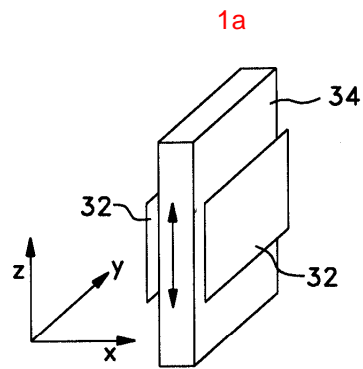
20  
FinFET  
22.  
17  
(damage)

Fin  
가

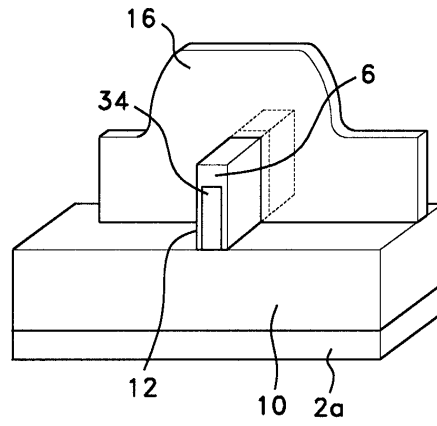
FinFET

23.  
17  
SiGe,  
-

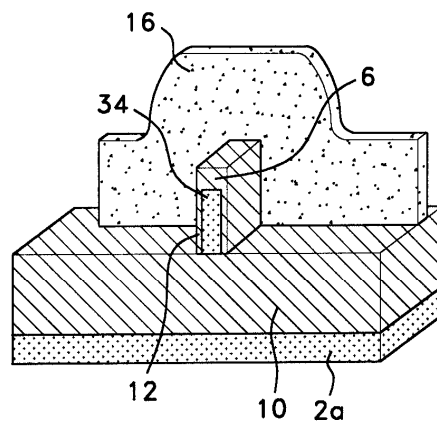
FinFET



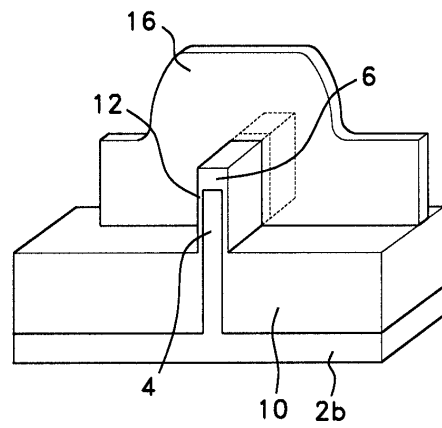
2a



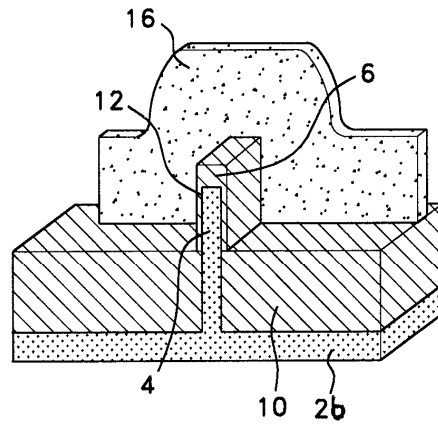
2b



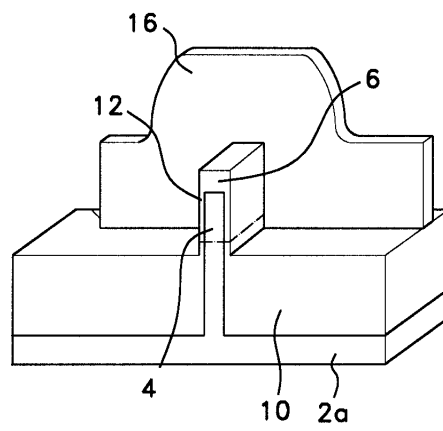
3a



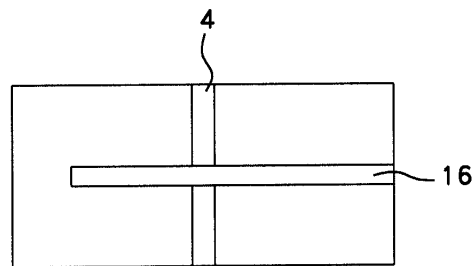
3b



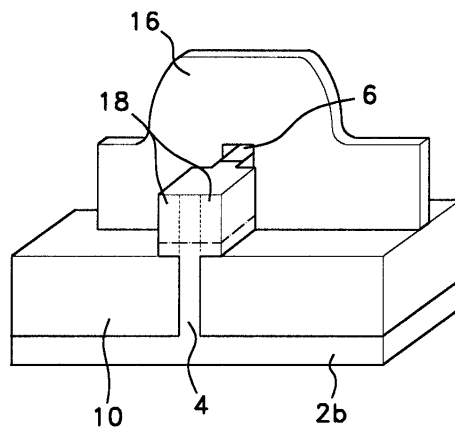
4a



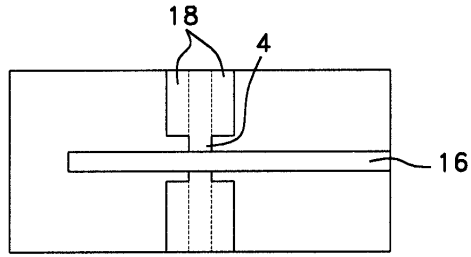
4b



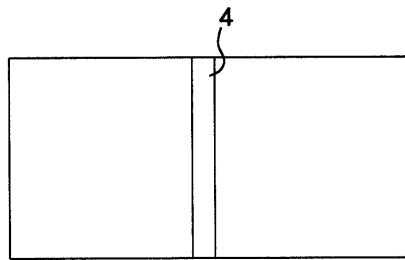
5a



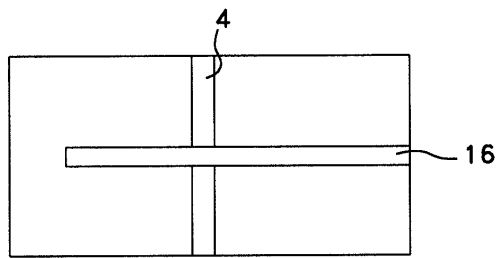
5b



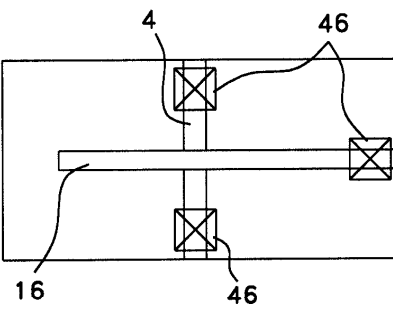
6a



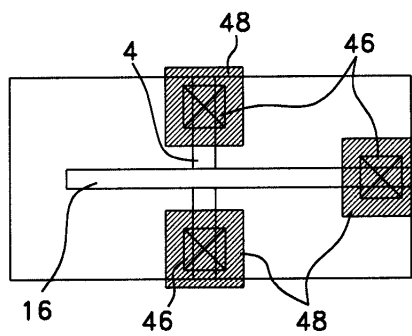
6b



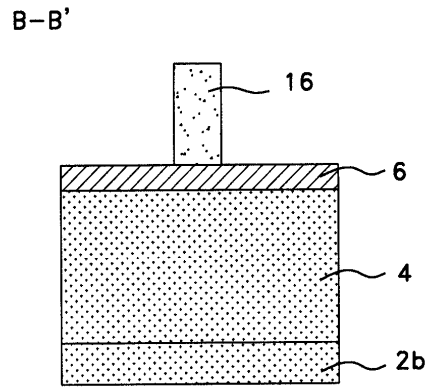
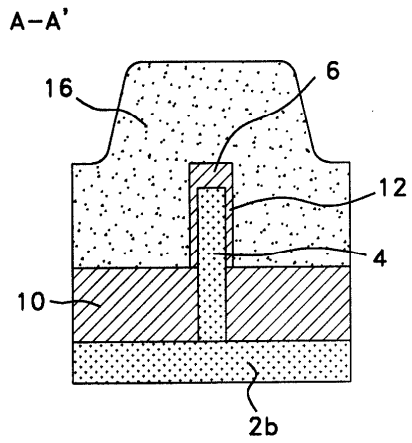
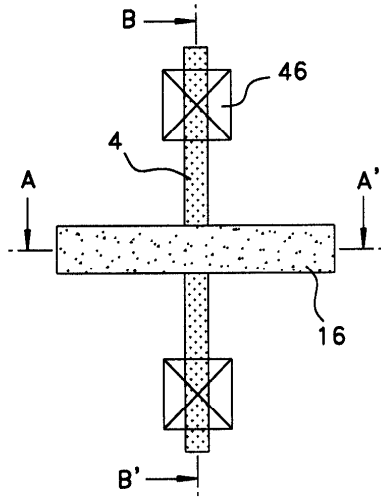
6c



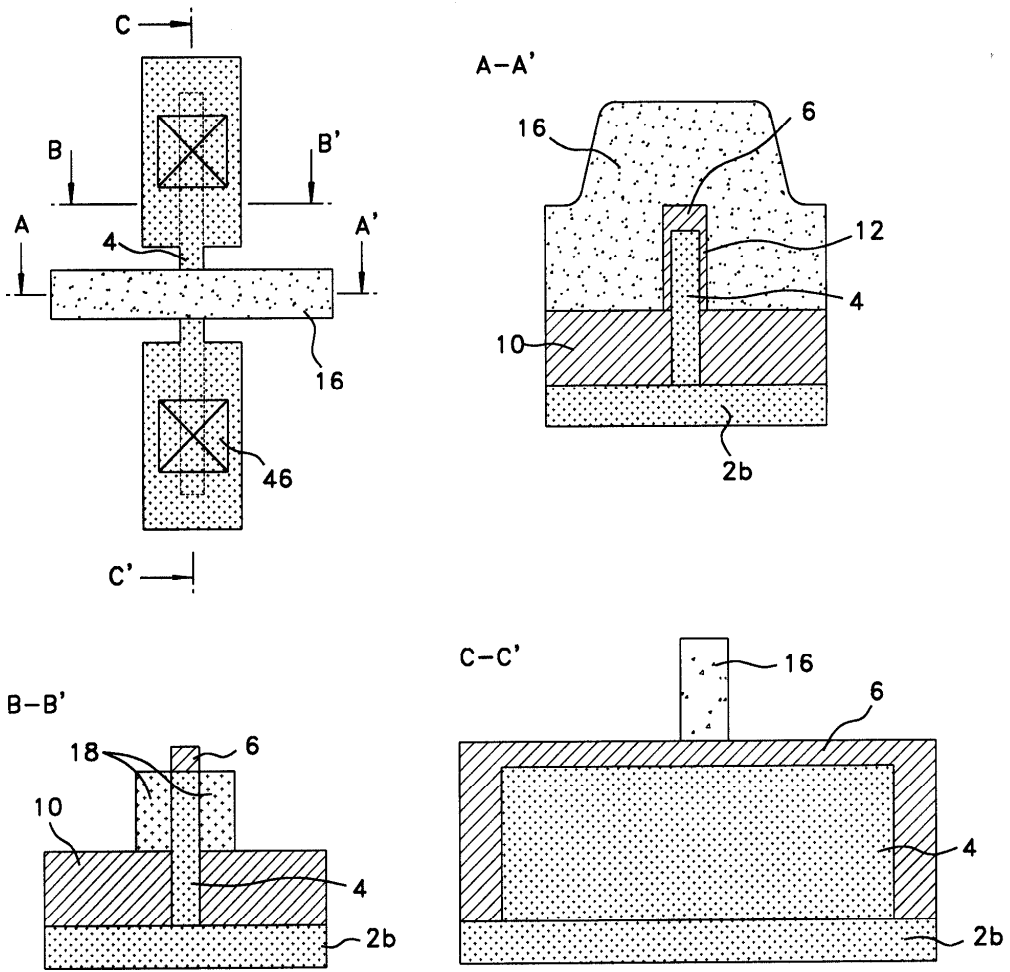
6d



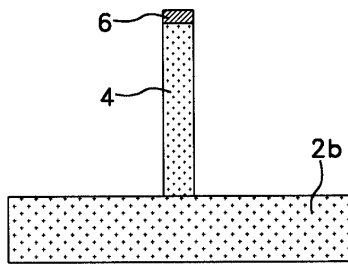
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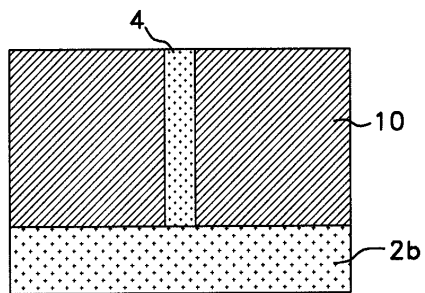
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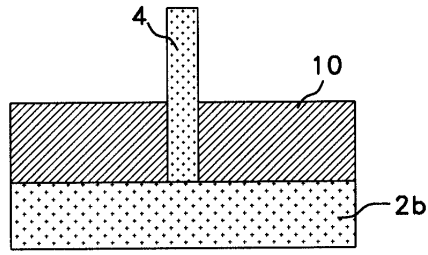
9a



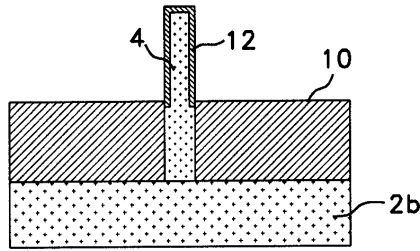
9b



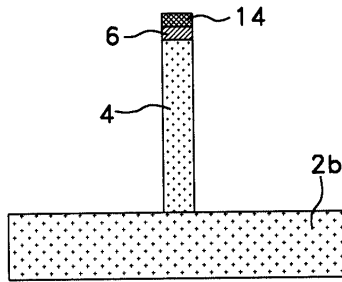
9c



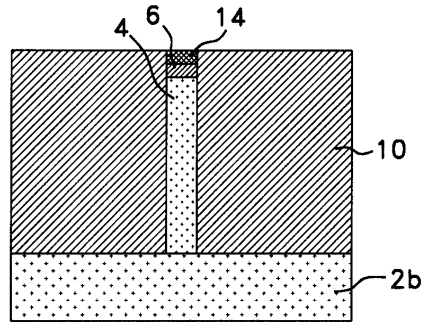
9d



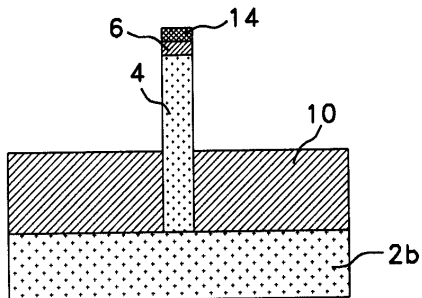
10a



10b

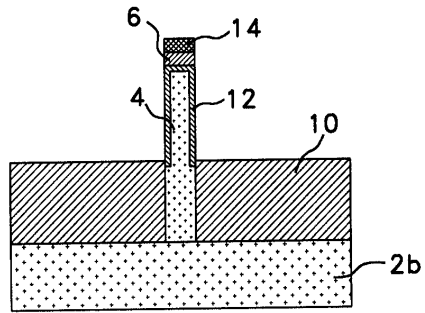


10c

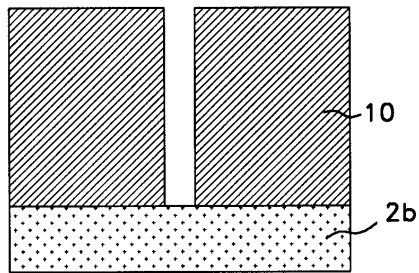




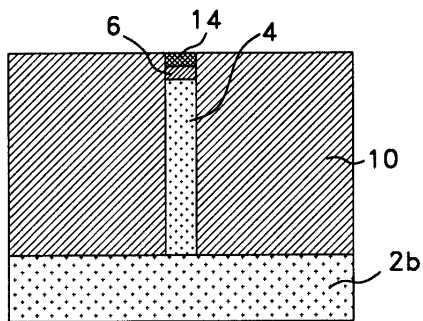
10d



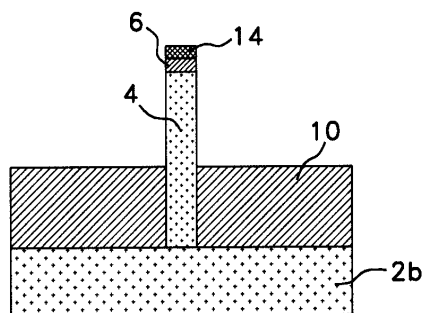
11a



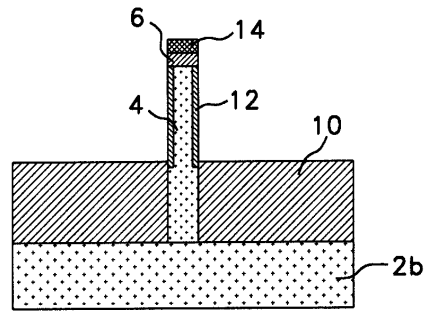
11b



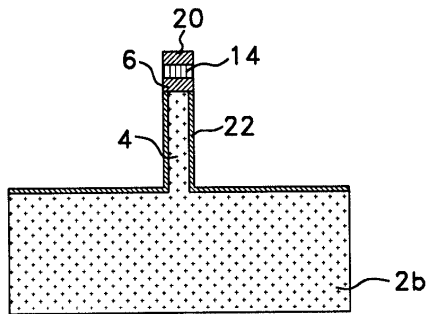
11c



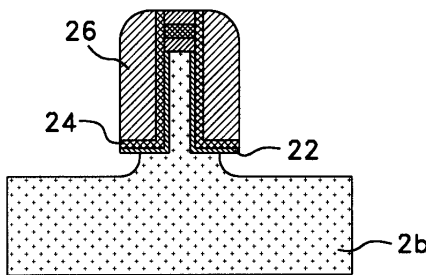
11d



12a



12b



12c

