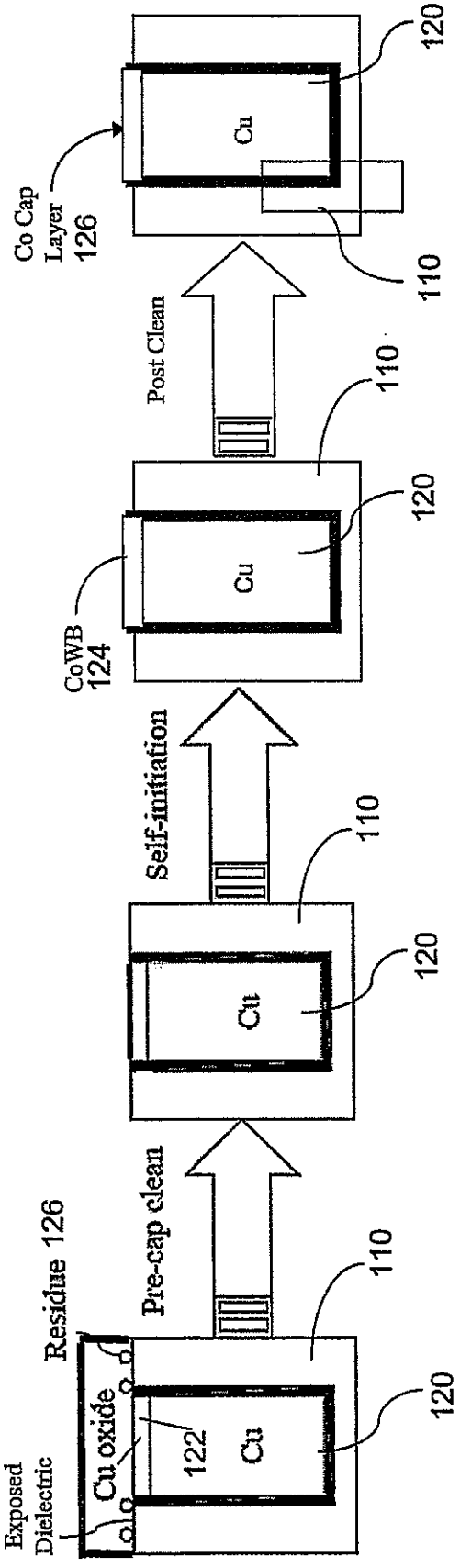

Exposed Dielectric
Cu oxide
122
Cu
120
110
Residue 126
Pre-cap clean
Cu
120
110
Self-initiation
CoWB 124
Cu
120
110
Post Clean
Co Cap Layer 126
Cu
120
110

FIG. 1

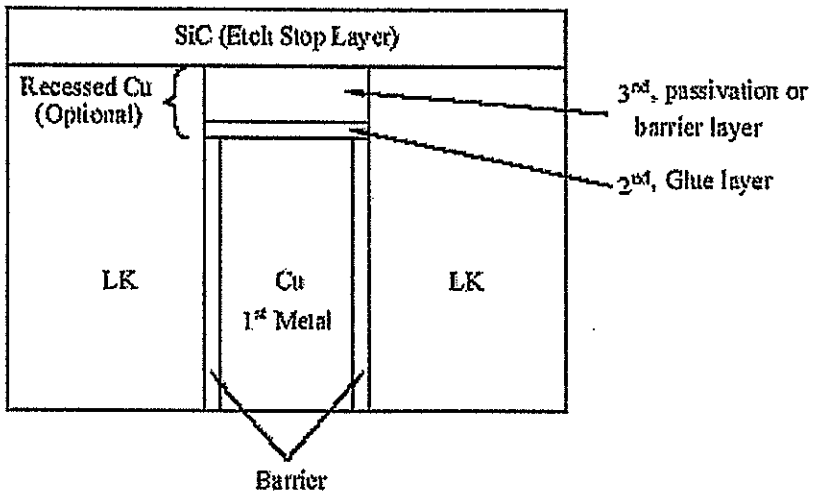

SiC (Etch Stop Layer)
Recessed Cu
(Optional)
3rd, passivation or
barrier layer
2nd, Glue layer
LK
Cu
1st Metal
LK
Barrier

FIG. 2

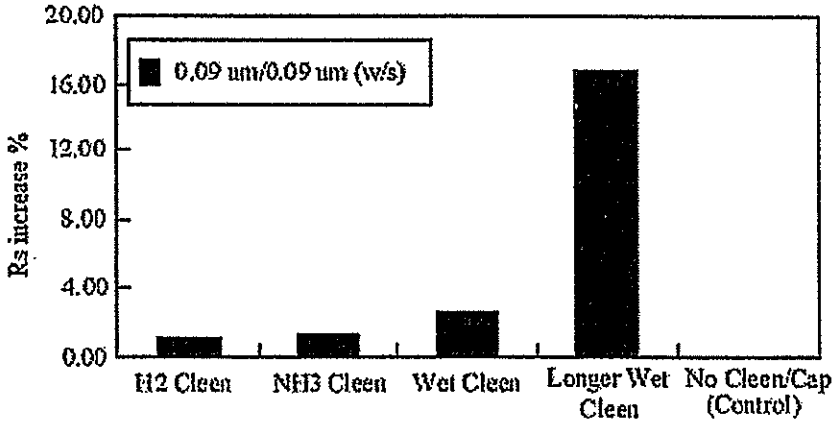

20.00
16.00
12.00
8.00
4.00
0.00
Rs increase %
0.09 um/0.09 um (w/s)
H2 Clean
NH3 Clean
Wet Clean
Longer Wet Clean
No Clean/Cap (Control)

FIG. 3

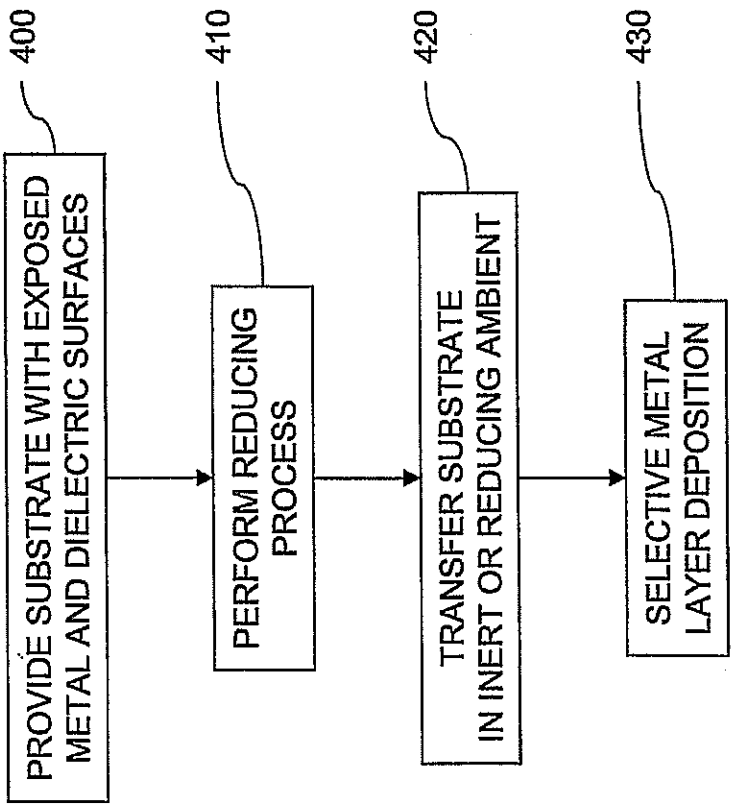

400
PROVIDE SUBSTRATE WITH EXPOSED METAL AND DIELECTRIC SURFACES
410
PERFORM REDUCING PROCESS
420
TRANSFER SUBSTRATE IN INERT OR REDUCING AMBIENT
430
SELECTIVE METAL LAYER DEPOSITION

FIG. 4

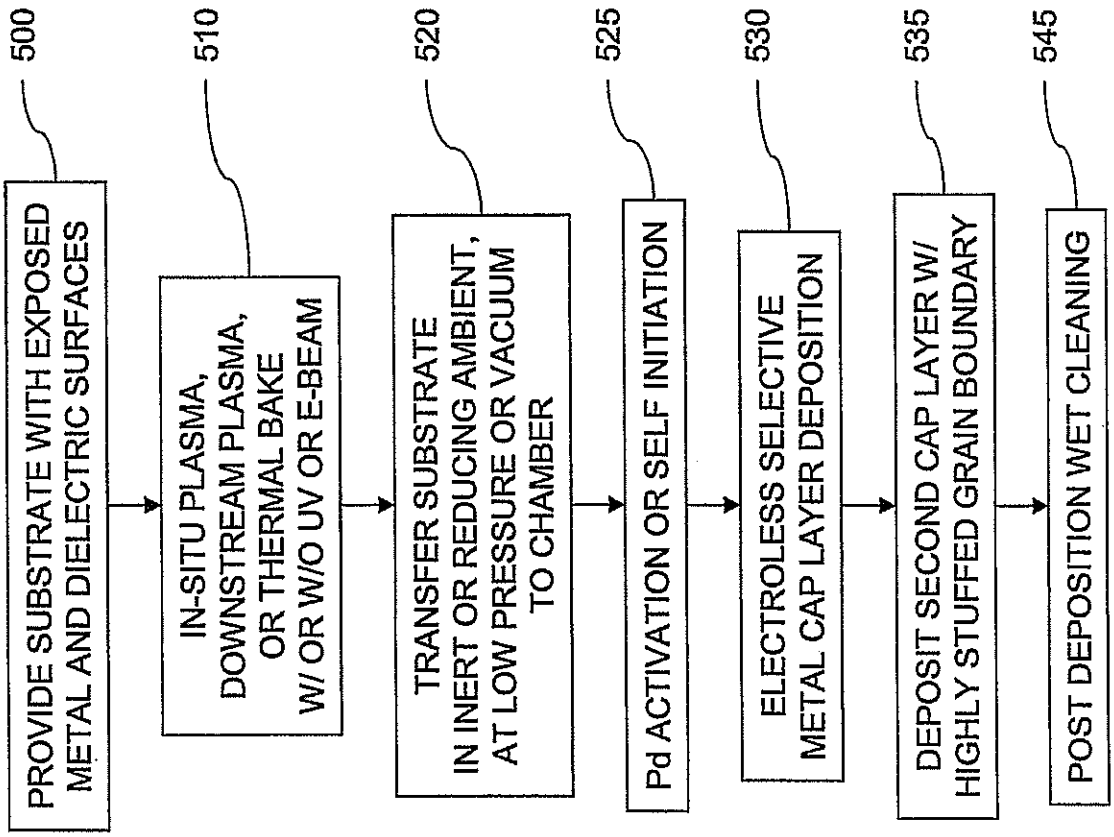
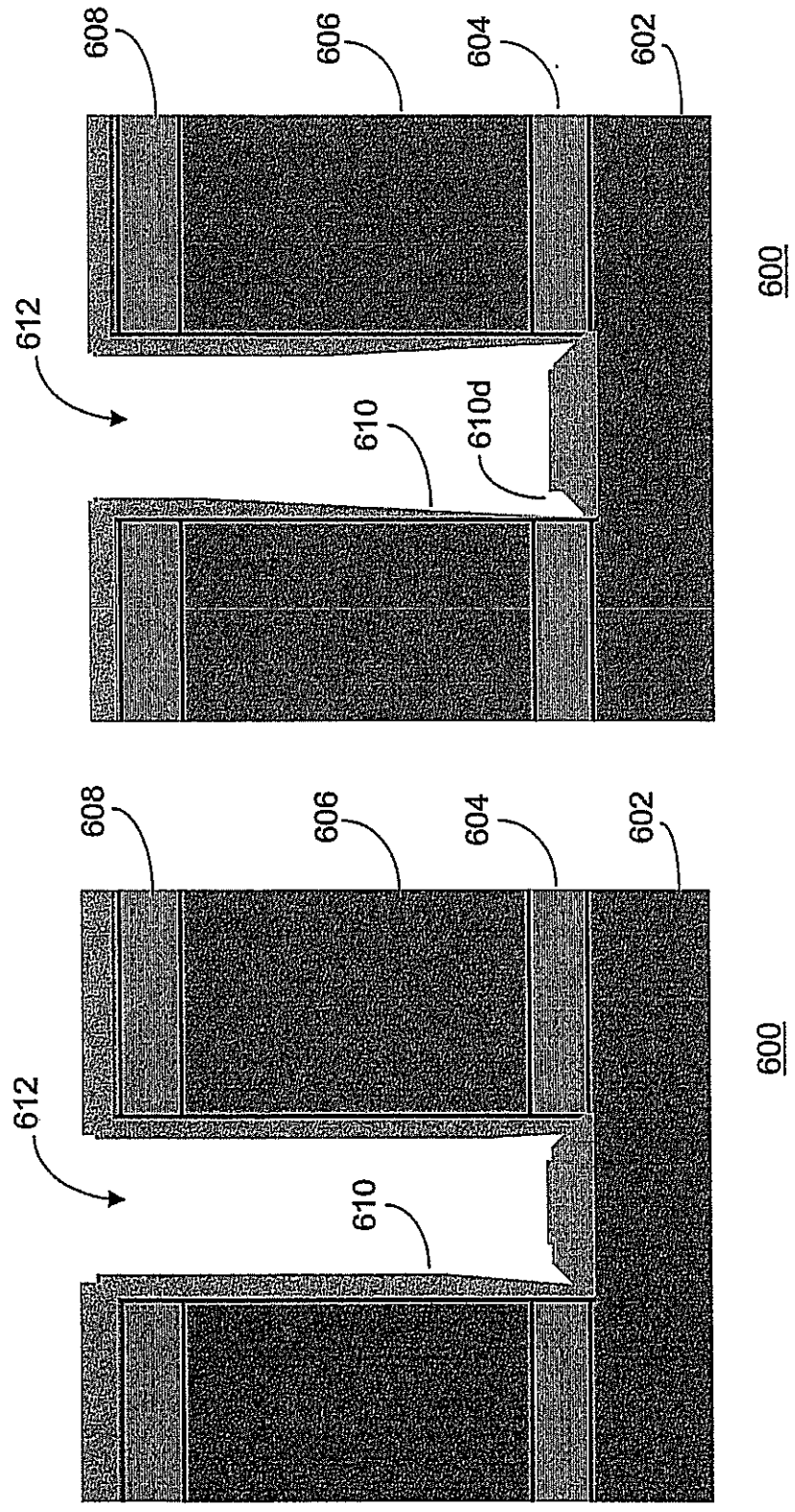

500
PROVIDE SUBSTRATE WITH EXPOSED METAL AND DIELECTRIC SURFACES
510
IN-SITU PLASMA, DOWNSTREAM PLASMA, OR THERMAL BAKE W/ OR W/O UV OR E-BEAM
520
TRANSFER SUBSTRATE IN INERT OR REDUCING AMBIENT, AT LOW PRESSURE OR VACUUM TO CHAMBER
525
Pd ACTIVATION OR SELF INITIATION
530
ELECTROLESS SELECTIVE METAL CAP LAYER DEPOSITION
535
DEPOSIT SECOND CAP LAYER W/ HIGHLY STUFFED GRAIN BOUNDARY
545
POST DEPOSITION WET CLEANING

FIG. 5



(PRIOR ART)
FIG. 6B

FIG. 6A

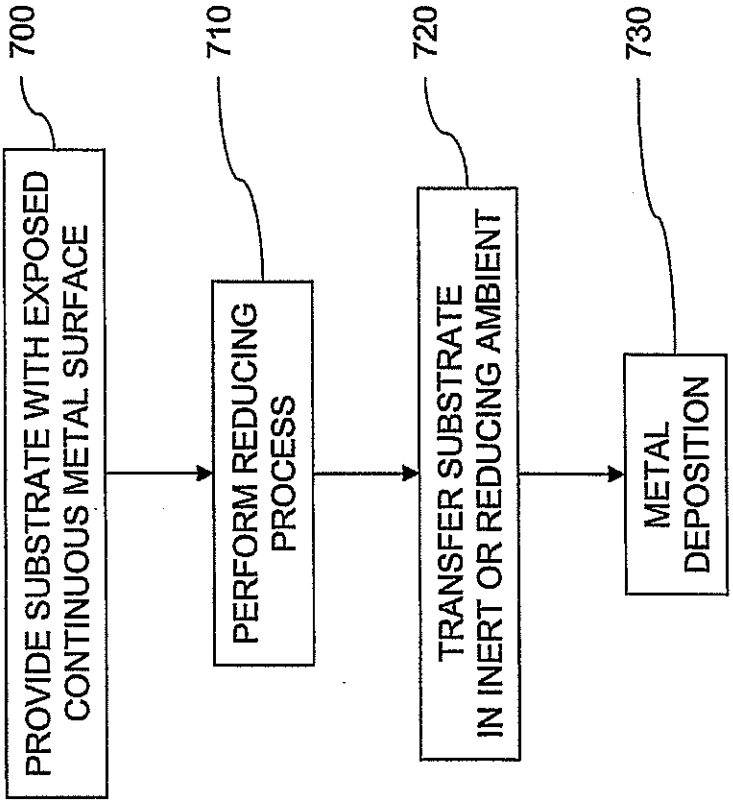

700
PROVIDE SUBSTRATE WITH EXPOSED CONTINUOUS METAL SURFACE
710
PERFORM REDUCING PROCESS
720
TRANSFER SUBSTRATE IN INERT OR REDUCING AMBIENT
730
METAL DEPOSITION

FIG. 7

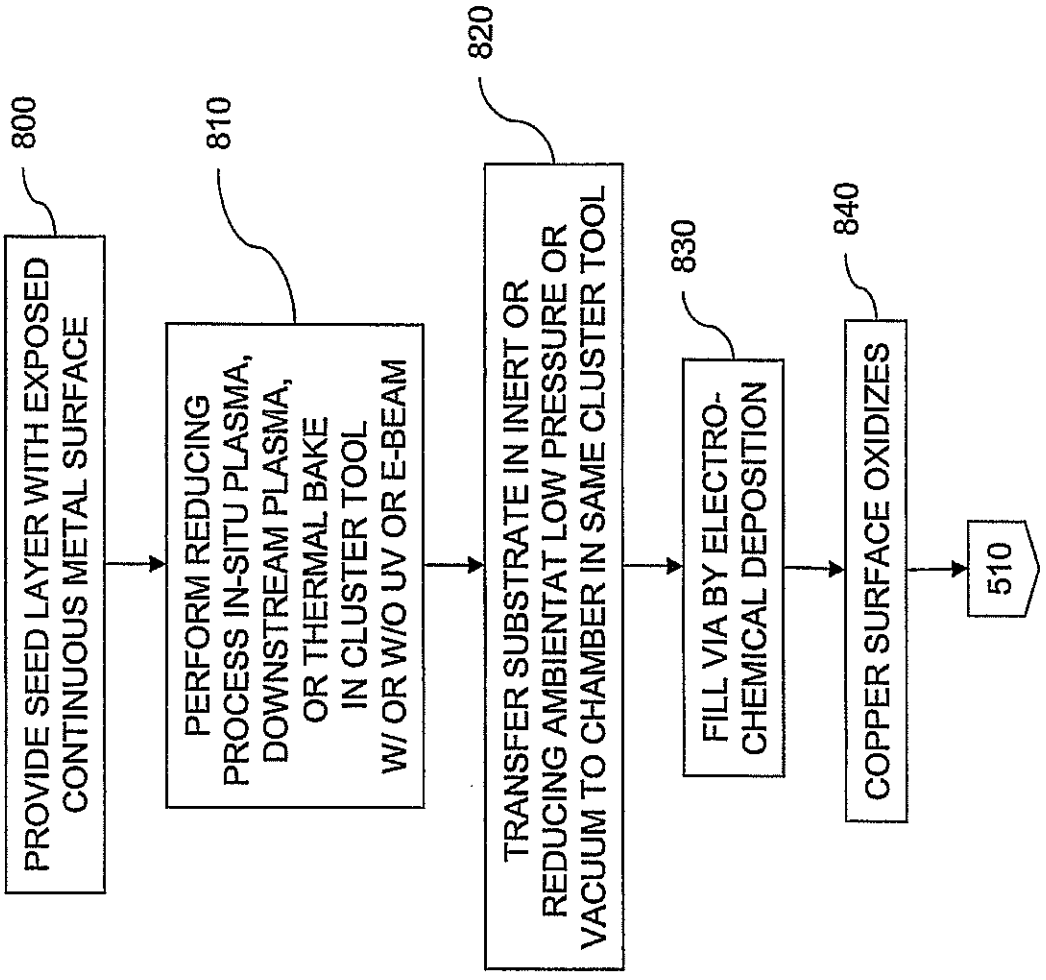

800
PROVIDE SEED LAYER WITH EXPOSED CONTINUOUS METAL SURFACE
810
PERFORM REDUCING PROCESS IN-SITU PLASMA, DOWNSTREAM PLASMA, OR THERMAL BAKE IN CLUSTER TOOL W/ OR W/O UV OR E-BEAM
820
TRANSFER SUBSTRATE IN INERT OR REDUCING AMBIENTAT LOW PRESSURE OR VACUUM TO CHAMBER IN SAME CLUSTER TOOL
830
FILL VIA BY ELECTRO-CHEMICAL DEPOSITION
840
COPPER SURFACE OXIDIZES
510

FIG. 8