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2003 12 23

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(65)
(43)

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2002 12 05

(73) 416

(72) 4 1-1505

1 963 108 404

(74)
:

(54)

가 , a)
, b) 가
, c) , d) 가
, e) , f) b) e) Ta2O5 , h) T
a2o5 , g) , Ta2O5

6

1 4 ALD
5
6 5 A
7
8
9

DRAM
Al2O3
가

10 Al2O3 UV O3 가
 11 Al2O3 UV O3
 < >
 20 : 22 :
 24 : 26 :
 28 : 30 :
 32 : 34 :
 36 : 38 : 1
 40 : 42 :
 44 : 46 : 2
 48 : 50 :
 52 :

Al2O3 Ta2O5 , Ta2O5
 DRAM 가 가
 가 가 HS
 G(Hemisphere Silicon Grain) 가 ,
 , 가 ,
 Ta2O5 26 256M
 DRAM 가 Ta2O5 (Oxygen reduction) Ta
 (rich phase)
 , Ta2O5 SiO2 RTN(Rapid Thermal Nitridation)
 (Si3N4) Si (incubation time)
 , Ta2O5 (native oxide)
 , Ta2O5 Ta2O5 가 CVD(Cheical Vaporation Deposition) (ox
 ygen vacancy) UV O3
 , Ta2O5 가 ,
 가 5,316,982 , Ta2O5 Ta2O5
 Ta2O5 , Ta2O5
 CVD, CVD
 ,
 203 가 AI

Al ₂ O ₃	Ta ₂ O ₅	Ta ₂ O ₅
a)		
b)	가	
c)	가	
d)	가	
e)	가	
f)	b)	e)
g)		Ta ₂ O ₅
h)	Ta ₂ O ₅	
TEA(Tri Ethyl Aluminum ; Al(C ₂ H ₅) ₃)		TMA(Tri Methyl Aluminum ; Al(CH ₃) ₃)
2	, N ₂ O	, H ₂ O, O ₃ , O
Al ₂ O ₃	가	Al ₂ O ₃
	UV O ₃	
		가
a)		
b)	가	
c)	가	
d)	b)	c)
e)		
g)		Ta ₂ O ₅
h)	Ta ₂ O ₅	
	UV O ₃	
	(ALD : Atom Layer Deposition)	(Chemisorption) (Desorption)
ALD	CVD	가
1		가
AXn(g)	(10) 가	AXn(g)
(chemisorption)	(chemisorption)	(physiso
2	(purgings)	AXn
AXn(s)		, Xn n
(chemical ligand)		
3	, AXn(s)	H ₂ O
가	H	, A가 A
4	(purgings)	HXn(g)
	가	AO(s)
5		
DRAM	DRAM	
(20)	(22)	
MOS	(24)	(26)
		(30)
		(32)
		(28)
	(34, 36)	CMP
가	MOS	1 (38)
1	(38)	1 (38)
(40)	(42)	(34) (40)
	(44)	

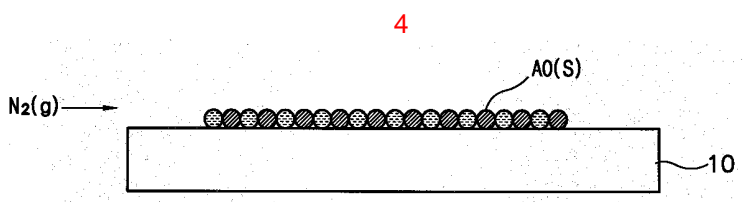
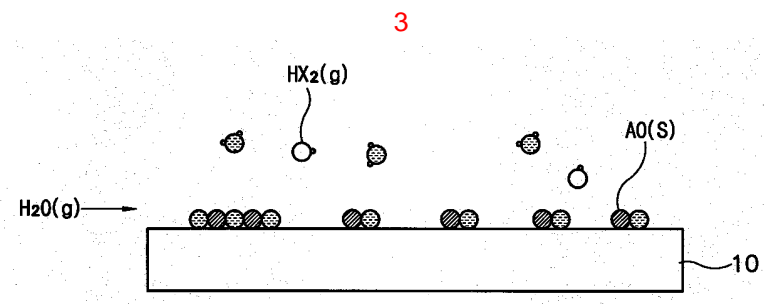
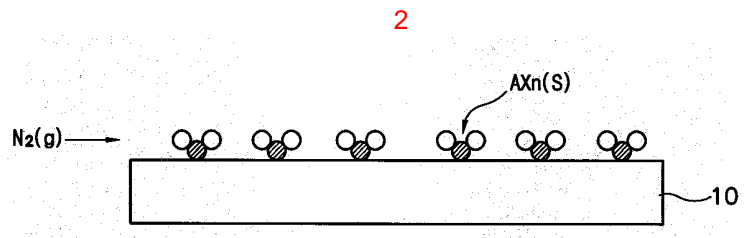
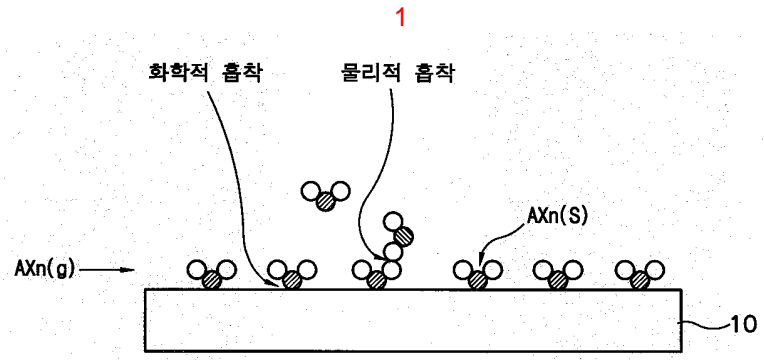
(40) 2 (46) 가가 2 (46) CMP
가 .
2 (46) 2 (46) (36)
(48) 2 (46) 5,000 15,000 가 (48)
HSG 가 . ()
(50) (50)
6 5 A 6 30 (52)
I2O3 40 (50a) 60 (50) A
50 Ta2O5 (50b)
7
ALD S10 (S10).
ALD 가 TMA(Al(CH3)3) 가 (S12). Al(CH3)3
(S14).
ALD N2 가
(S16).
ALD H2O, O3, O2 N20 가
8 (S20).
2Al(CH3)3 + O3 Al2O3 + 3C2H6(g)
C2H6
N2 가 8
S14 S22 20 (S22)
CVD (S26), Ta2O5 50
(S26). UV O3 Ta2O5 (S28).
750 15
9 Ta2O5 Al2O3 가 가 25
36 10
가 ALD
9 5 SiO2
10 UV O3 가
11 UV O3 가 1fA/CELL
, Al2O3 UV O3 1.4V
(TAKE OFF) 1.2V 2.4V

Ta2O5 가 Ta2O5
, Al2O3 , ALD
UV O3 Al2O3

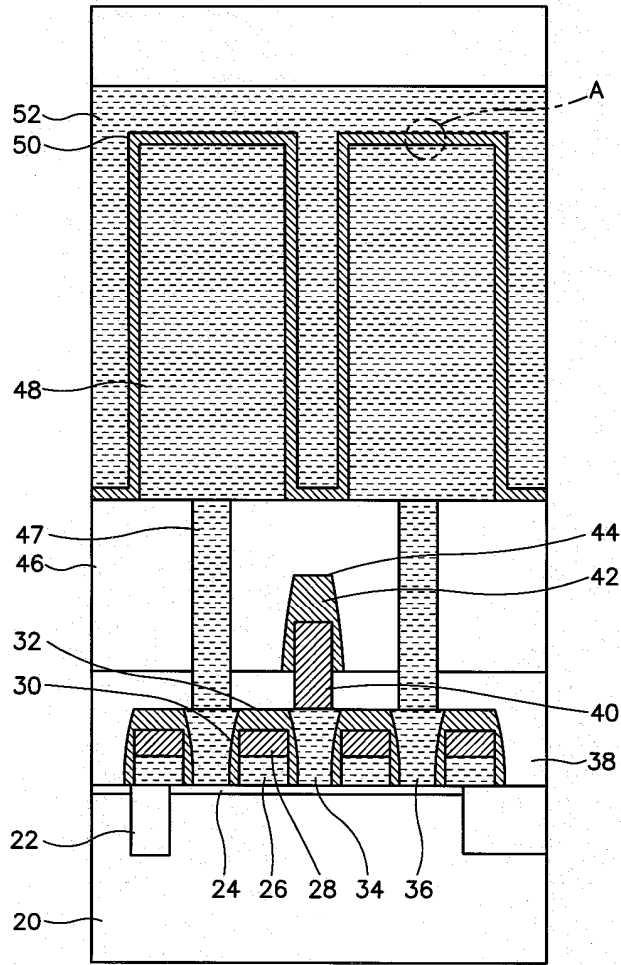
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1.

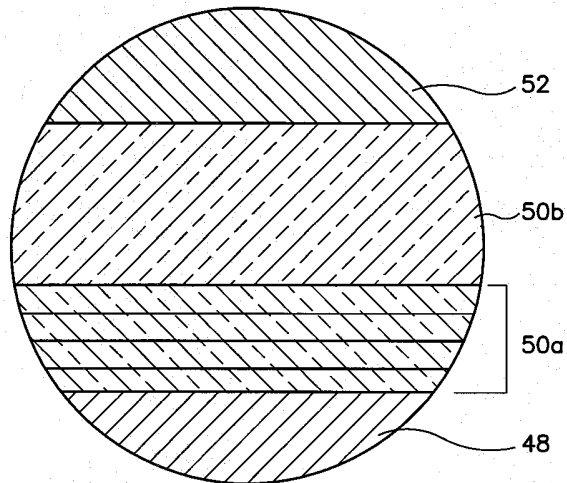
- a) 가 ; ,
 - b) 가 ;
 - c) 가 ;
 - d) 가 ;
 - e) 가 ;
 - f) b) e) ;
 - g) Ta2O5 ;
 - h) Ta2O5 ;
2. ,
 3. 가 TMA(Tri Methyl Aluminum) TEA(Tri Ethyl Aluminum)
 4. Al2O3
 5. UV O3
 6. 가 H2O, O3, O2 , N2O
 7. 40
 8. Ta2O5 60
 9. 가 25
 10. 가 ; ,
 - a) 가 ;
 - b) 가 ;
 - c) ;
 - d) b) c) ;
 - e) ;
 - g) Ta2O5 ;
 - h) Ta2O5 ;
11. UV O3



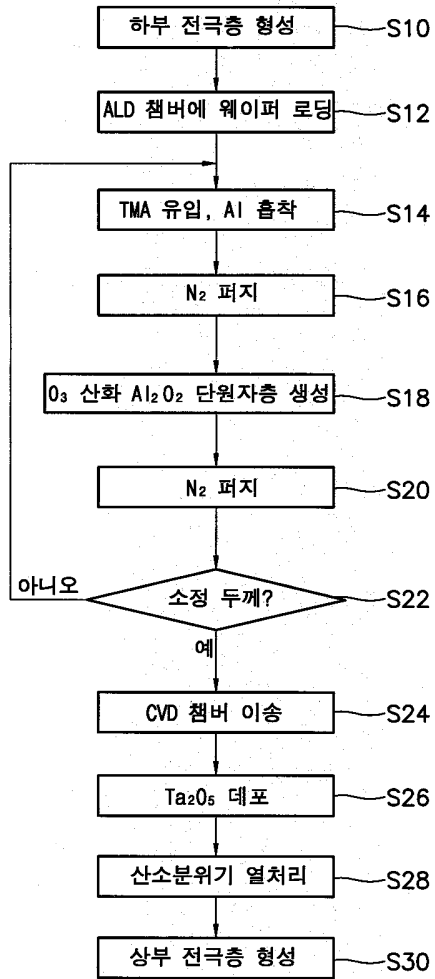
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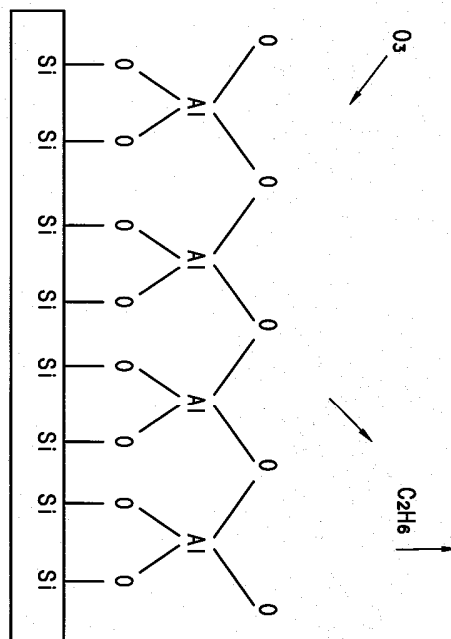
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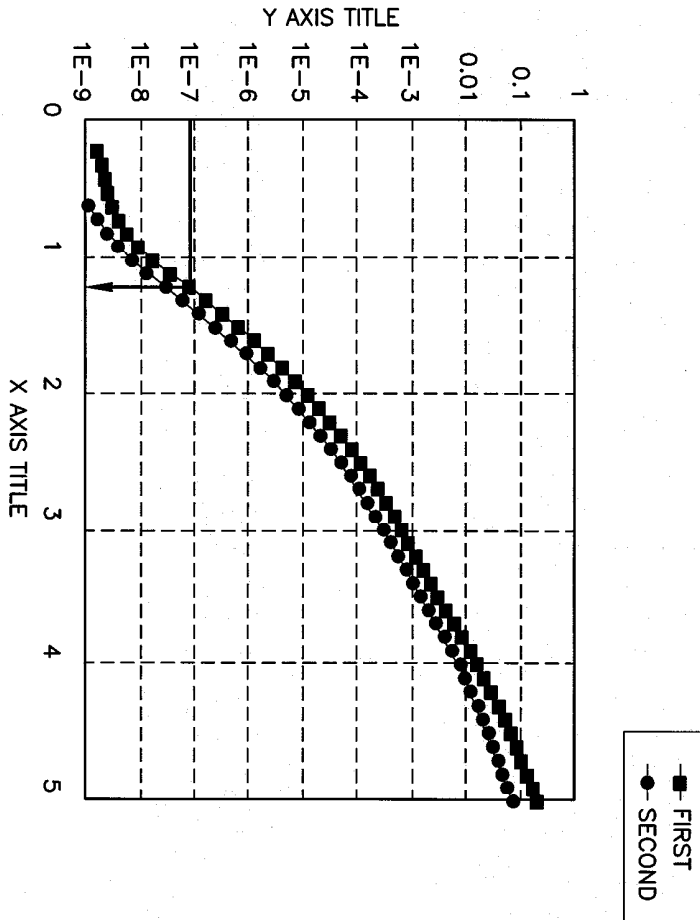
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LAYER	유전율(ε)	TOXEQ(Å)
SiO2 5Å	~4	5
Al2O3 30Å	~10	12
Ta2O5 50Å	~26	8
TOTAL		25

10



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