FIG. 1A

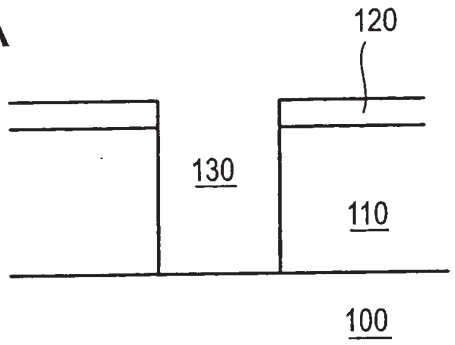


FIG. 1B

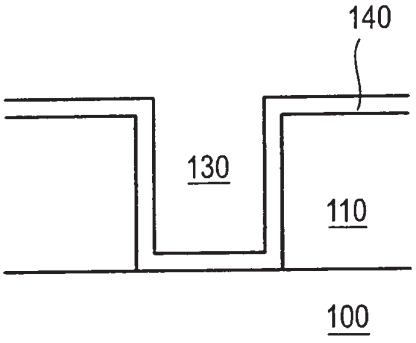


FIG. 1C

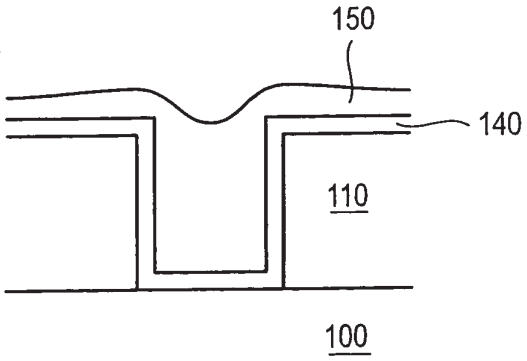
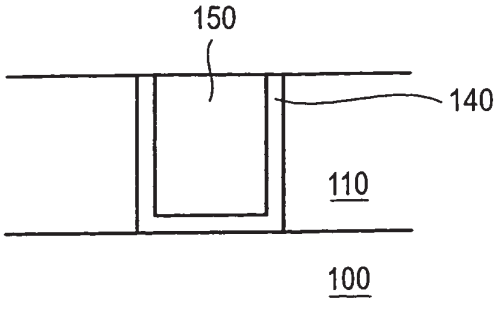


FIG. 1D



PRIOR ART

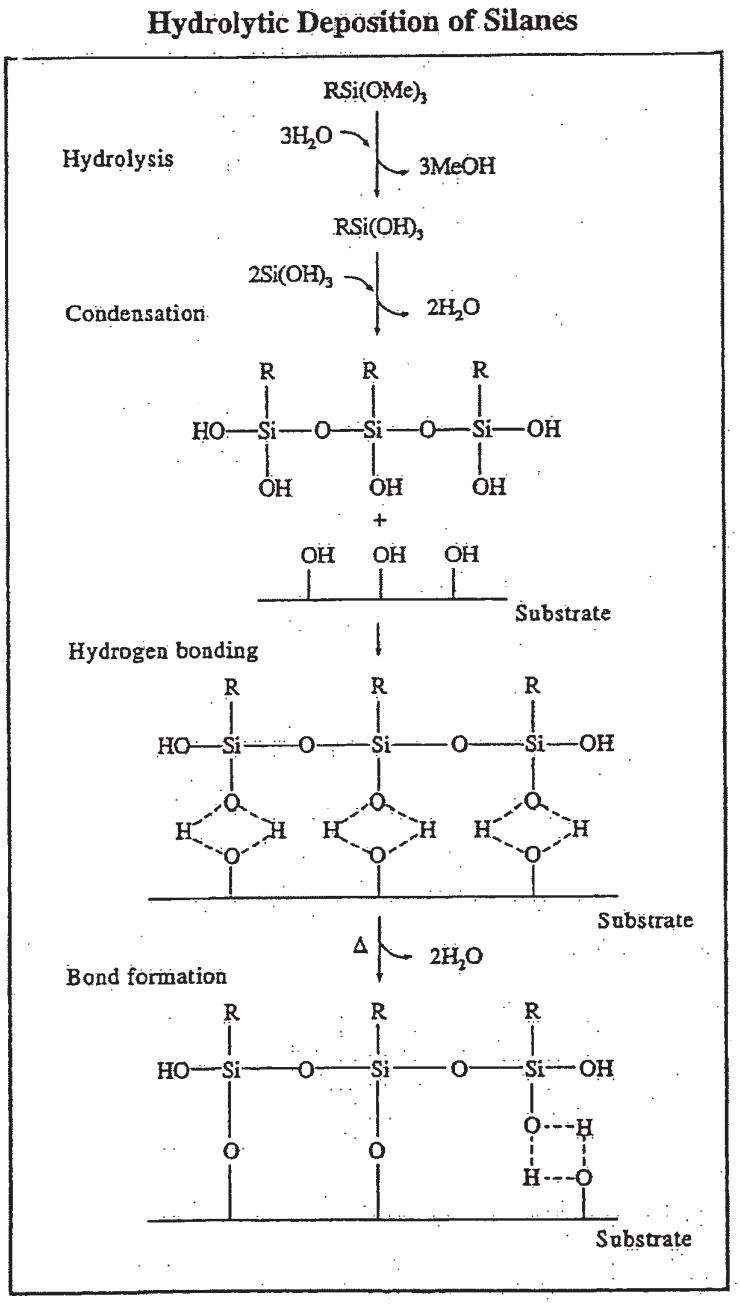


FIG. 2

REACTING SURFACE-BOUND Si-OH GROUPS AND FORMING A HORIZONTAL NETWORK

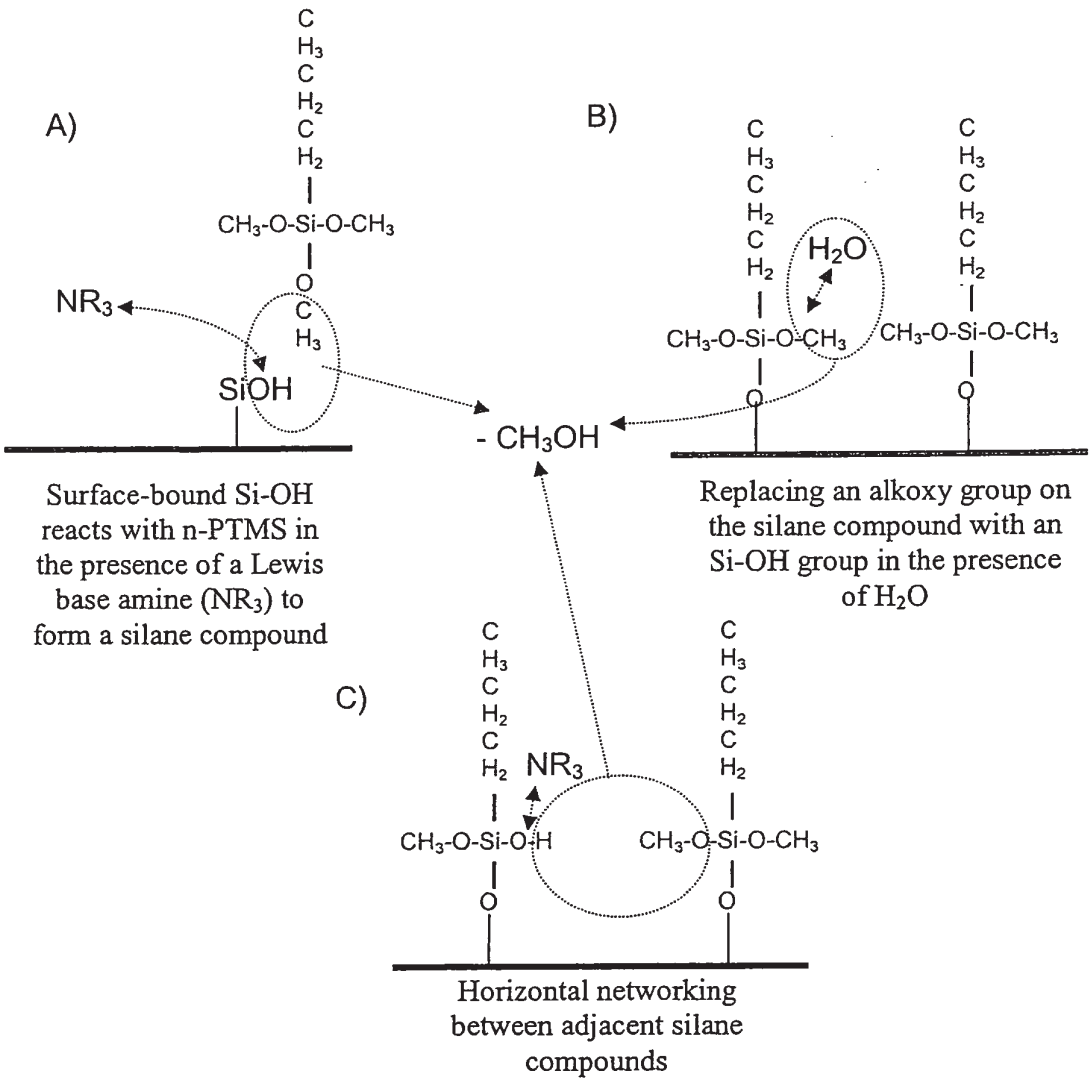
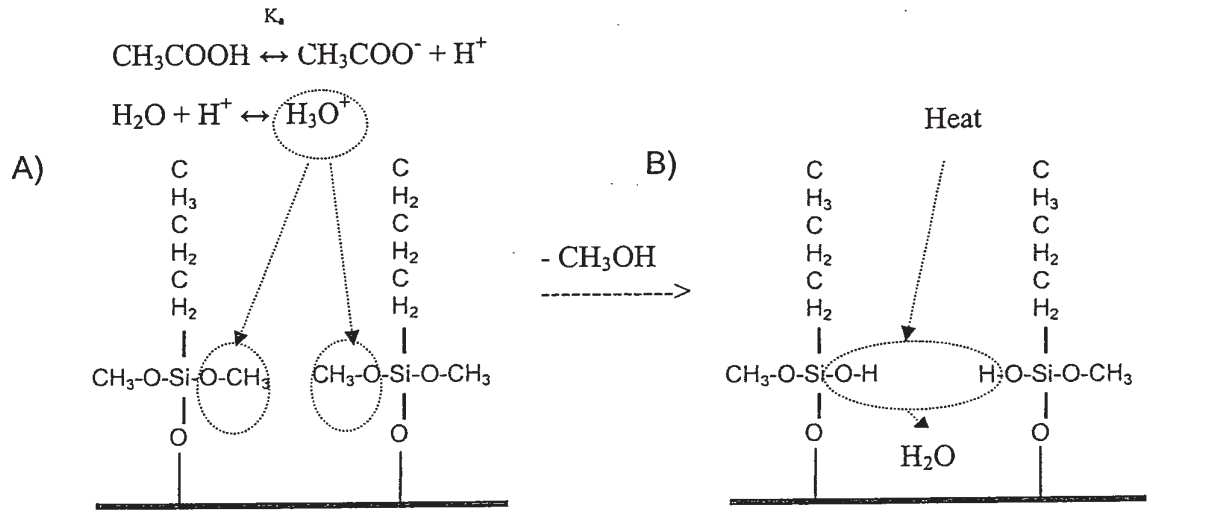

A)
B)
C)
NR_3
SiOH
CH_3-O-Si-O-CH_3
H_2O
- CH_3OH
Surface-bound Si-OH reacts with n-PTMS in the presence of a Lewis base amine (NR_3) to form a silane compound
Replacing an alkoxy group on the silane compound with an Si-OH group in the presence of H_2O
Horizontal networking between adjacent silane compounds

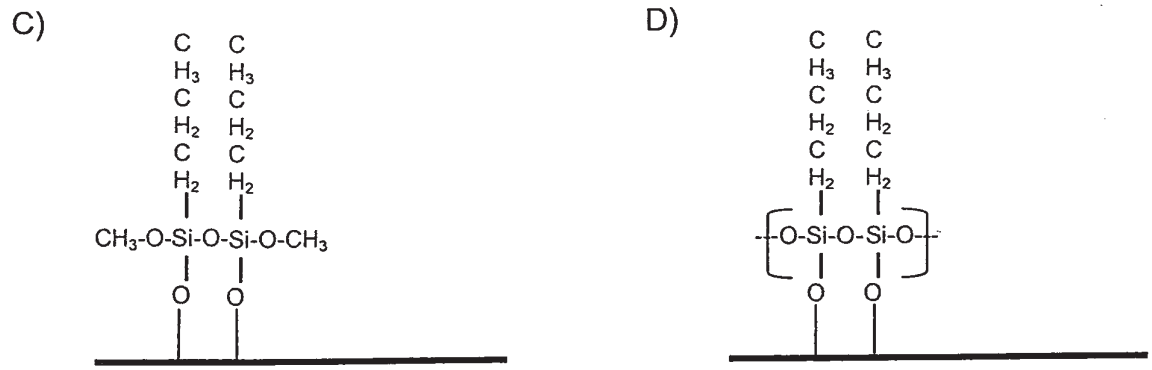
FIG. 3

HORIZONTAL NETWORK FORMATION USING ORGANIC ACIDS AS CATALYSTS TO ACCELERATE HYDROLYSIS



Organic Acid(s) (*e.g.*, acetic acid) increase the rate of hydrolysis of the alkoxy groups on the silane compounds

The application of heat results in the condensation of water as a by-product



After the condensation of water -Si-O-Si- bonds are formed to create a partial network of silane compounds

All alkoxy groups are removed from the silane compounds to form a completed network of silane compounds

FIG. 4

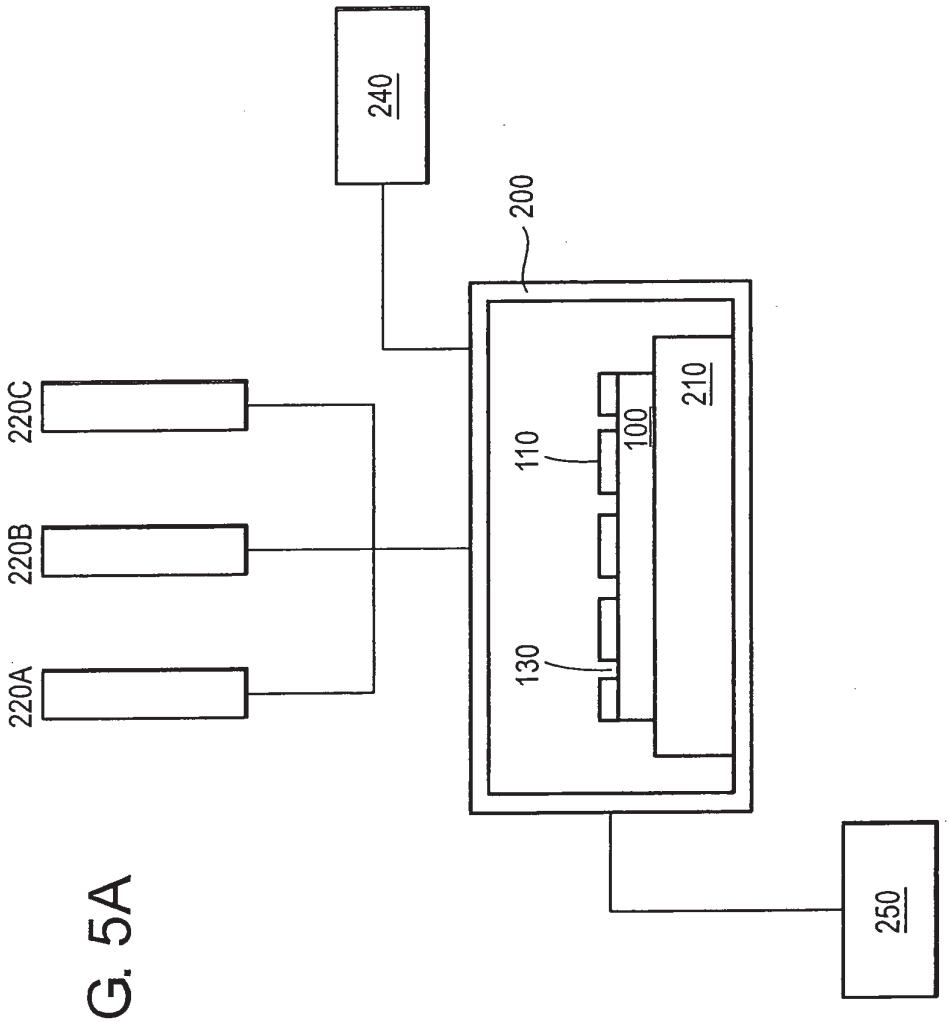


FIG. 5A

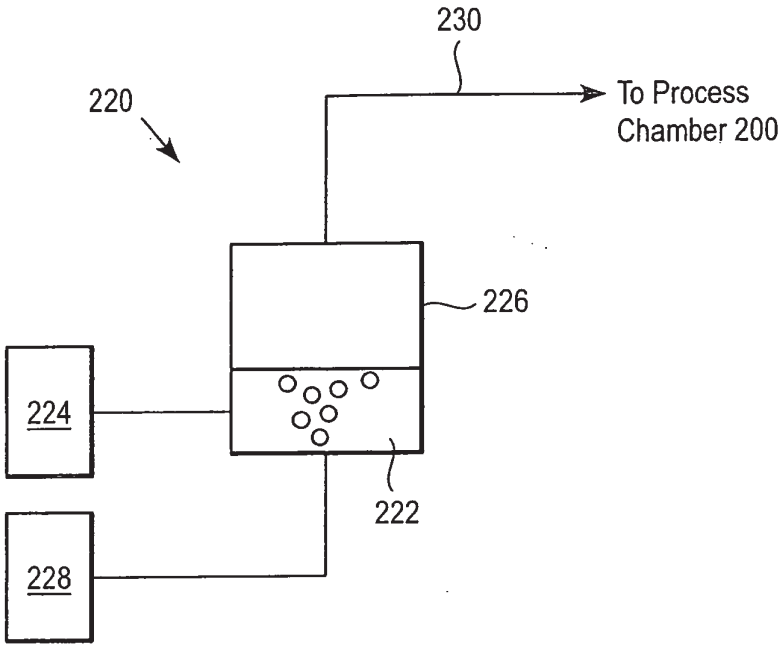
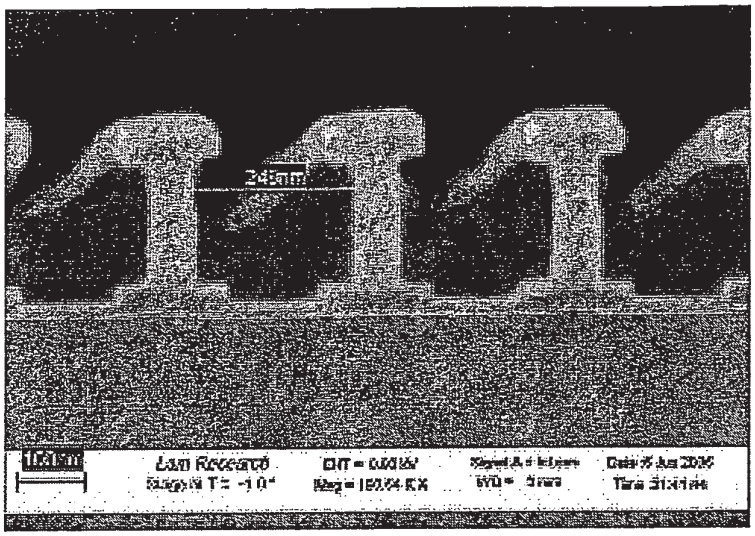


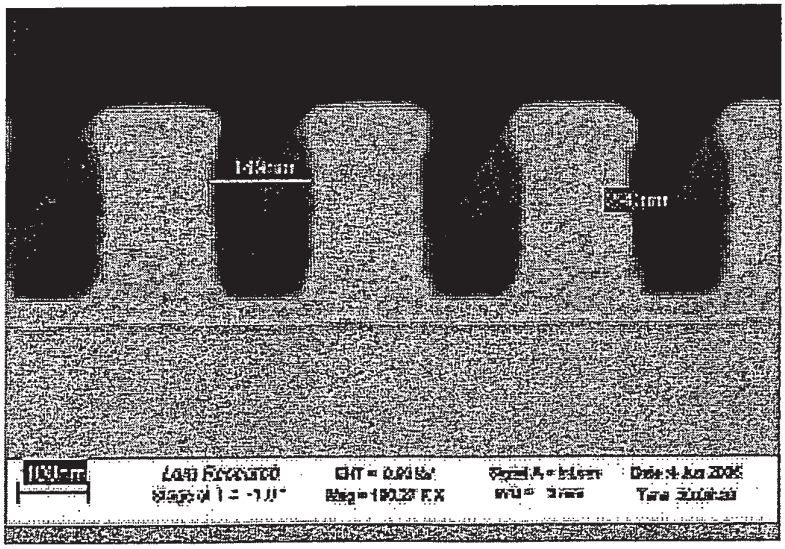
FIG. 5B

FIG. 6A



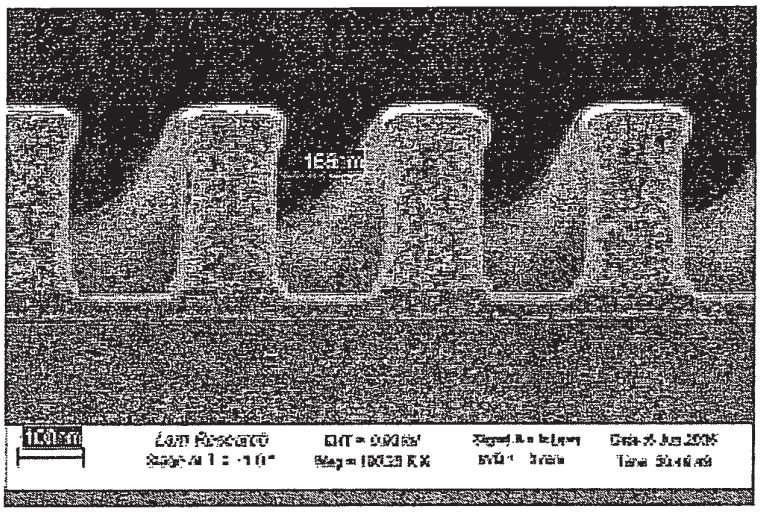
Damage ~ 43 nm/side

FIG. 6B



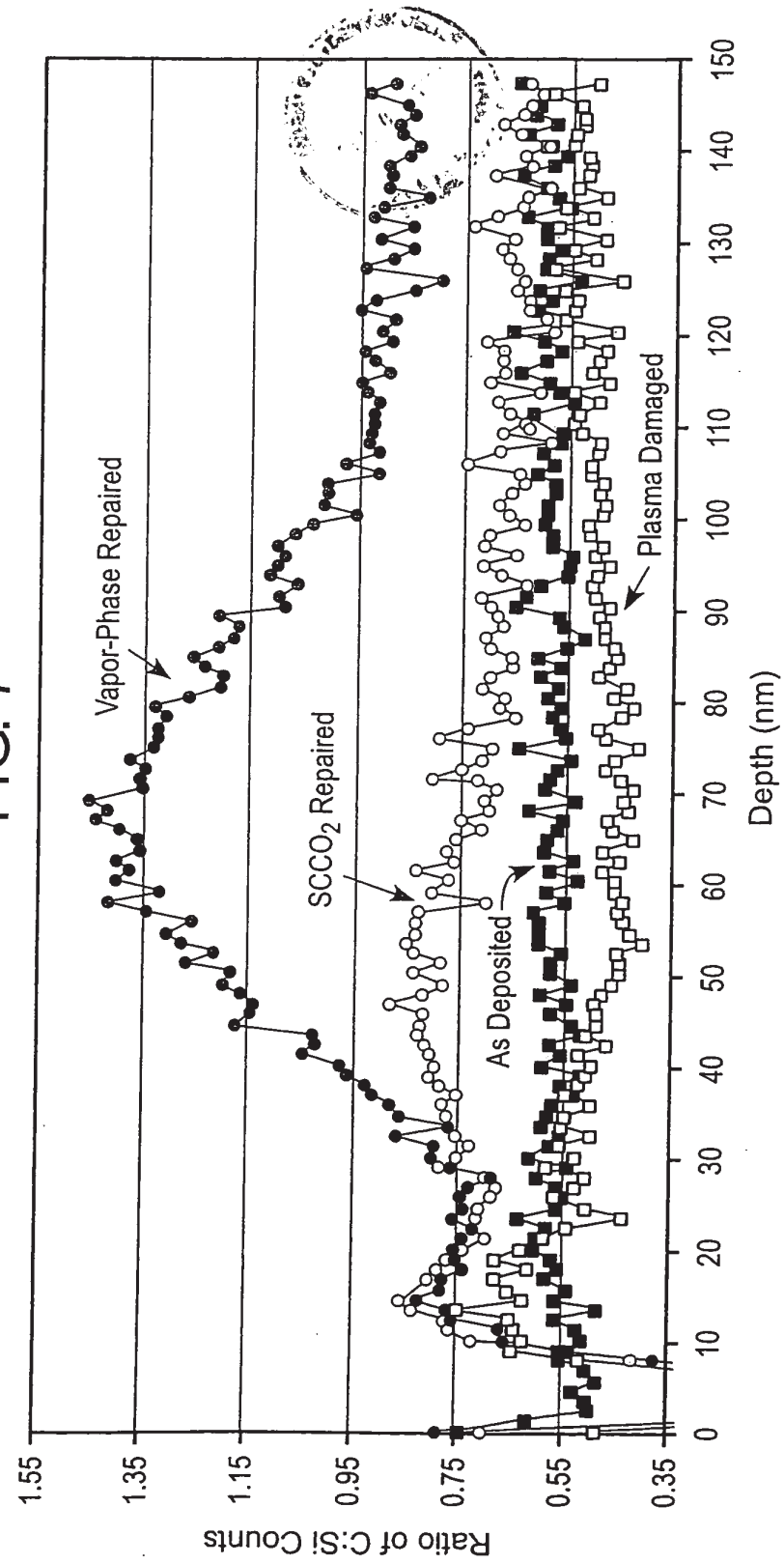
Damage ~ 11 nm/side

FIG. 6C



Damage ~ 11 nm/side

FIG. 7


Ratio of C:Si Counts
1.55
1.35
1.15
0.95
0.75
0.55
0.35
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Depth (nm)
Vapor-Phase Repaired
SCCO2 Repaired
As Deposited
Plasma Damaged