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(73) 가 가 2 2 3

(72) 가 2 2-3 가 가
2 2-3 가 가
2 2-3 가 가
2 2-3 가 가

(74)

:

(54)

(7) (4) , (3) . RIE - lag (5a) , (5a) , (6) (7)
(4) (6) , ,

ULSI, , RIE,

1	1	1	.
2	, 1		.
3	, 2		.
4	, 3		.
5	, 4		.
6	, 4		.
7	2	1	.
8	, 7		.
9	, 8		.
10	, 9		.
11	3	1	.
12	, 11		.
13	, 12		.
14	, 13		.
15	4	1	.
16	, 15		.
17	, 16		.
18	, 17		.
19	, 18		.
20	5	1	.
21	, 20		.
22	, 21		.

23	,	22	.
24	6		1
25	,	24	.
26	,	24	.
27	,	26	.
28	7		1
29	,	28	.
30	,	28	.
31	,	30	.
32		1	.
33	32		.
34	33		.
35			.

<

3, 8 :

4 :

5a, 5b, 5c, 5d, 5e :

6 :

7 :

7a :

7b :

32 :

, ULSI 가 , 가 ,
 .
 32 , () (104) .
 (104) () (103) (103)
 () .
 , (103) , (104)
 (105) .
 3) , (105) (105) (106) , (104) (10
 t₁ .
 , (106) , (107) .
 (107) , (132) .
 33 , (132) (107) ,
 (103) (106) .
 34 , (132) , (106)
 (107) (103) (132) .
 (107a) .
 , (107a) , (103) () .
 ,
 6) , (103) , (106) 가 , t₁ (10
 , (105) (106) , (104)
 가 가 , , HCl NH₄OH
 , (104) NH₄OH , 35
 , (104) (120)가 .
 () , (120) () .
 , (107a) (106) (104)
 가 가 , (107a) (106) (104)
 가 , (104) 가 .

, 1

1

, RIE - lag

, NH₄OH

가

, RIE - lag

가,

2

1

1

1

2

2

1

1

1

2

1

가

2

1

가

가

1

1

0.75

1

2

, NH₄OH 가

3

1

2

1

1

2

2

1

2

1

1

2

NH₄OH

가

4

1

가

RIE - lag

가

NH₄OH

5

1

1

2

2

1

3

2

1

1

1

(2)

(4)

(4)

(2)

CVD

(3)

2

(3)

31

RIE

, C₄F₈ : 0.01L/min(10sccm), CO : 0.05L/min(50sccm), O₂ : 0.05L/min(50sccm), Ar : 0.15L/min(150sccm), : 1.995Pa(15mTorr), RF : 140W, : - 10

(31)

(3)

(5a)

(5a)

(3)

(3)

RIE

(ECR)

가

, CHF₃/CF₄/Ar , C₄F₈/O₂

가

3, (5a) (3), CVD
 10nm (Ti) 70nm (TiN),
 (6)

(5a), (5a) (6), (5a)
 (3) (5a) (6) t₁ 80nm, (5a)
 (6) t₂ 20nm가 .
 (6), CVD, 100nm (W) (7)
 (7), (32) (32),
 (5a)

4, (ICP), SF₆ : 0.09L/min(90sccm), CF₄
 : 0.02L/min(20sccm), N₂ : 0.01L/min(10sccm), : 1.995Pa(15mTorr), RF : 40W,
 : 20 (A), (32), (7)
 (3) (6)

, Cl₂ : 0.08L/min(80sccm), BCl₃ : 0.02L/min(20sccm), CF₄ : 0.02L/min(20sccm),
 : 1.995Pa(15mTorr), RF : 60W, : 20 (B), (6)
 (3)

(3) (6) 가
 (5a) (3) (7) (6)

(ICP) (ECL)
 (7) 가 SF₆가, SF₆/CF₄ 가
 6) 가 Cl₂가, Cl₂/Ar 가, Cl₂/BCl₃ 가 . ()
 (32) . 5 (7a) (7b)가
 6, (3), (8)

, 4, (6)
 , (5a) (7) (6)

, (5a) (6) t₂, (5a) (3)
 (6) t₁, (5a) (6)
 , 가 가 .

, (5a) (6), (3) ()

, RIE - lag (6) 가 . RIE - lag , (5a)
 , RIE - lag (5a) (6)
 , (5a) (4)

(2) NH₄OH
 (4)가 (6) (4)
 (7a) (4)가, (7b) (6)
 가 .

2

2
 1 (3) (31)
 7 RIE , C₄F₈ : 0.01L/min(10sccm), CO : 0.05L/min(50sccm),
 O₂ : 0.1L/min(100sccm), Ar : 0.15L/min(150sccm), : 1.995Pa(15mTorr), RF : 100W,
 : - 10 (31) (3)
 (5b)

(5b)

RIE (ECR)
 가 , CHF₃/CF₄/Ar CF₄/O₂/Ar 가 .

8 (5b) (3) CVD
 10nm (Ti) , 70nm (TiN) (6)

(5b) (5b) (6) (6) t₁ 80nm
 (5b) (3) t₂ (5b) 20nm가 .

(6) CVD 100nm (W) (7)
 (7) (32)

9 1 A 가 (32)
 (7) (3) (6)

1 B 가 (6)
 (3) (32) (7a)
 (7b)가 .

10 (7) (3) (8)
 (7a)

9 (6)
 1 (7) (5b)
 (6) 가, (5b) (3) , RIE - lag

(5b) (4)
 (1) NH₄OH 가 (4)
 가 .

(7a)가 (4)가, (7b) (6)

3

3, 1 (3) ()가 200nm (3) (4)

11 (3) (31) RIE (ECR), C₄F₈ : 0.01L/min(10sccm), CO : 0.05L/min(50sccm), O : 0.01L/min(10sccm), Ar : 0.15L/min(150sccm), : 1.995Pa(15mTorr), RF : 140W, : -10 (31) (3) (4) (5c)

12 (5c) (3) CVD 10nm (Ti) 70nm (TiN) (6)

(5c) 0.75 (6) (5c) t₁ 80nm (5c) (3) t₂ 40nm (6) (7) CVD (32) 100nm (W) (7)

13 (7) 1 (3) A 가 (32) (6)

(6) 1 (3) B 가 (32) 32

14 (7) (3) (7a) (8)

(7) (5b) (6) (6) 가, (5b) (3) , RIE - lag

(1) (5b) (4) NH₄OH 가 (4) 가

(7a)가 (4)가, (7b) (6)

4

4
 15 (3) (4) () (3)
 (5d) (5d) (3) (4) (Co)
 (9) (4) (3) (5d)
 () () (9) 60 70nm
 16 10nm (5d) 70nm (TiN) (3) CVD (6)
 (Ti)
 (3) (6) (5c)
 (6) 80nm (6) CVD
 100nm (W) (7) (7) (32)
 17 (7) 1 A 가 (32)
 (6) 18 (3) B 가 (32)
 19 (7) (3) (8)
 (5d) 18 (6)
 (5d) (7) (6)
 (5d) (4) (5d)
 (9) NH₄OH 가 (4)
 (7a) (4)가, (7b), (6) (9)
 가

5

20 5 (6) 4 (7) 15 (7) (32) (9)
 21 (7) 1 A 가 (32)
 (3) (6)

, 1 B 가 , (6)
(3)

RF 22 , O₂ : 8L/min(8000sccm), N₂ : 1L/min(1000sccm), : 0.023Pa(3.0Torr),
: 1300W, : 200
(32)

23 , (7) , (8)

, 21 (6)
(5a) (4)
, 22 (4)
(10)

4OH (10) 5nm , (10) , NH
가 (4)가, (7b) (6) (4)가 , (7a)
가

6

6
24 , 5 , 20 (32) ,
(33) (33) , 25 (5e)
(33a) (33b)

26 , 1 A 가 , (33)
(7) (3) (6)

, 1 B 가 , (6)
(3)

, (33) (5e) , (5e)
(6)

27 , (7) , (3) , (8)

, 26 (33) , (5e)
(6)
H₄OH , (5e) , (6) , N
가 (4)가

, (7a) (4)가, (7b) (6)
가

7

6 7 , 24 , (5e) (33)

34) 28 (5e) 가 가 20nm(0.02μm) (

29 (34a) (34) (5e) (34b) (5e)

30 1 A 가 (34) (7) (3) (6)

1 B 가 (6) (3)

31 (7) (3) (8)

30 (34) (5e) (6) (6)

(7) (5b) (6) (6) RIE - lag (6)

(1) (5b) NH₄OH (4) 가 (4)가

(7a) 가 (4)가, (7b) (6)

, RIE - lag NH₄OH 가

NH₄OH 가

(57)

1.

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(2),

(2)

(4),

(4)

(2)

(3),

(3)

,

(4)

(5 a 5e),

(5a 5e)

,

(5a 5e)

(4)

(6, 7)

,

(5a 5e)

,

(6, 7)

(5a 5e)

.

2.

1

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(5a, 5b)

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3.

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(2),

(2)

(4),

(4)

(2)

(3),

(3)

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(4)

(5e),

(5e)

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(5e)

(4)

(6,

7)

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(6, 7) ,

1

(6),

1

(6)

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1

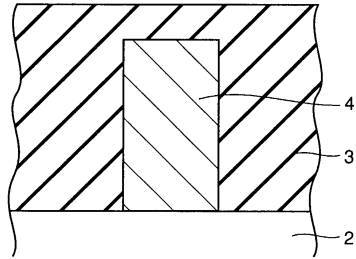
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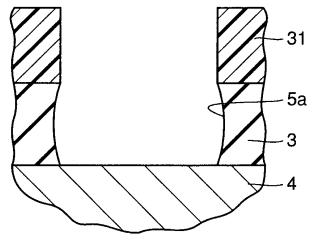
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2 (7) , (5e)

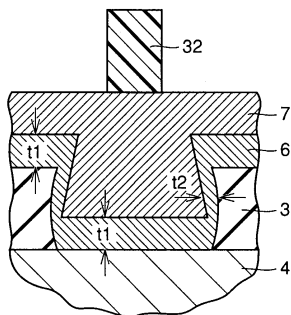
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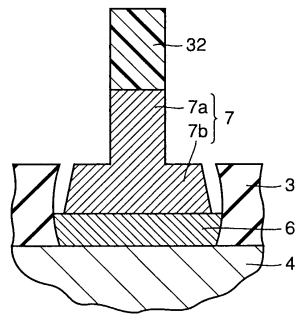
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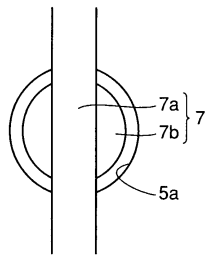
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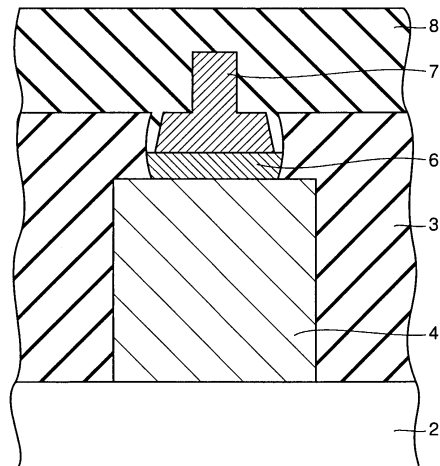
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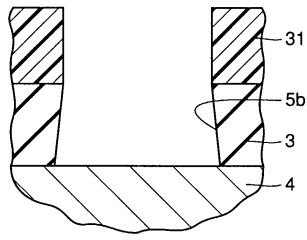
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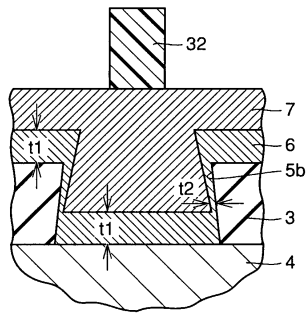
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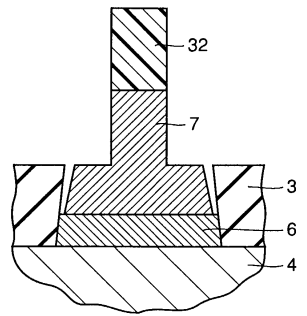
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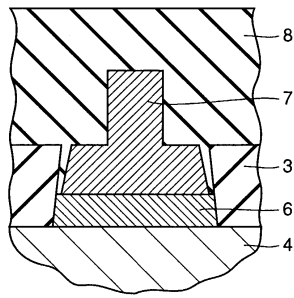
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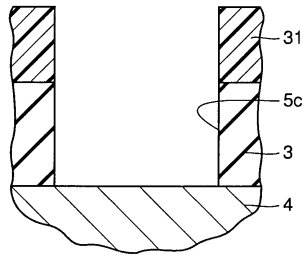
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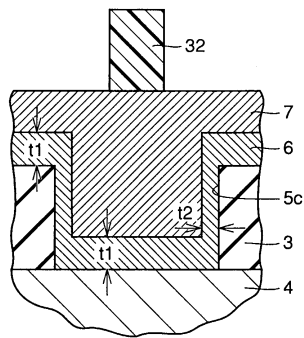
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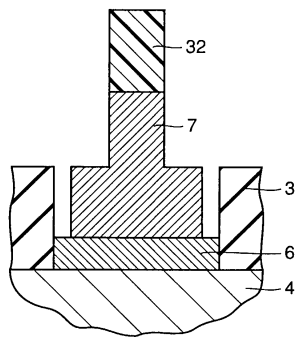
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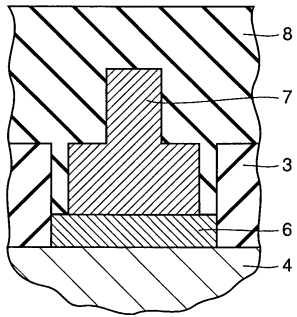
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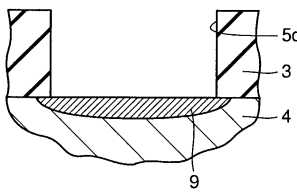
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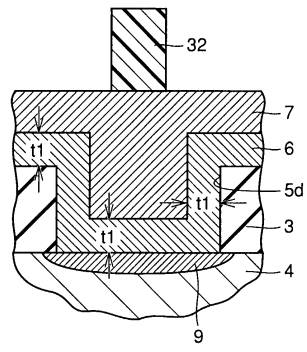
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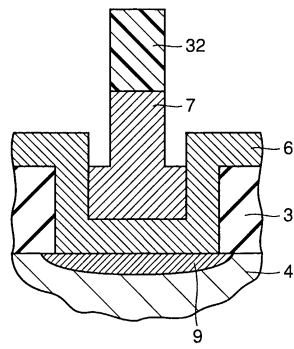
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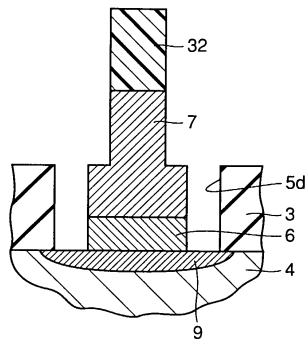
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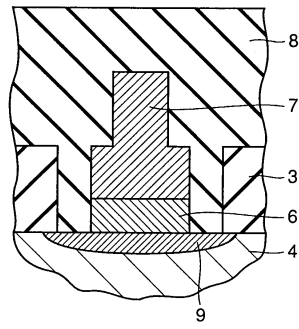
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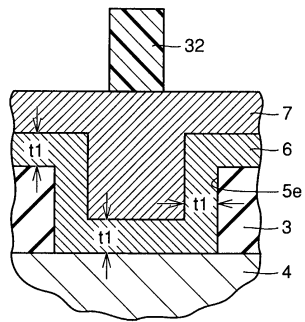
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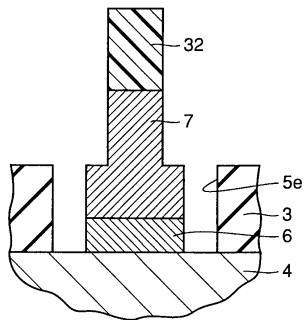
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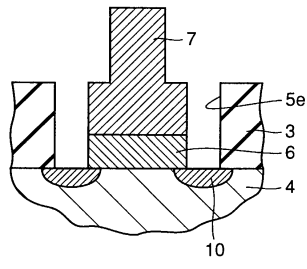
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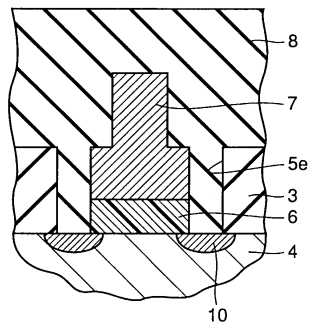
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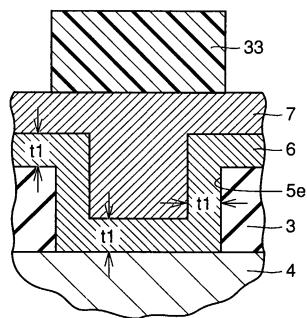
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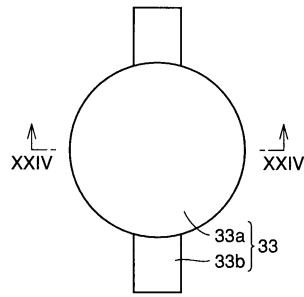
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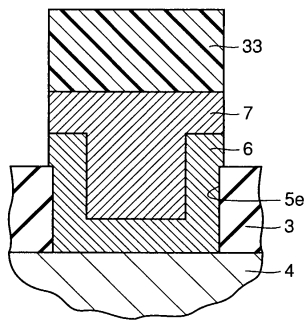
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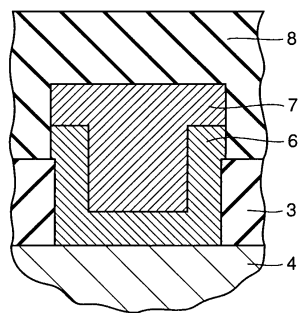
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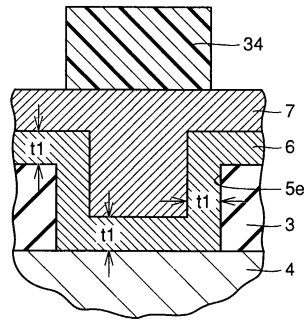
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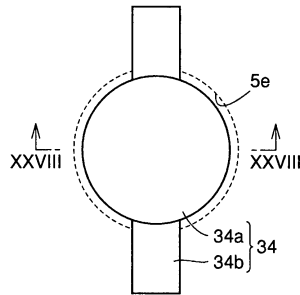
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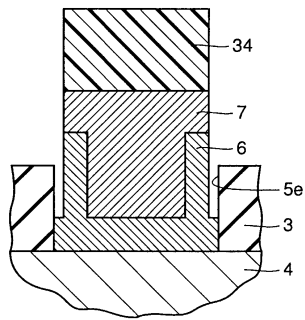
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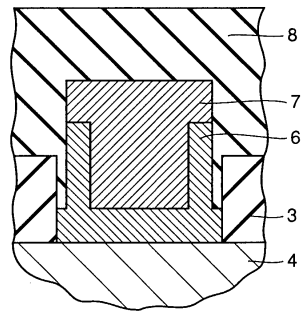
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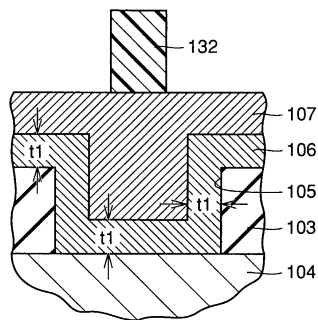
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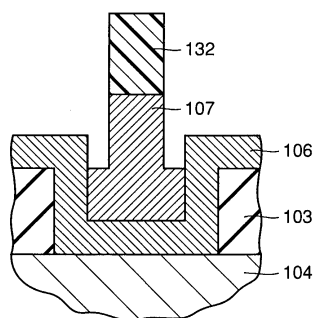
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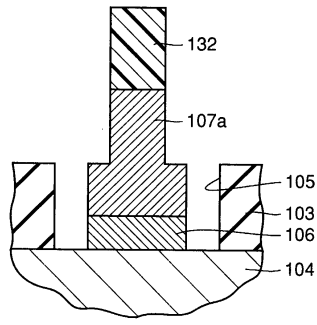
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