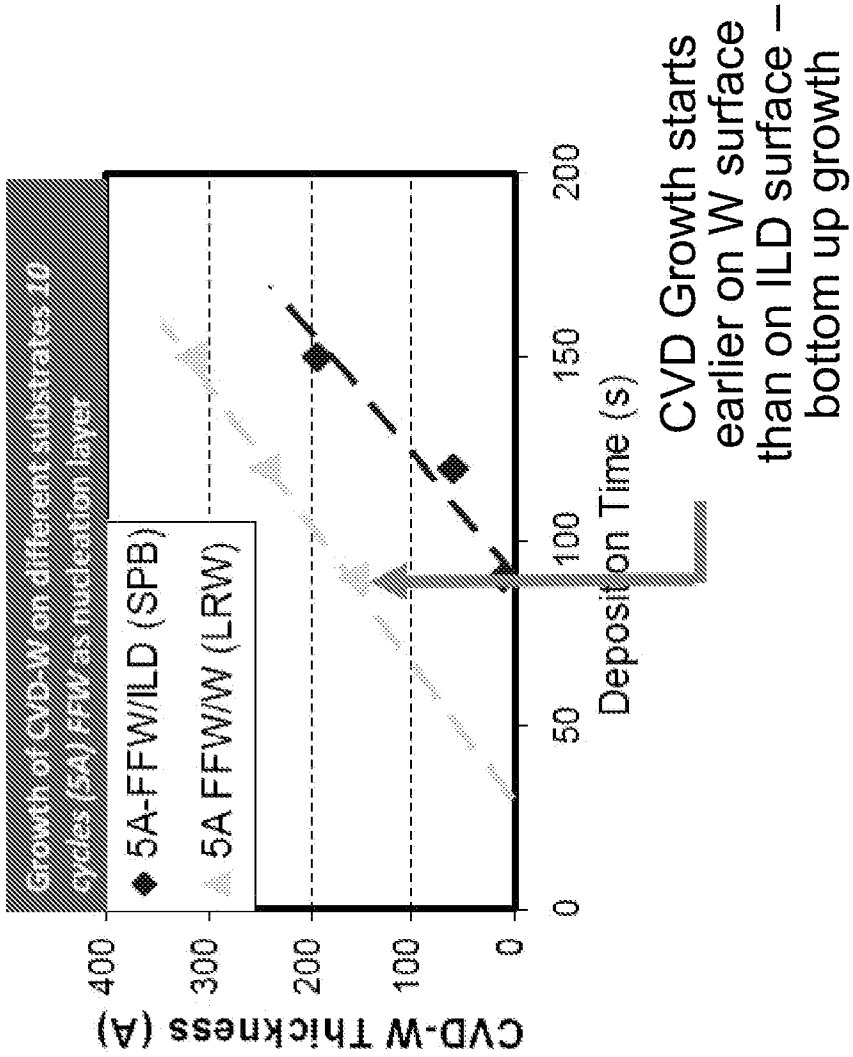
FIG. 1


Growth of CVD-W on different substrates 10 cycles (5A) raw as nucleation layer
5A-FFW/ILD (SPB)
5A FFW/W (LRW)
CVD-W Thickness (A)
0
100
200
300
400
0
50
100
150
200
Deposition Time (s)
CVD Growth starts earlier on W surface than on ILD surface – bottom up growth

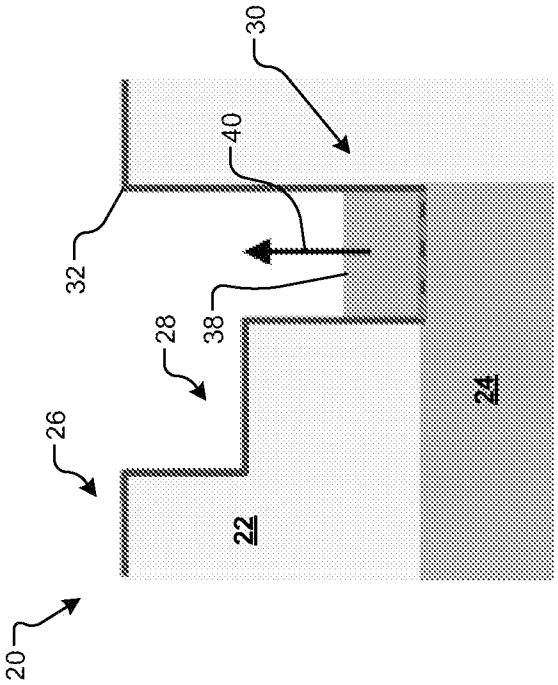


FIG. 2B

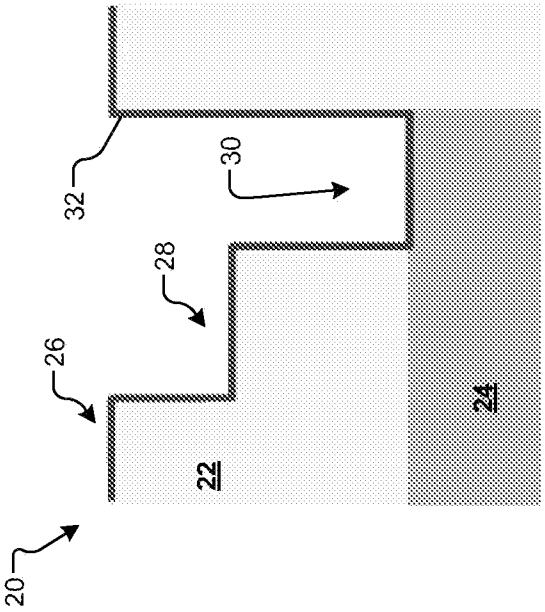


FIG. 2A

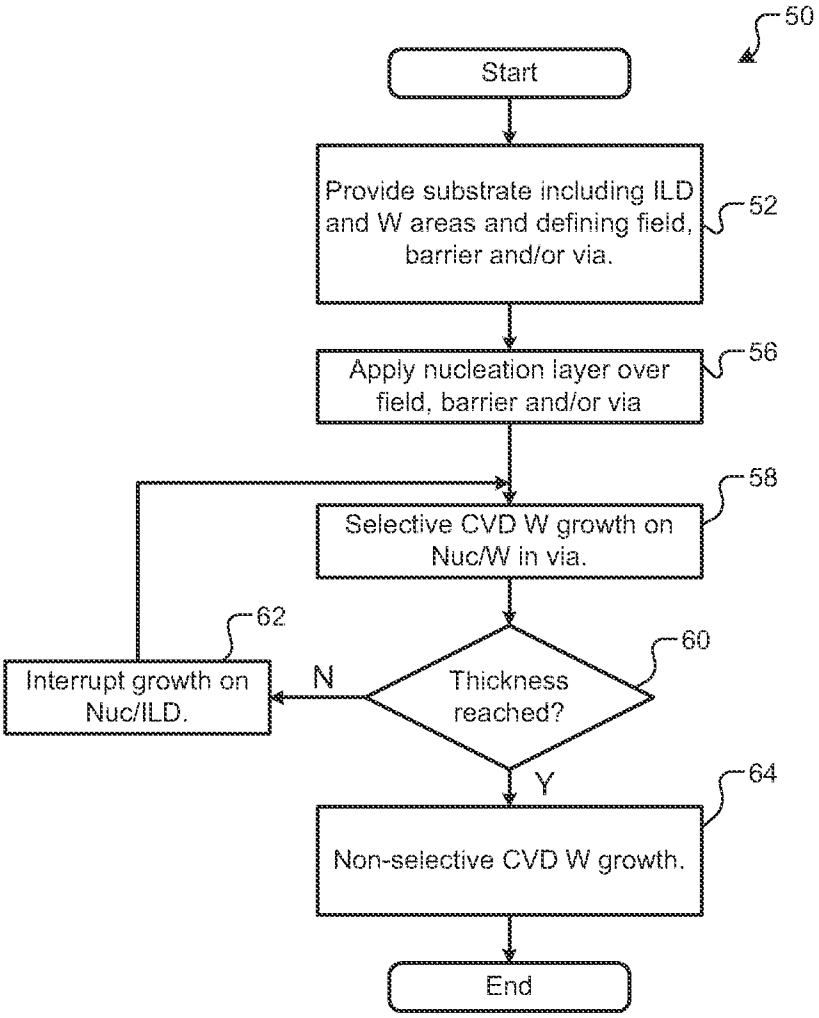

50
Start
Provide substrate including ILD and W areas and defining field, barrier and/or via.
52
Apply nucleation layer over field, barrier and/or via
56
Selective CVD W growth on Nuc/W in via.
58
Thickness reached?
60
N
Interrupt growth on Nuc/ILD.
62
Y
Non-selective CVD W growth.
64
End

FIG. 2C

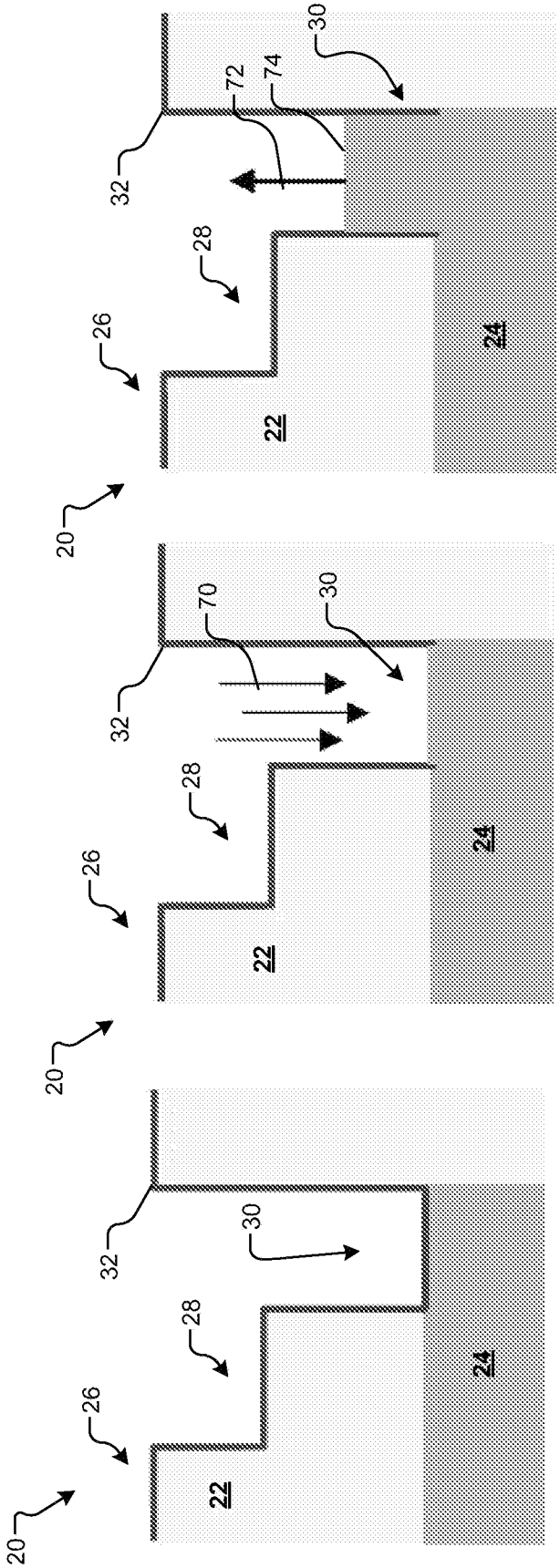


FIG. 3A

FIG. 3B

FIG. 3C

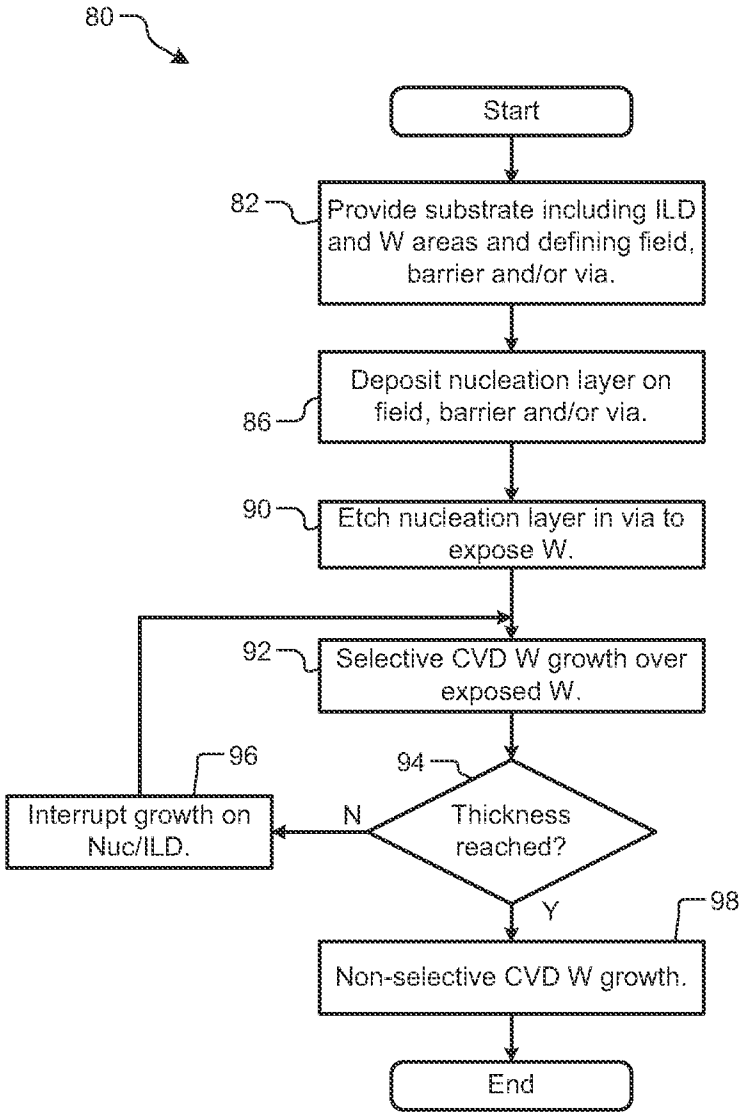
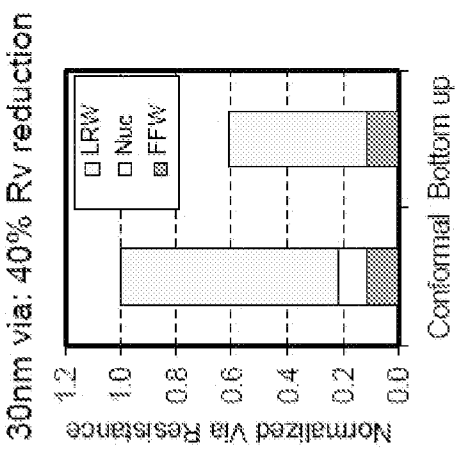

80
Start
82
Provide substrate including ILD and W areas and defining field, barrier and/or via.
86
Deposit nucleation layer on field, barrier and/or via.
90
Etch nucleation layer in via to expose W.
92
Selective CVD W growth over exposed W.
94
Thickness reached?
N
96
Interrupt growth on Nuc/ILD.
Y
98
Non-selective CVD W growth.
End

FIG. 3D

FIG. 5



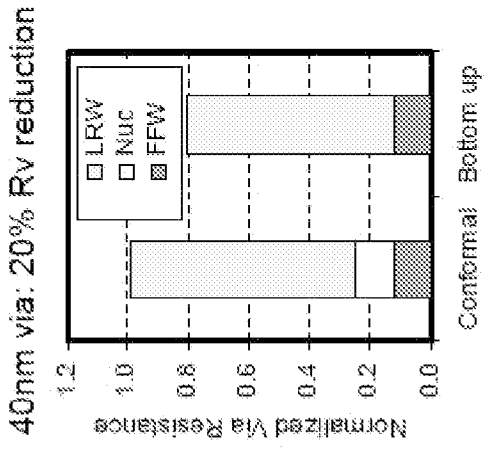


FIG. 6

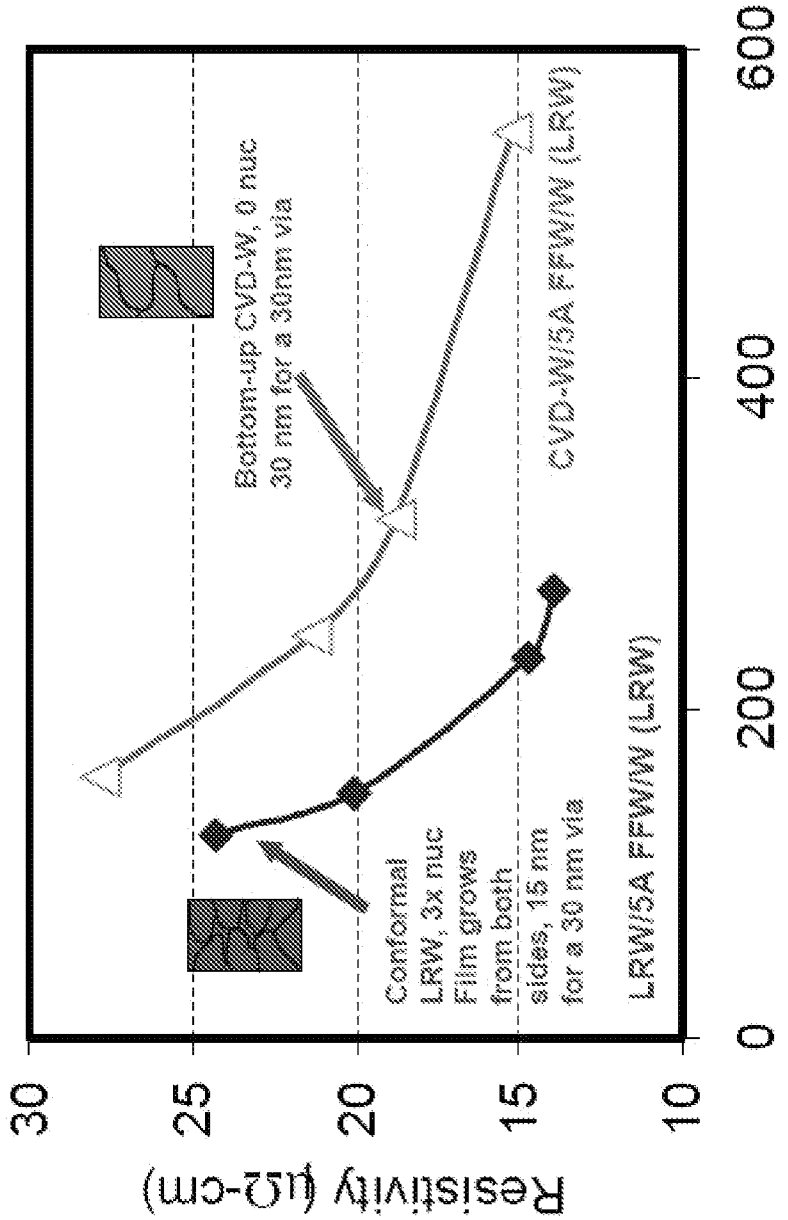


FIG. 4

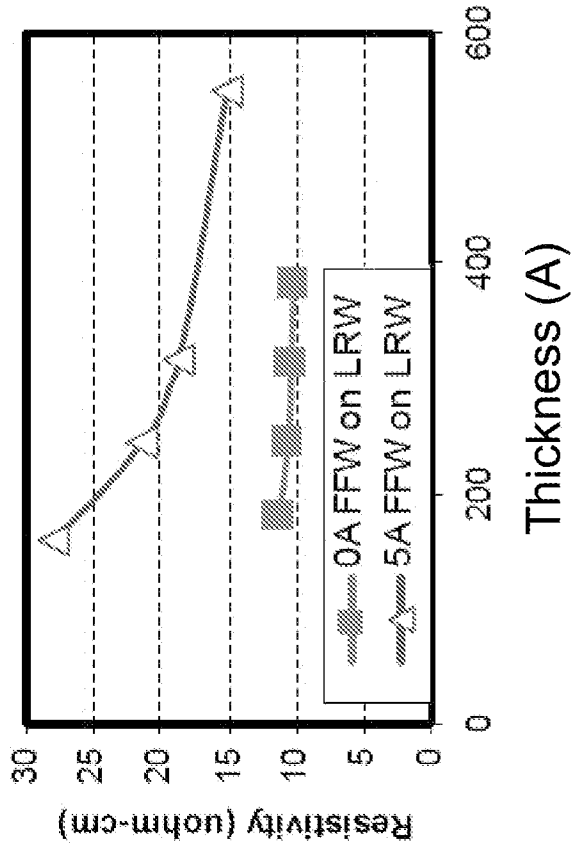

Resistivity (uohm-cm)
30
25
20
15
10
5
0
0
200
400
600
Thickness (A)
0A FFW on LRW
5A FFW on LRW

FIG. 8

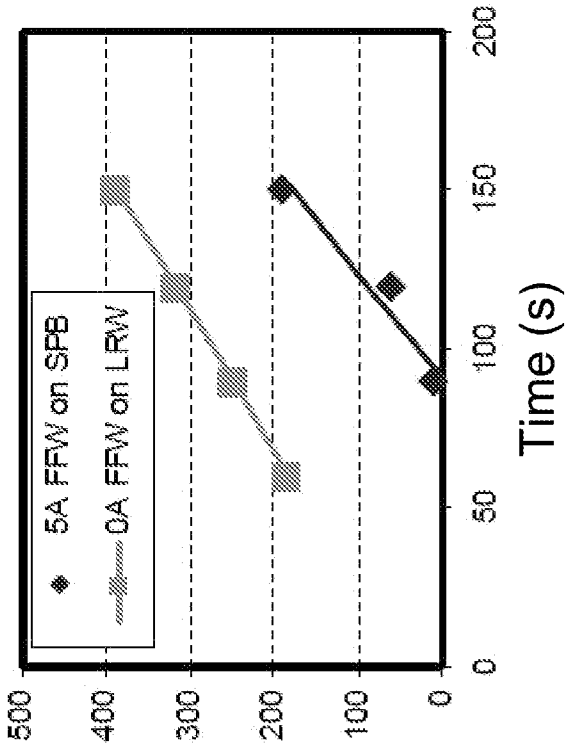

500
400
300
200
100
0
0
50
100
150
200
Time (s)
5A FFW on SPB
0A FFW on LRW

FIG. 7

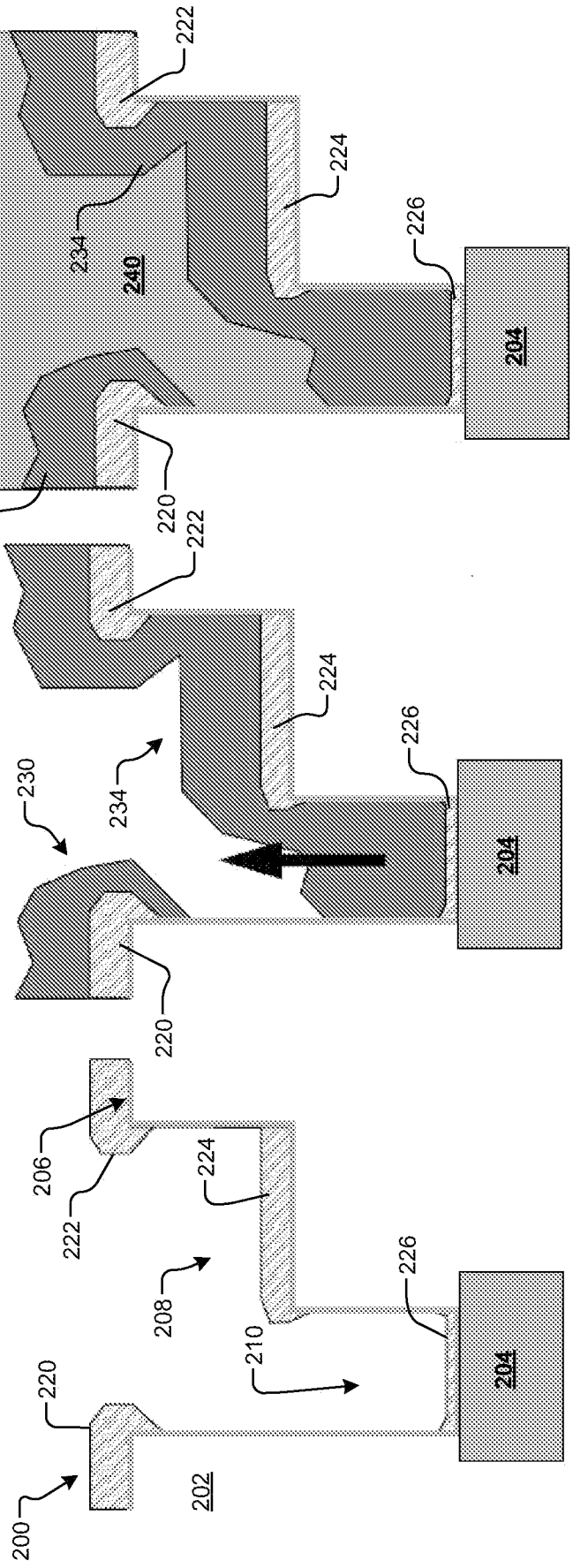


FIG. 9A

FIG. 9B

FIG. 9C

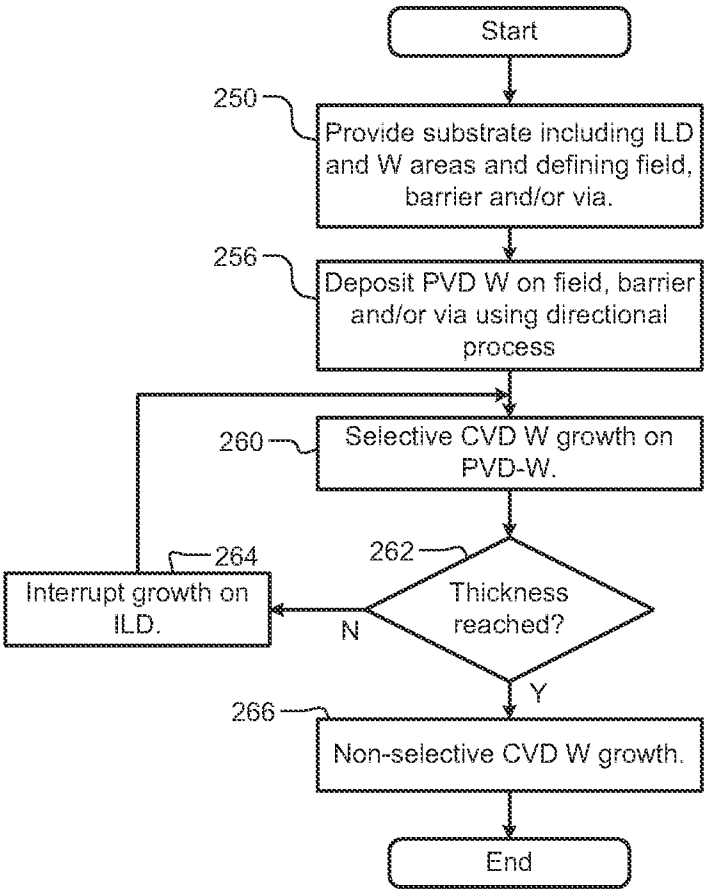

Start
250
Provide substrate including ILD and W areas and defining field, barrier and/or via.
256
Deposit PVD W on field, barrier and/or via using directional process
260
Selective CVD W growth on PVD-W.
262
Thickness reached?
N
264
Interrupt growth on ILD.
Y
266
Non-selective CVD W growth.
End

FIG. 9D

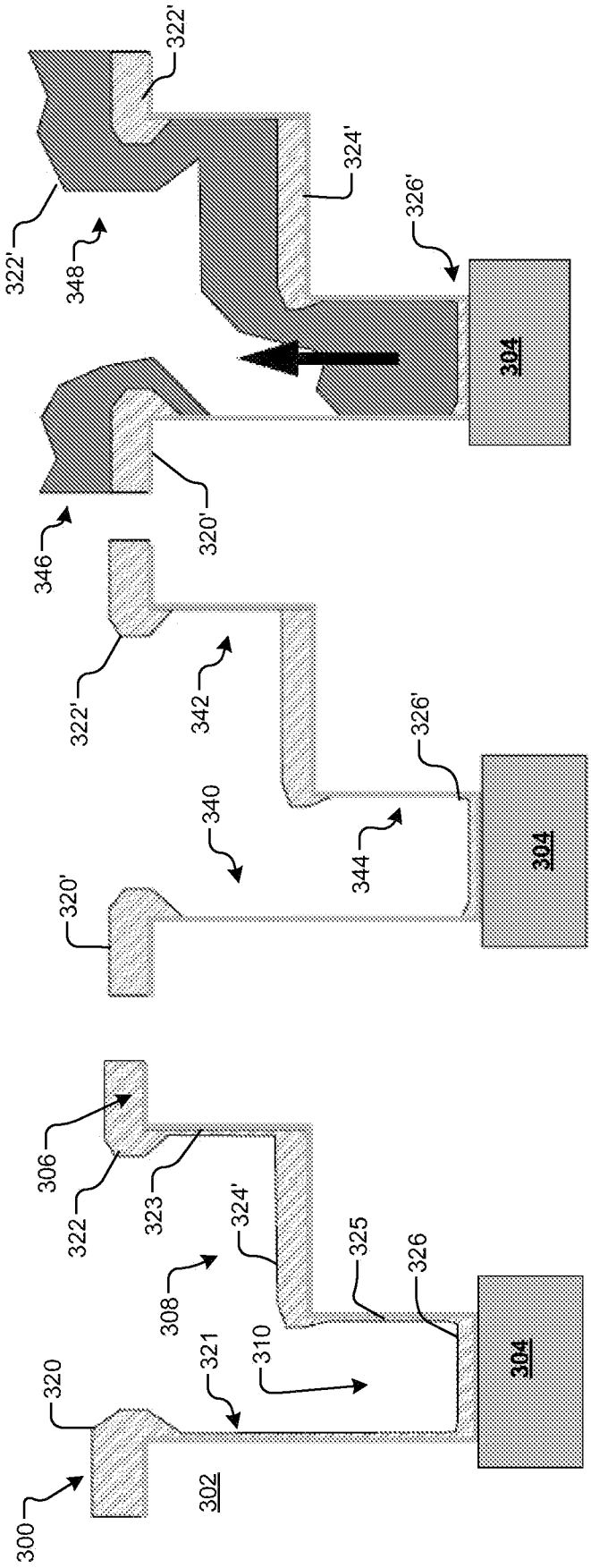


FIG. 10C

FIG. 10B

FIG. 10A

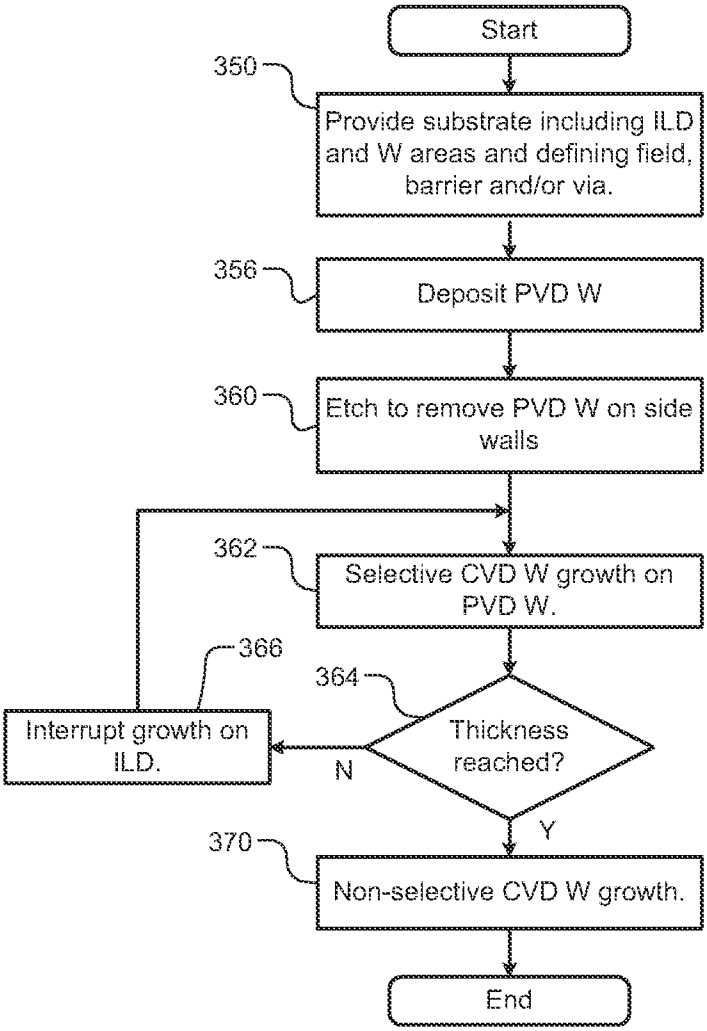

Start
350
Provide substrate including ILD and W areas and defining field, barrier and/or via.
356
Deposit PVD W
360
Etch to remove PVD W on side walls
362
Selective CVD W growth on PVD W.
364
Thickness reached?
N
366
Interrupt growth on ILD.
Y
370
Non-selective CVD W growth.
End

FIG. 10D

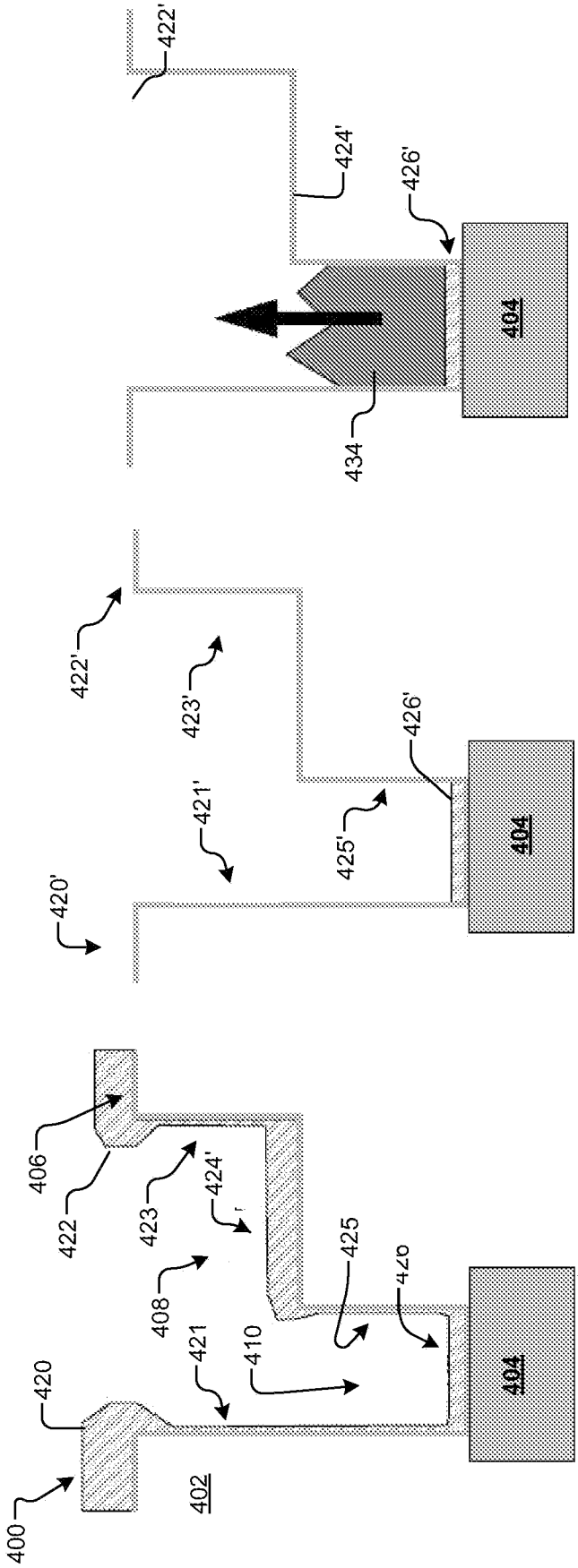


FIG. 11A

FIG. 11B

FIG. 11C

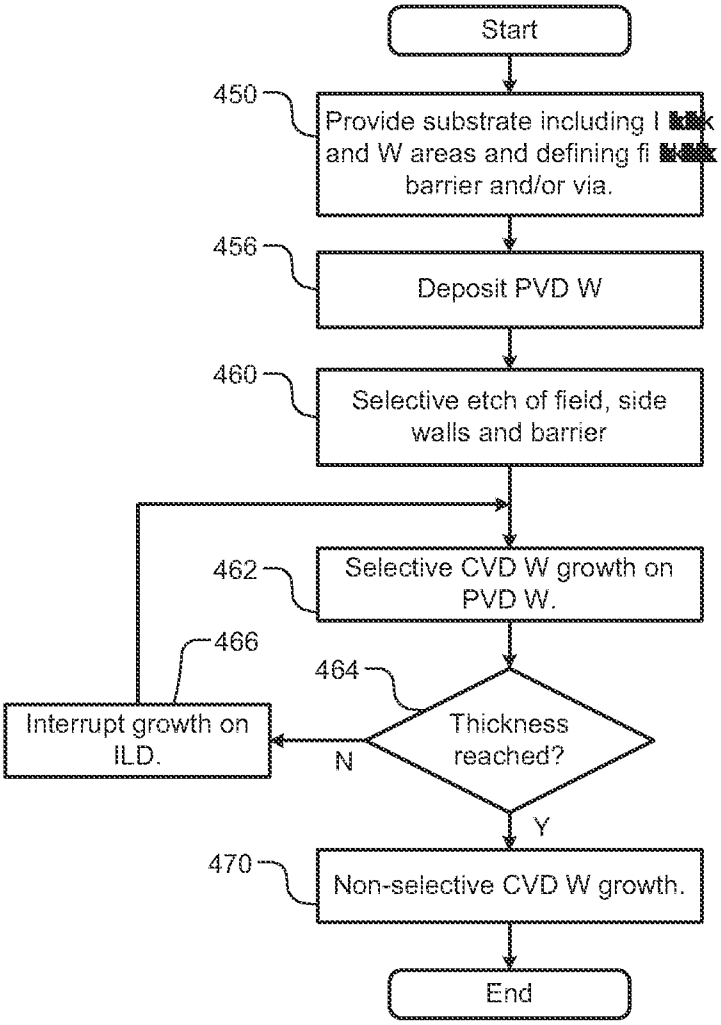

Start
450
Provide substrate including I
and W areas and defining fi
barrier and/or via.
456
Deposit PVD W
460
Selective etch of field, side
walls and barrier
462
Selective CVD W growth on
PVD W.
466
464
Interrupt growth on
ILD.
N
Thickness
reached?
Y
470
Non-selective CVD W growth.
End

FIG. 11D