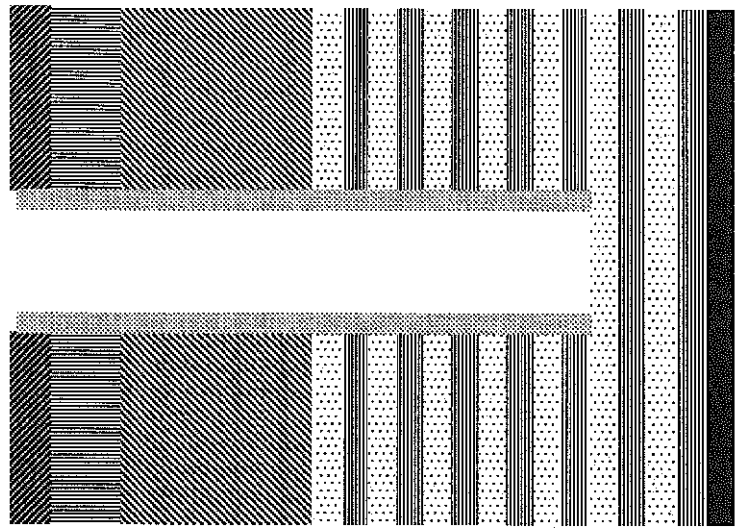


FIG 1a

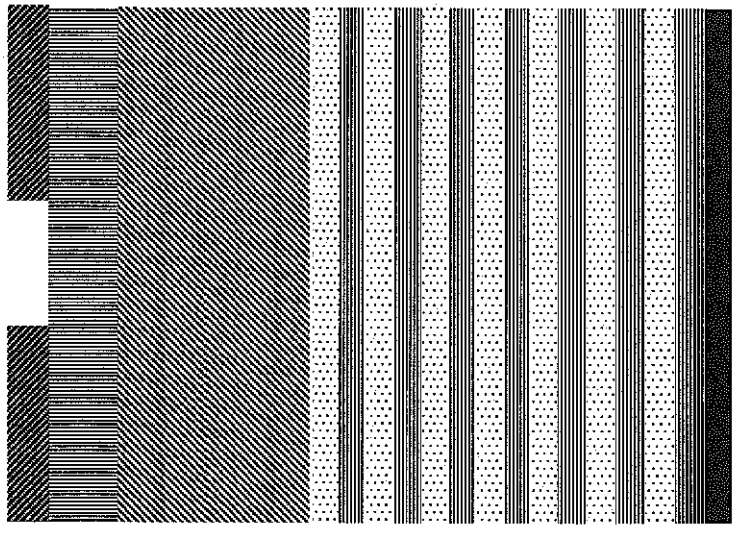
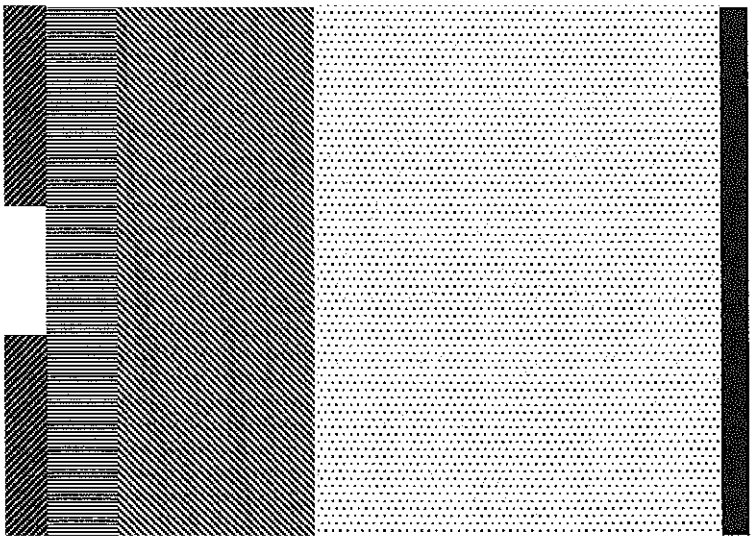


FIG 1

photoresist
ARC (anti reflective coating)
APF Amorphous carbon mask
SiN
SiO
Si
Sidewall passivation layer (FIG 1a)



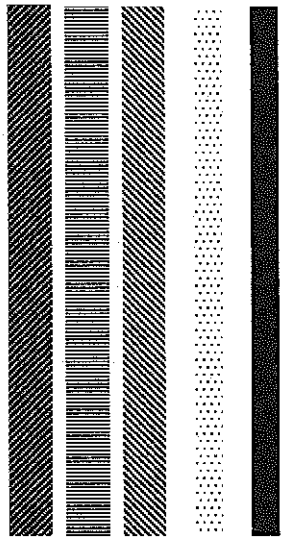

photoresist
ARC (anti reflective coating)
APF Amorphous carbon mask
SiO
Si

FIG 2

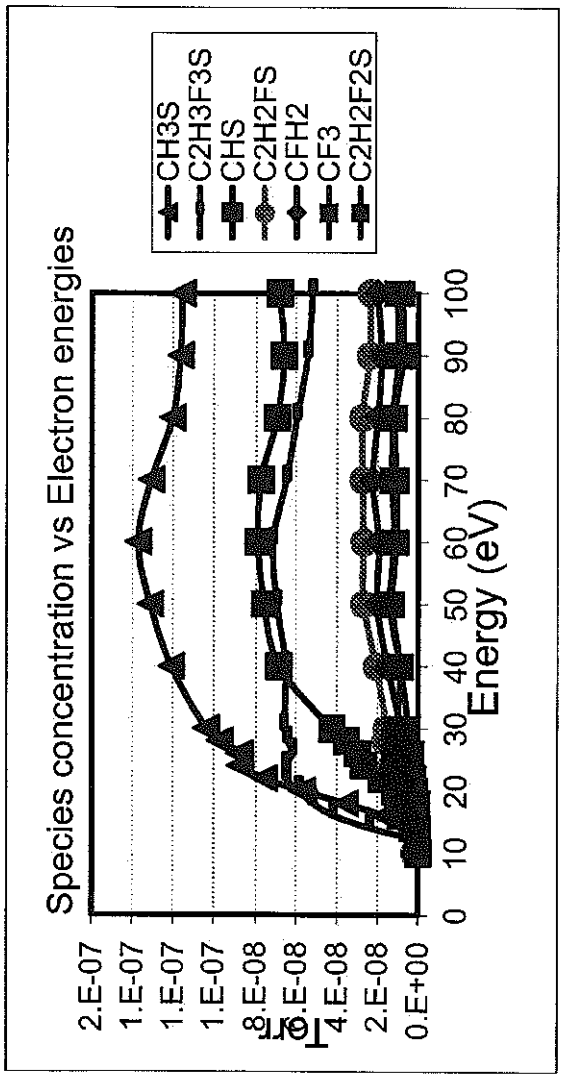

Species concentration vs Electron energies
CH3S
C2H3F3S
CHS
C2H2FS
CFH2
CF3
C2H2F2S
Torr
Energy (eV)
2.E-07
1.E-07
1.E-07
1.E-07
8.E-08
4.E-08
2.E-08
0.E+00
0
10
20
30
40
50
60
70
80
90
100

FIG 3

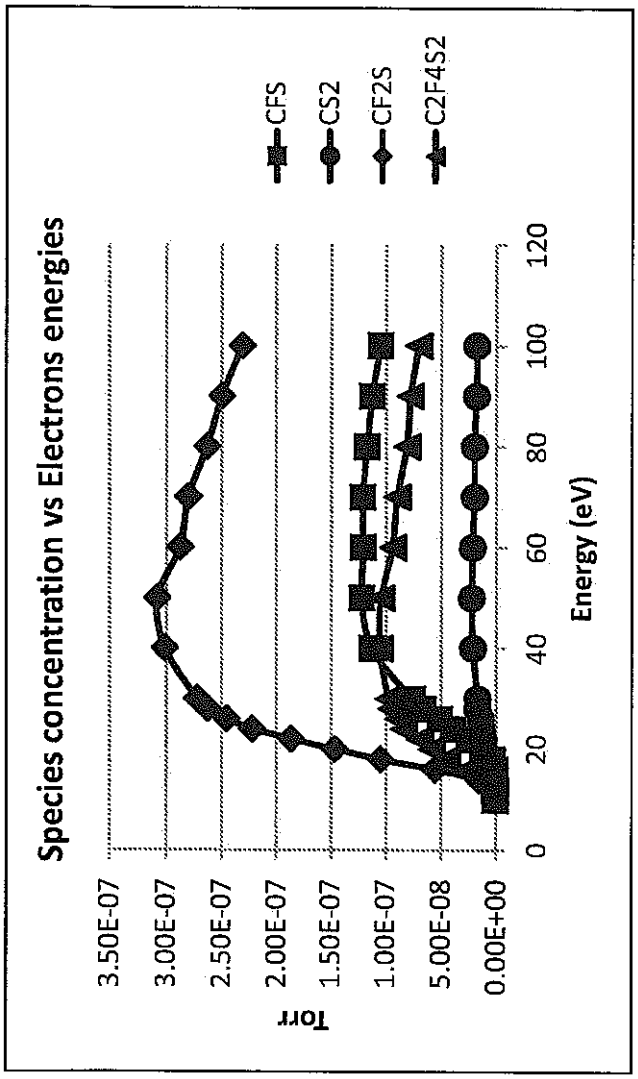

Species concentration vs Electrons energies
CFS
CS2
CF2S
C2F4S2
Torr
Energy (eV)
3.50E-07
3.00E-07
2.50E-07
2.00E-07
1.50E-07
1.00E-07
5.00E-08
0.00E+00
0
20
40
60
80
100
120

FIG 4

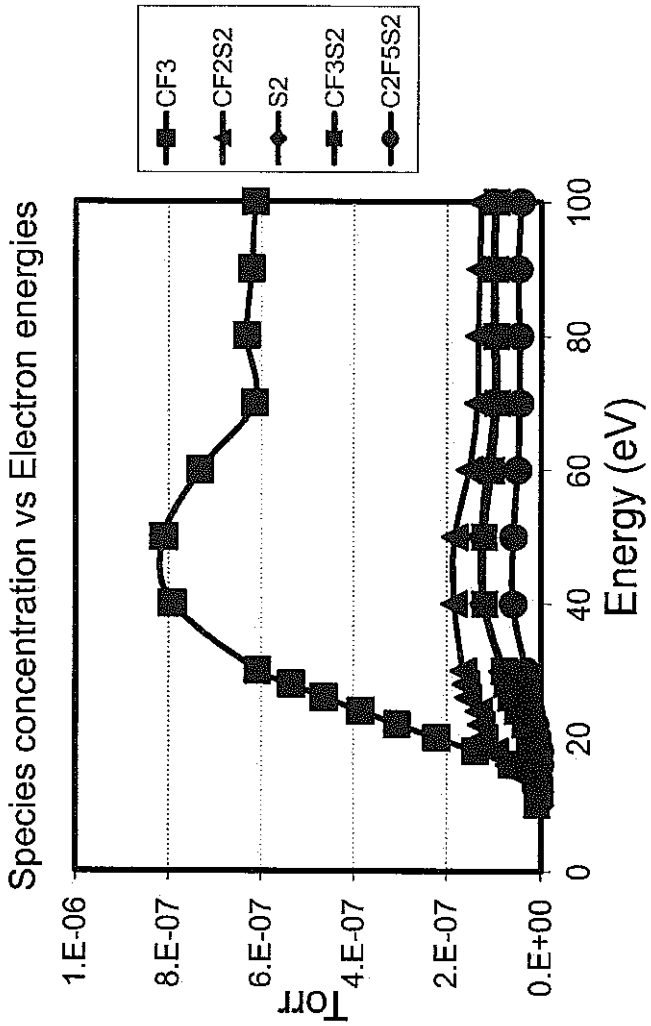

Species concentration vs Electron energies
CF3
CF2S2
S2
CF3S2
C2F5S2
Torr
1.E-06
8.E-07
6.E-07
4.E-07
2.E-07
0.E+00
0
20
40
60
80
100
Energy (eV)

FIG 5

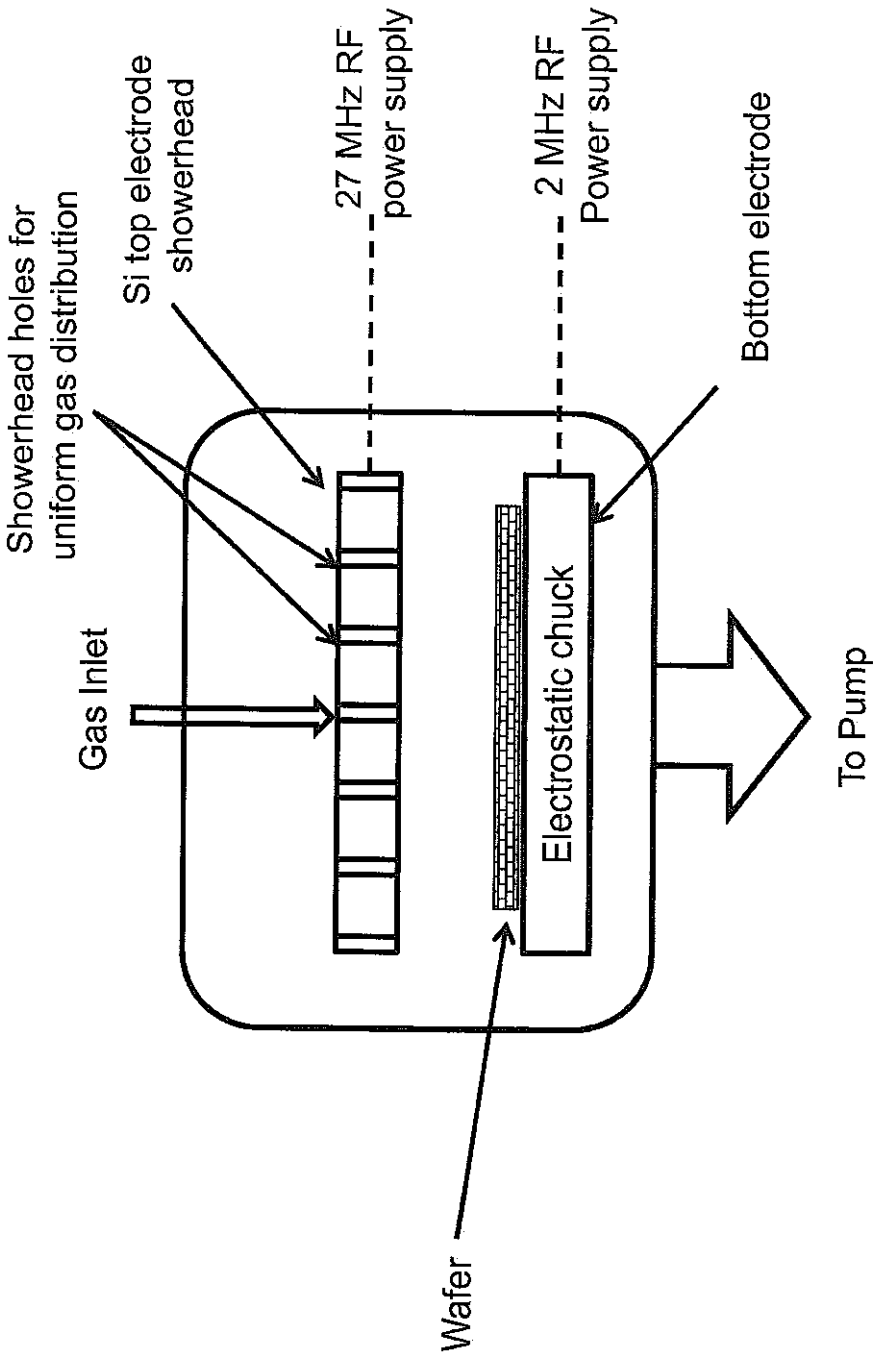

Showerhead holes for uniform gas distribution
Si top electrode showerhead
27 MHz RF power supply
2 MHz RF Power supply
Bottom electrode
Gas Inlet
Electrostatic chuck
To Pump
Wafer

FIG 6

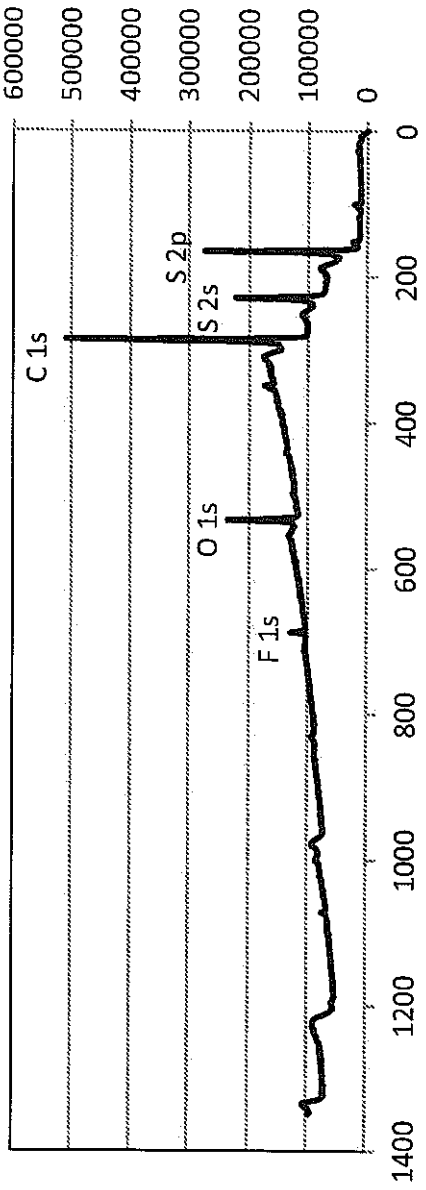


FIG 7

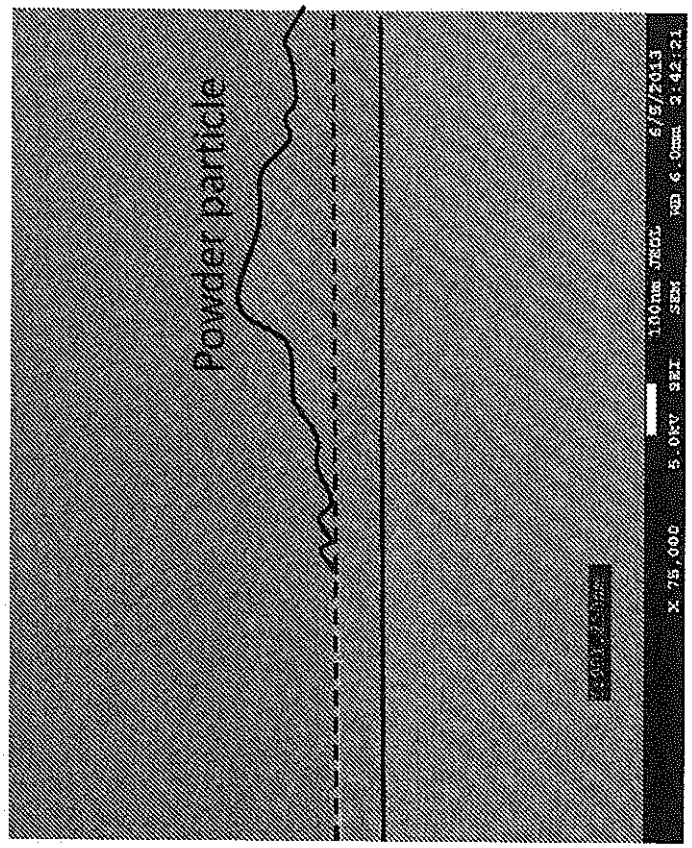


FIG 8B

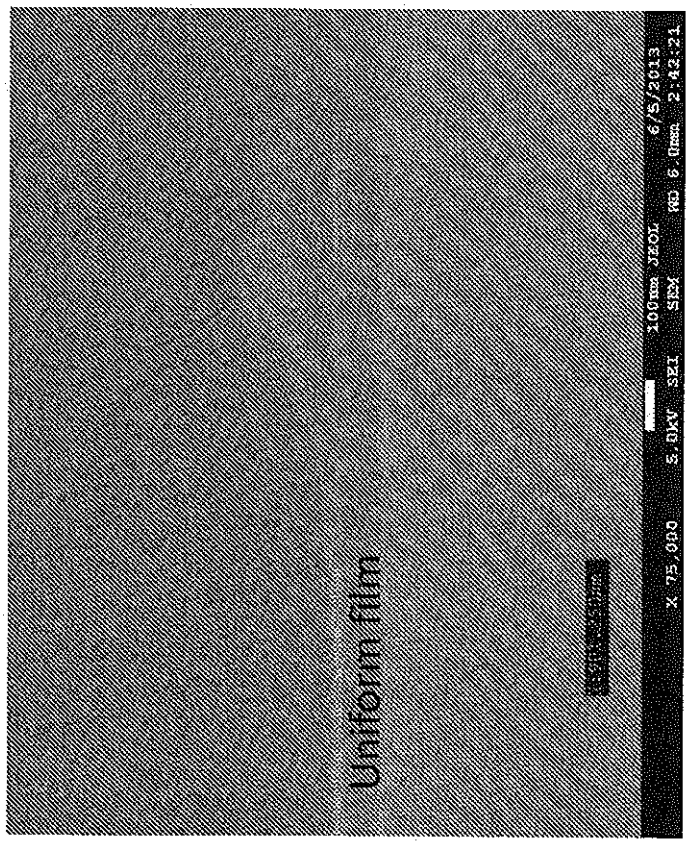


FIG 8A

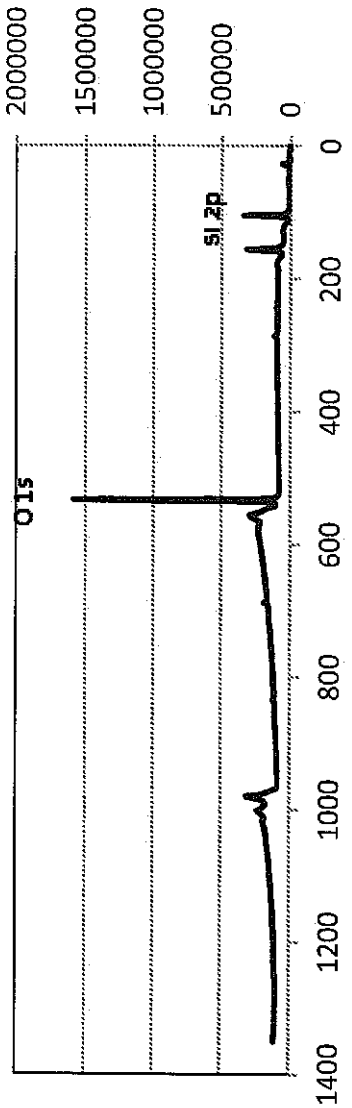

2000000
1500000
1000000
500000
0
O 1s
Si 2p
0
200
400
600
800
1000
1200
1400

FIG 9

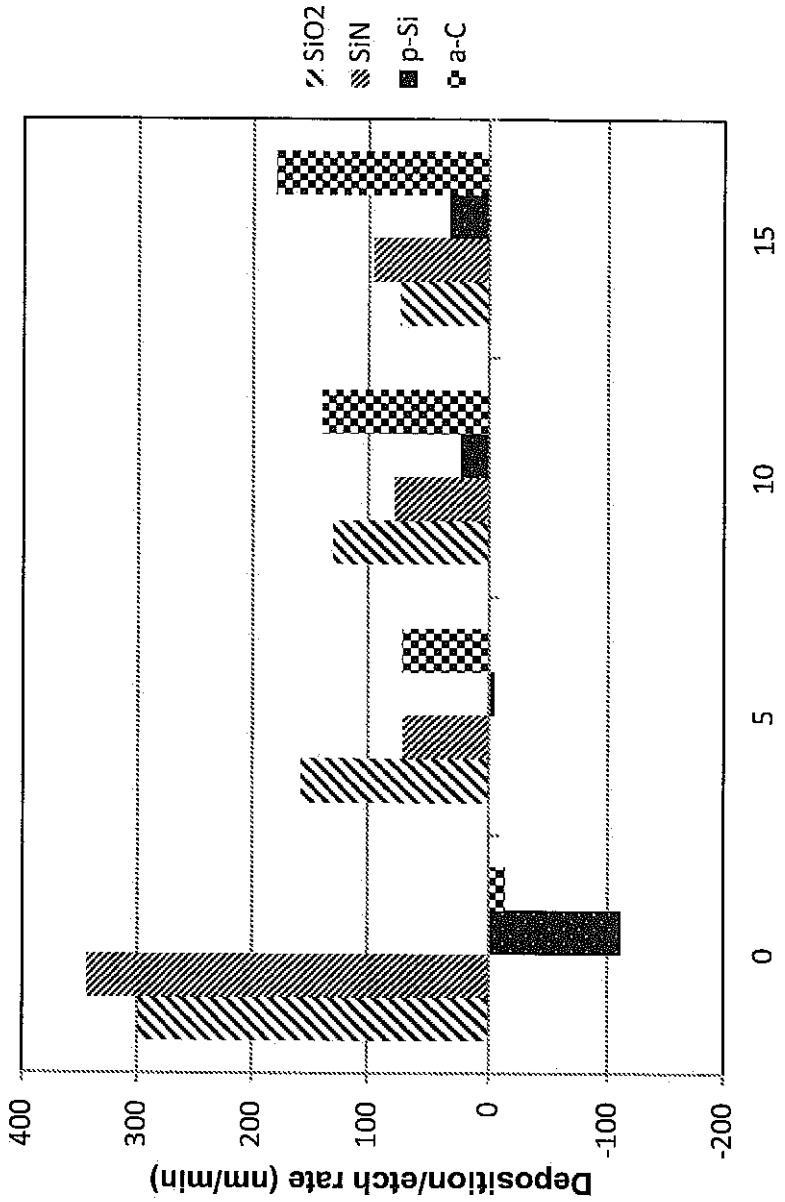

SiO2
SiN
p-Si
a-C
Deposition/etch rate (nm/min)
400
300
200
100
0
-100
-200
0
5
10
15
O2 flow (sccm)

FIG 10

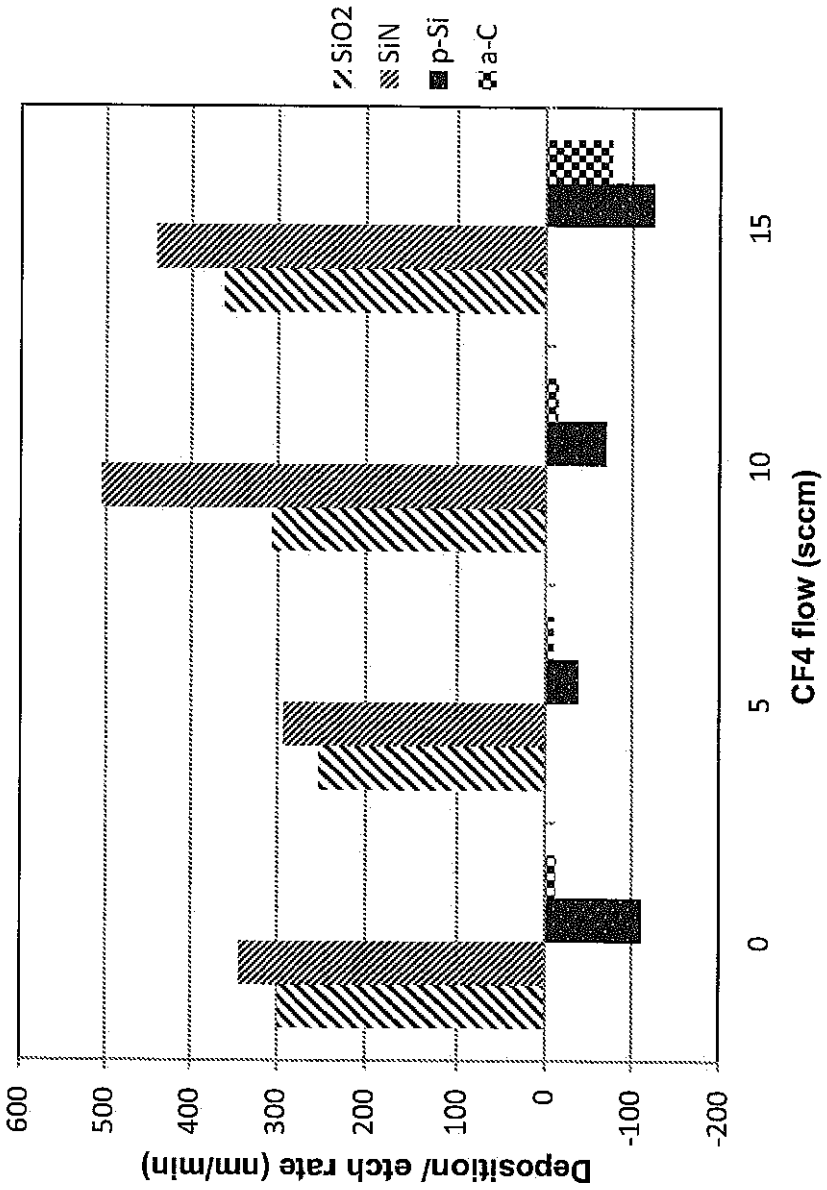

SiO2
SiN
p-Si
a-C
600
500
400
300
200
100
0
-100
-200
Deposition/ etch rate (nm/min)
0
5
10
15
CF4 flow (sccm)

FIG 11

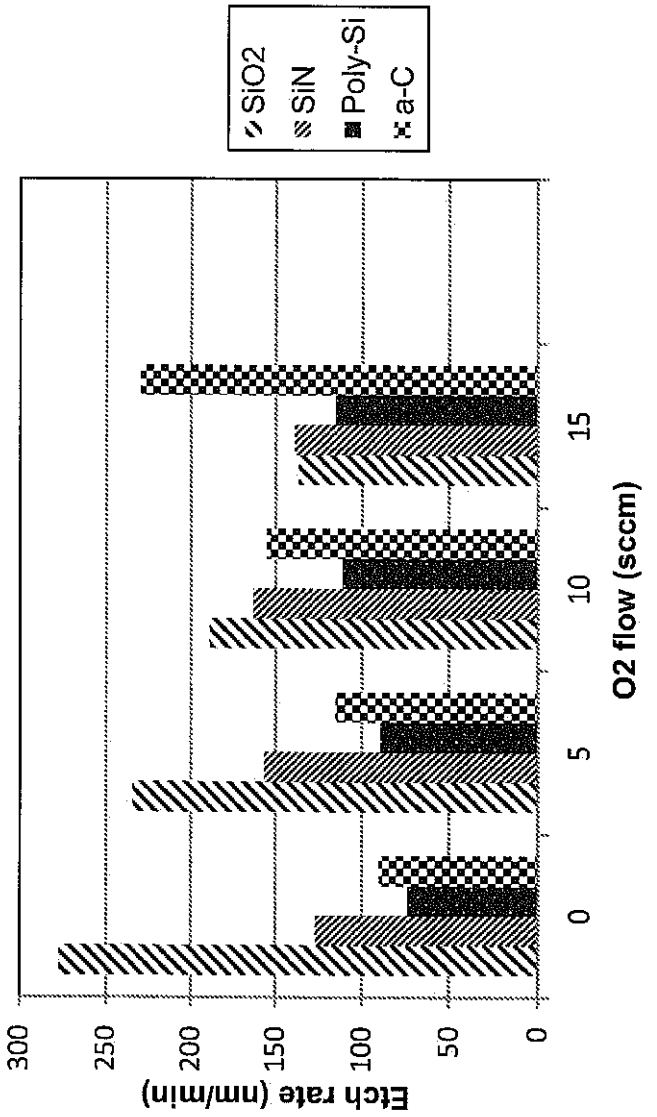

SiO2
SiN
Poly-Si
a-C
Etch rate (nm/min)
300
250
200
150
100
50
0
0
5
10
15
O2 flow (sccm)

FIG 12

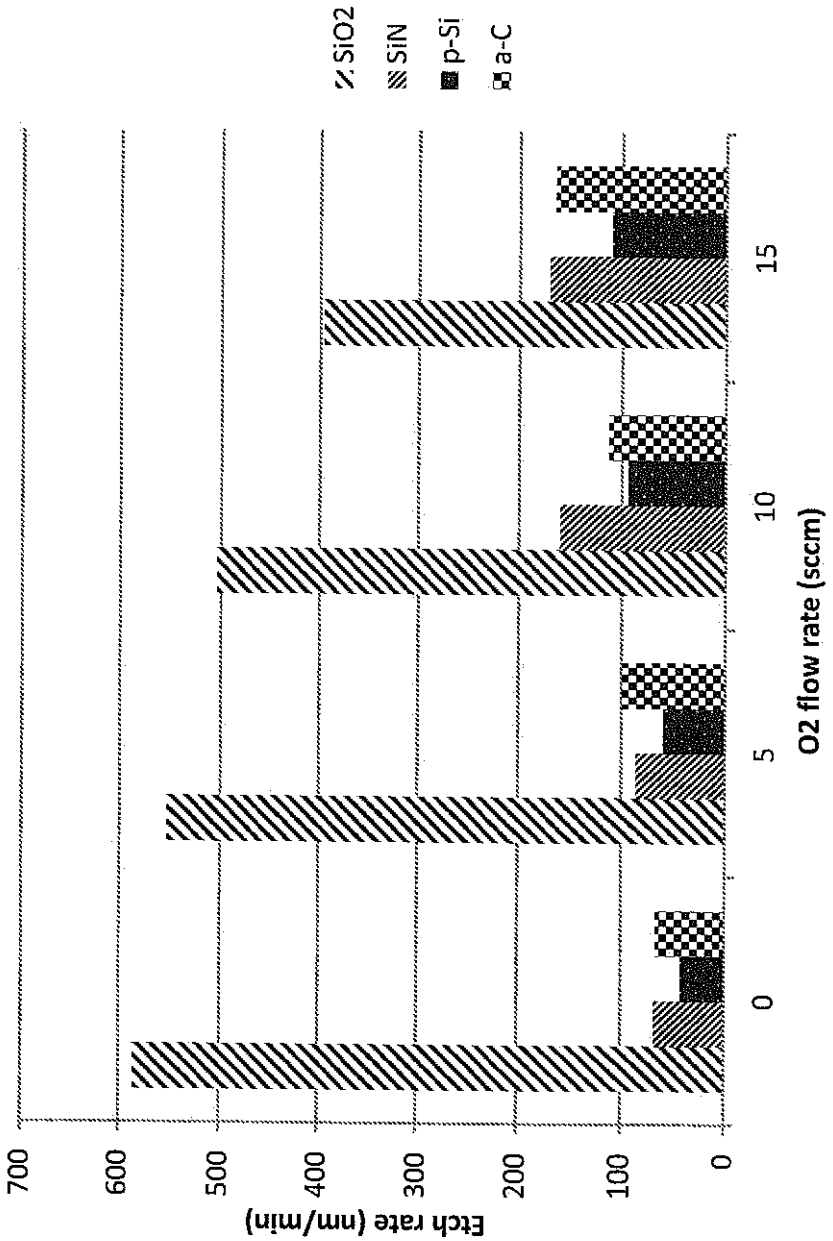

SiO2
SiN
p-Si
a-C
Etch rate (nm/min)
0
100
200
300
400
500
600
700
0
5
10
15
O2 flow rate (sccm)

FIG 13

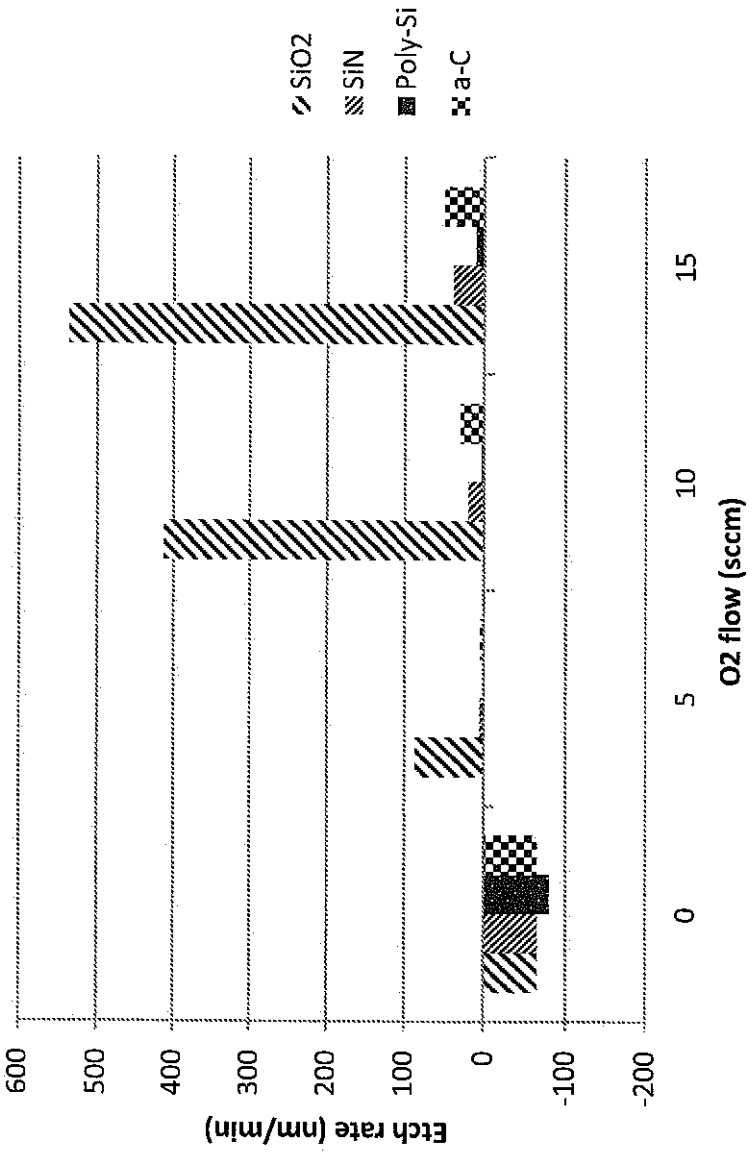

SiO2
SiN
Poly-Si
a-C
600
500
400
300
200
100
0
-100
-200
Etch rate (nm/min)
0
5
10
15
O2 flow (sccm)

FIG 14

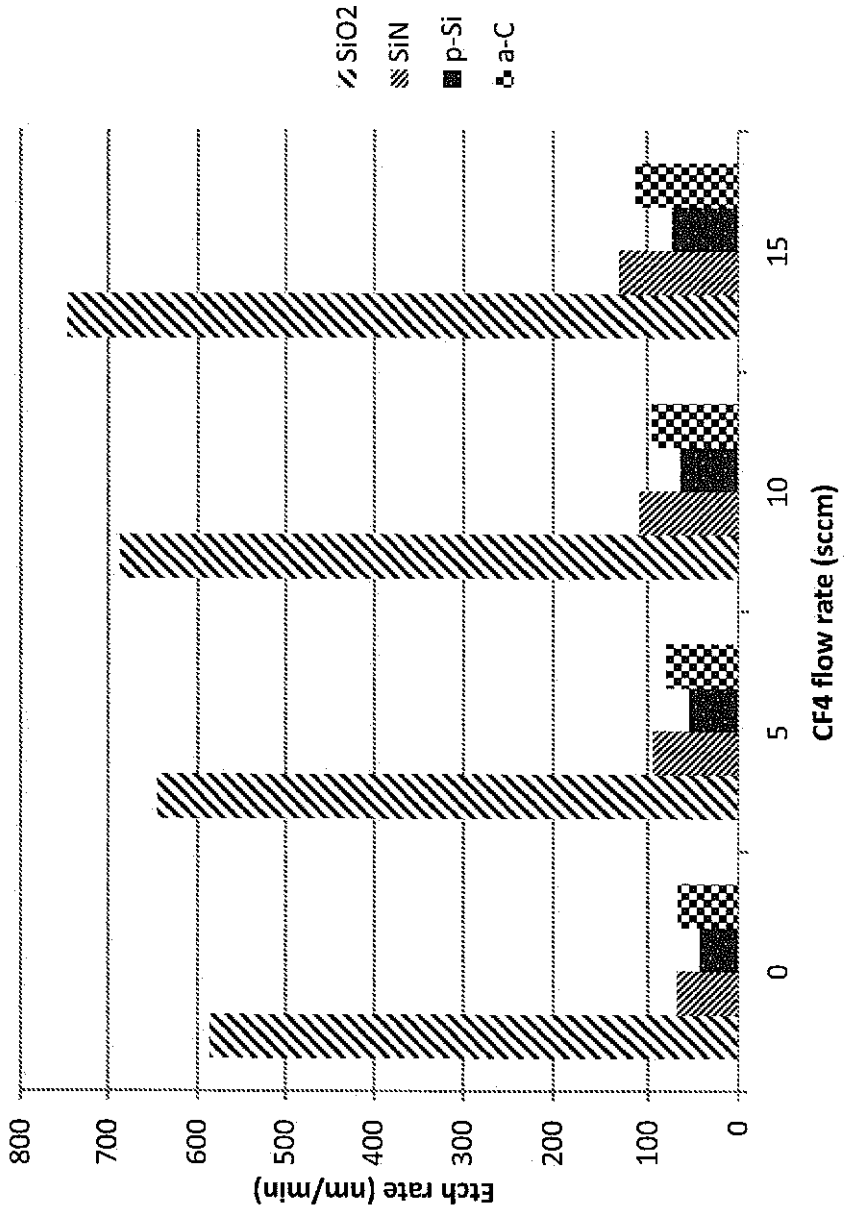

SiO2
SiN
p-Si
a-C
Etch rate (nm/min)
800
700
600
500
400
300
200
100
0
0
5
10
15
CF4 flow rate (sccm)

FIG 15