(19) (KR)
(12) (B1)

(54)

, CHF$_3$, N$_2$ He   ,
.

1

1   .

2   .

***   ***

1.   2.

3, 3' VIA   4.

20,21.   22.

23.   24.

25.   26.

                                        ,   , $SiOx$ (a
spect ratio) $SiOx$ (MSix)   TiSix
                   .

                            ,   1992   1
0   9   S. Gupta, et al   07/960,499
          .

                 ,
    .

   .

               .

                 ,   ,   ,
  ,   ,   5000   20000   .   ,
    VIAS   ,
    .   ,   VIA
           ,   ,   .
   ,   (debris)   ,
          VIA   .   ,   TiN
   VIAS   VIA   .
         (10.0Torr > p > 0.8Torr)   (flow rate)   400
KHz RF CHF_3
   .

     TiN
   .

        (MSix)   ,   , TiSix   ,
   .

SiOx   TiSix   VIAS
.

VIAS   TiSi   VIAS
SiOx   VIAS   .

,   2   ,   (2)
(4)   (1)   4000   20,000   .
VIA   (3.3')   ,
,   "   (overetch)"   .

(4)   TiSix   500   800

.   , 700   TiSix   700
.

. CHF₃   CF₃   , VIA
, VIA   O₂   (ashing)   .
,   ,   (fill plug)   .

1   ,   ,
.   1   LAM Research, Inc., Model ET 13   .   (23)   A
l   (21)   ,   (24)   (22)   .   (20)
,   (20,21)   .   ,   .   (25)
He   (24)   (30)   (26)   He
.   He   (
)   ,   (30)   ,
.

,   ,
.   ,   ,
.

VIA   TiSix   .
TiN   .   , CHF ₃   , He
N₂   .   (TEOS)   ,   TiSix   .
.   ,   1.2cm   , RF   800   , He   12 Torr
.

1   :

PR = 3000 MT

Powcr = 800 W

= 1.3 cm

CHF$_3$ = 40 SCCM

N$_2$ = 30 SCCM

He = 3000 SCCM

= 12 Torr He

, TEOS   ± 12.7%   22.2   3400 /min, ,   /TiSix

.   82   .

, 2   CF$_4$ Ar

.

, 6   ,   CHF$_3$, CF$_4$, Ar, He   N$_2$.
,   800mT   2400mT   .   CF$_4$ Ar
,   .   ,   Ar & C
F$_4$ (factorial)   :

PR = 1500 MT

Power = 800 W

= 1.3 cm

CHF$_3$ = 60 SCCM

He = 2300 SCCM

N$_2$ = 20 SCCM

= 12 Torr He

TEOS   ± 6%   4000 /min   TEOS   23:1   TiSix   .
87   .

TiSix   .   ,   ,
.

:

PR = 1700 MT

Power = 900 W

= 1.0 cm

CHF$_3$ = 60 SCCM

He = 2300 SCCM

$N_2 = 20$ SCCH

= 12 Torr He

TiSix   TEOS   87   4200 /min   TEOS   34:1   .
                              . O_2 (ash)   ,
  ,   SEM   .

          ,   ,
    .

        1.

SiOx   ,   SiOx   (MSix)

  (a)   ,

  (b)   SiOx
      ,

  (c) 1.5cm   D   1500 mT   Pr
                                    (1) CHF$_3$ N$_2$
            (2)   400 KHz   RF   P   ,

  (d)   96%   He
                                        ,

  (e)   D   P
          Pr   N$_2$ CHF$_3$ He   ,

  (f)
                                                                              .

        2.

    , SiOx   ,   SiOx   (MSix)

  (a)   ,

  (b)   SiOx
      ,

  (c) 1.5cm   D   1500mT   Pr
                                    (1) CHF$_3$ N$_2$ He
            (2)   400 KHz   RF   P   ,

(d)   He
          ,

(e)   D
   P   Pr   N$_2$ CHF$_3$ He   ,

(f)
                                                                                    .

     3.

   2   , He/CHF$_3$/N$_2$ 2300/60/20   ,   SiO$_x$
                                                      .

     4.

   3   , O$_2$ O$_2$
                     ,
                     .

     5.

   3   ,   .

     6.

(a)   ,

(b)   ,

(c)
                                                                          ,

(d)
         ,

(e) CHF$_3$, N$_2$ He
          ,

(f)   400KHz   RF   ,

     He   CHF$_3$ N$_2$,   P,   10.0 Torr > P > 0.
8 Torr   ,   He   96
      .

     7.

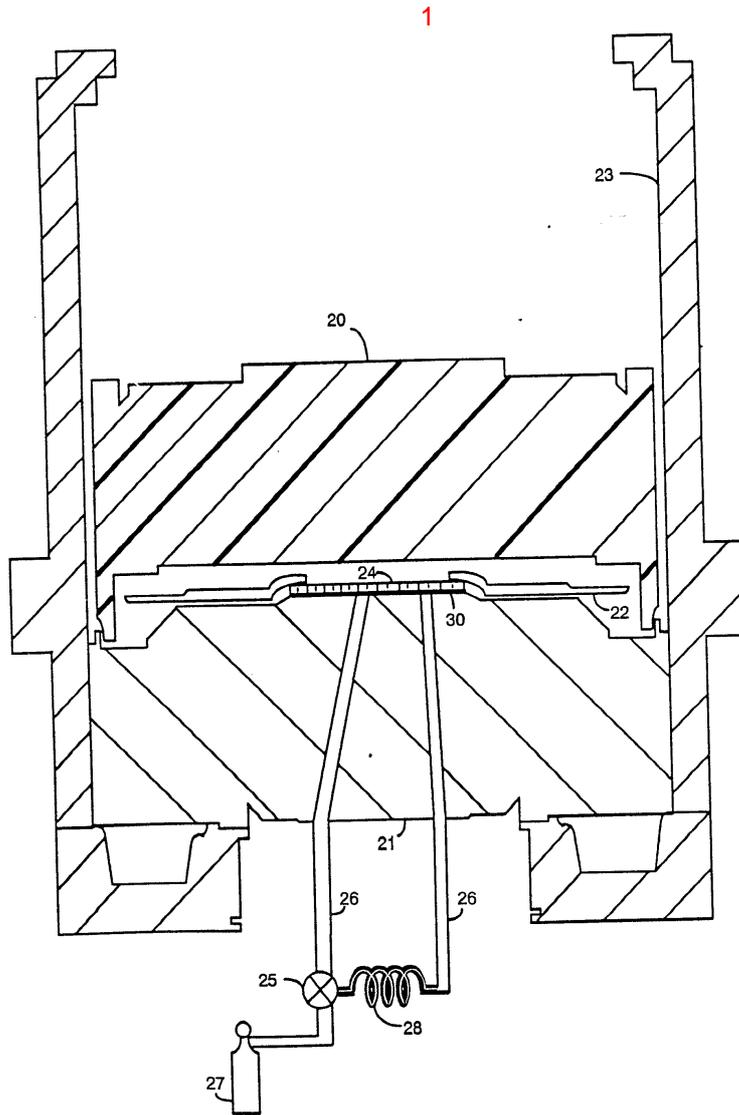   6   ,   700   .

8.

7   , ( )   VIA

.

9.

7   ,   .

2

ILD

기 판

필드 산화막

다결정
실리콘층

I=14000Å

4000Å

1

2

3

4

2

3'

4'

5