

(19)
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2004 03 06

(21) 10-2002-0051076
(22) 2002 08 28

(71) 136-1

(72) 3 218-7

502-2 202

441-1 101-404

103 2102

(74)
:

(54)

가

1e

1a 1e

2a 2b

* *
 1 : 2 :
 3 : 4 :
 5 : 6 :
 10 :

가 가

, 64M

가

가

3

(Cylinder), (Concave) (Pin)
 , Ta₂O₅ BST
 NO(/)

NO Ta₂O₅ BST
 가 ,

NO Ta₂O₅ BST

(leakage current)

(breakdown voltage)

가

NO Ta₂O₅ BST

NO Ta₂O

5 BST

가

(Hemispherical Silicon Grain)

NH₃ NH₃ LPCVD

5 30

(Atmosphere Pressure Oxidation) (Plasma Enhanced Oxidation), (Low Pressure Oxidation),

15 O₂

NO Ta₂O₅ O₂, N₂, NO O₂

O₂ 가 (post treatment) O₂, N₂, NO

(In-situ)

()

1a 1e

1a () (1) (2) (2)

(Hemispherical Silicon Grain)

1b (2) (2)

(3) LPCVD NH₃ (3) NH₃ (nitridation) , 5 30

1c (3) (3) (3) 가 (3)

(3) (pin hole) (slightly) (4) (3) (3)

(3) (3) (3) (3) 가 (3) (hole current)가

(3), (SiOxNy) (4) (3) (3) (post treatment), , ONO Ta₂O₅

N₂O 가

(Low Pressure Oxidation), (3) (Plasma Enhanced Oxidation),
 O₂ (4) O₂ (3)
 15
 1d (3) NO Ta₂O₅ (5)
 (5) O₂, N₂, NO O₂
 (oxygen vacancy)
 (5) NO (3) (4)
 (5) ONO
 1e (5) (6) (2)
 (3) (5) (6) (10)
 (In-situ)
 가 가
 2a 2b 2a
 2a 2b ONO (A)가 (norm
 al) ONO 가 (B) 가
 가
 ONO TaO

ONO	33.14fF/	2.63fF/	3.41V	0.11V
ONO	35.51fF/		3.52V	

NH ₃	Ta ₂ O ₅	10.9fF/μm ²	1.6fF/	3.7V	0.4V
Ta ₂ O ₅		12.5fF/μm ²		4.1V	

2a 2b 가

8.
1
NO Ta₂O₅

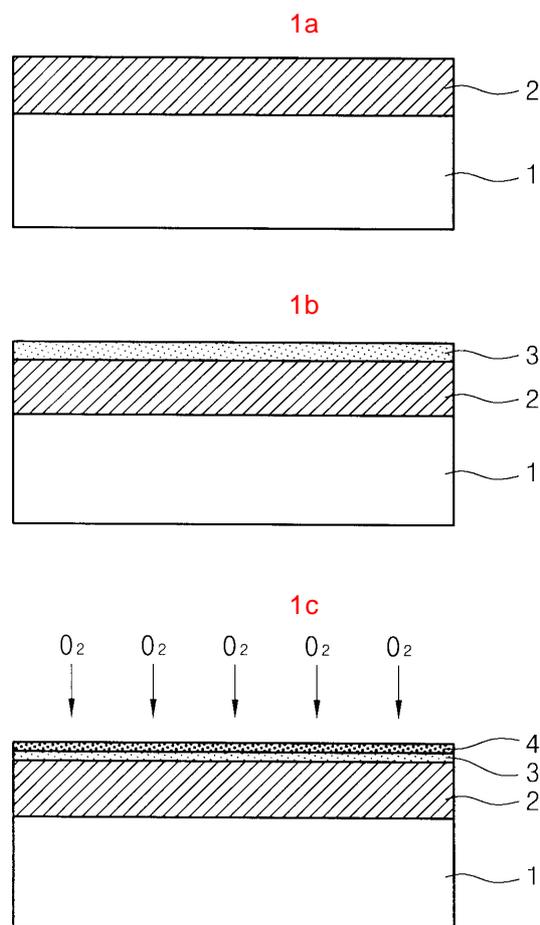
9.
1
O₂, N₂, NO O₂
t)

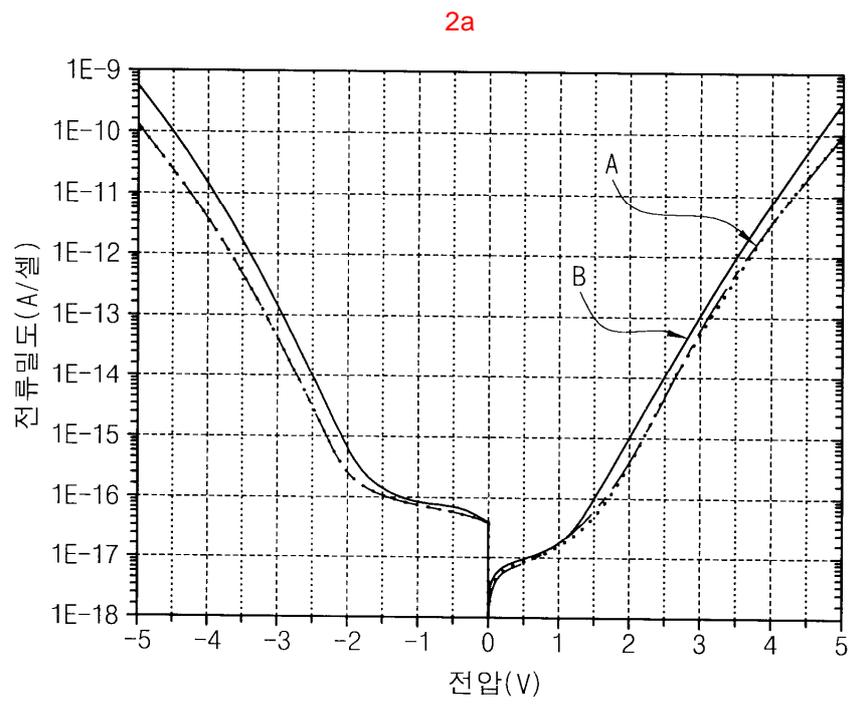
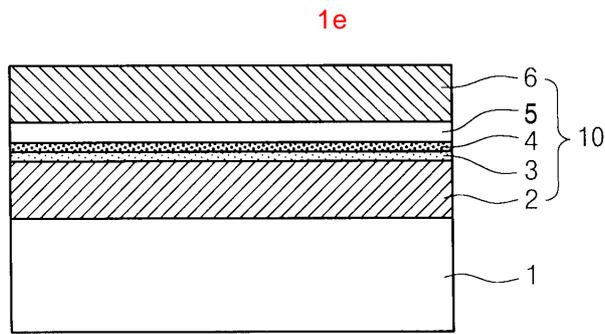
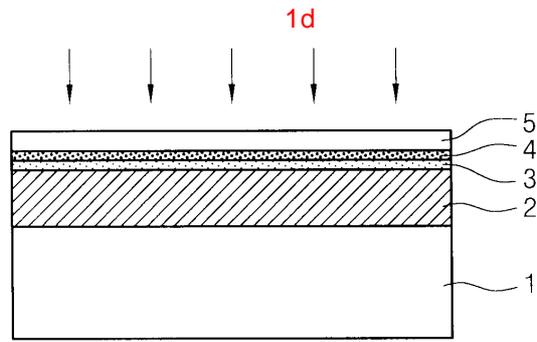
가

(post treatment)

10.
1 9

(In-situ)





2b

