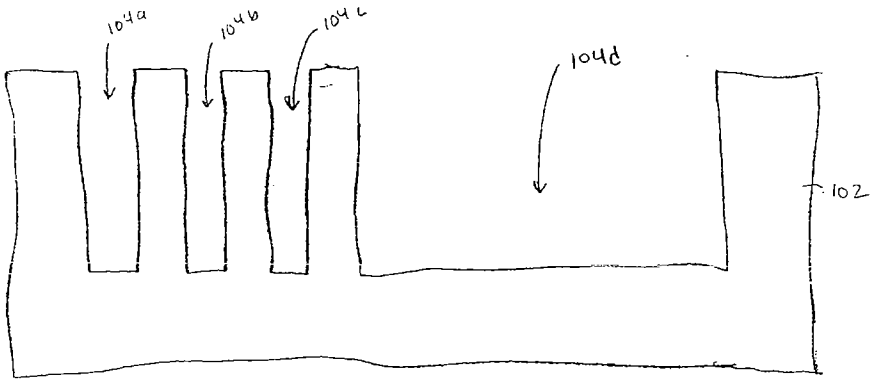


FIG. 1A

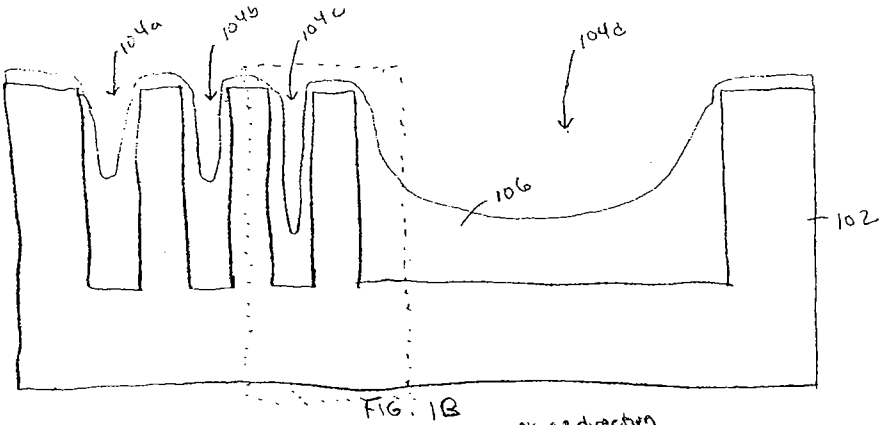


FIG. 1B

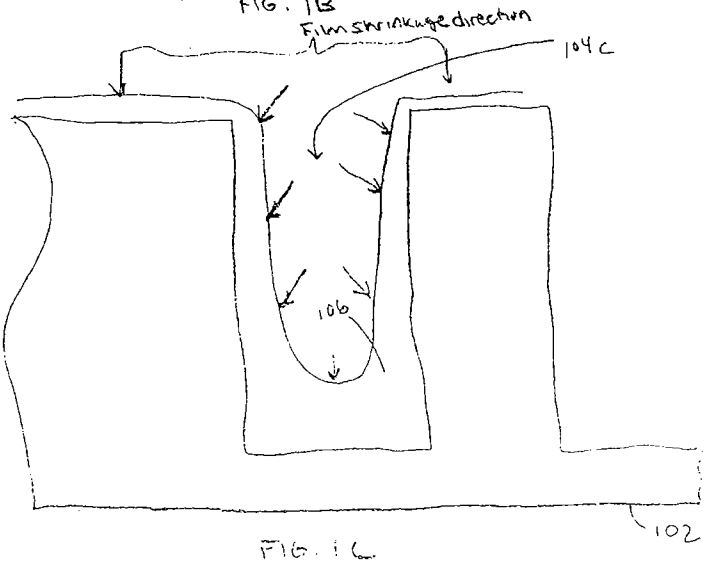


FIG. 1C

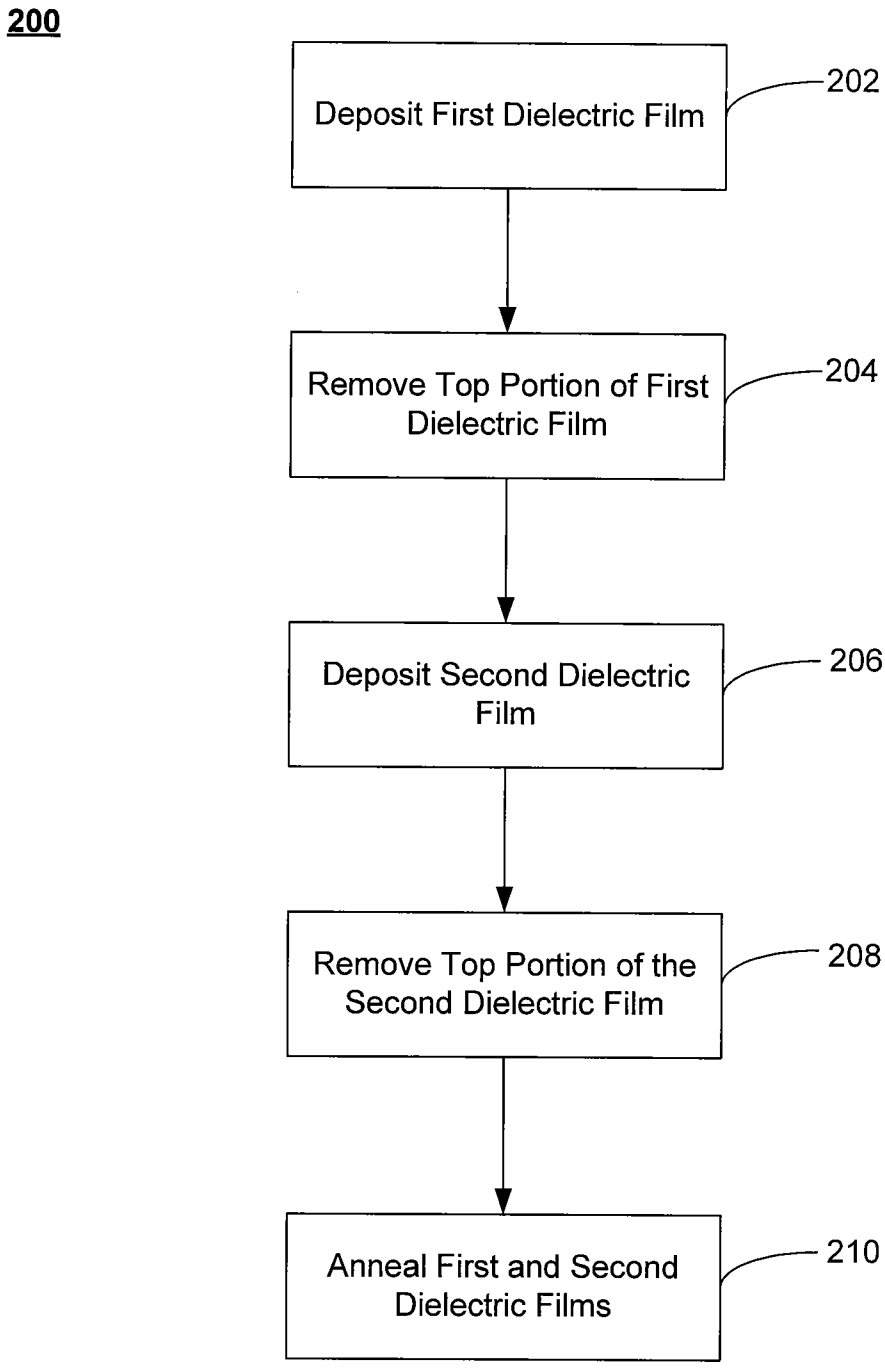

200
Deposit First Dielectric Film
202
Remove Top Portion of First Dielectric Film
204
Deposit Second Dielectric Film
206
Remove Top Portion of the Second Dielectric Film
208
Anneal First and Second Dielectric Films
210

Fig. 2A

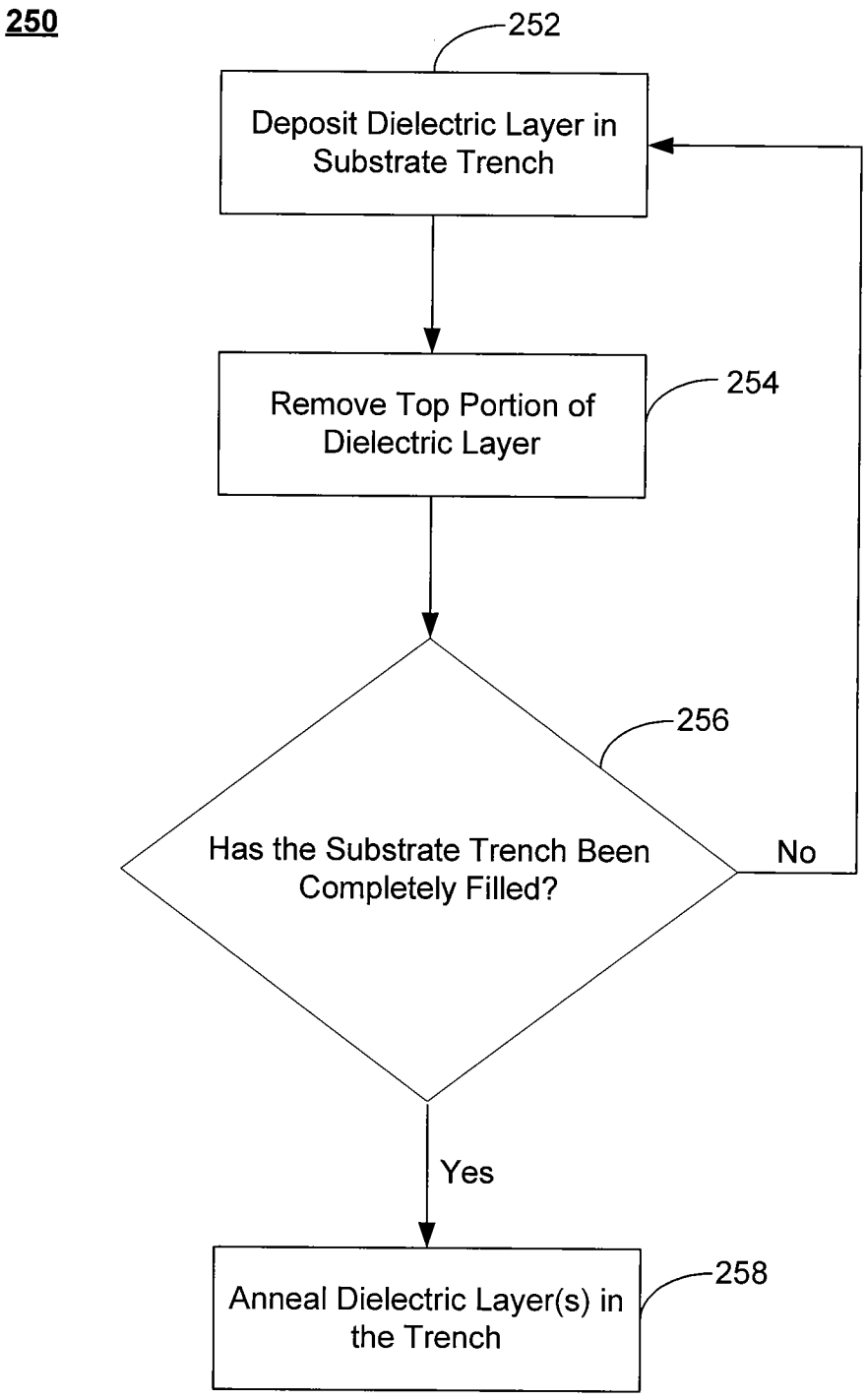

250
252
Deposit Dielectric Layer in Substrate Trench
Remove Top Portion of Dielectric Layer
254
256
Has the Substrate Trench Been Completely Filled?
No
Yes
Anneal Dielectric Layer(s) in the Trench
258

Fig. 2B

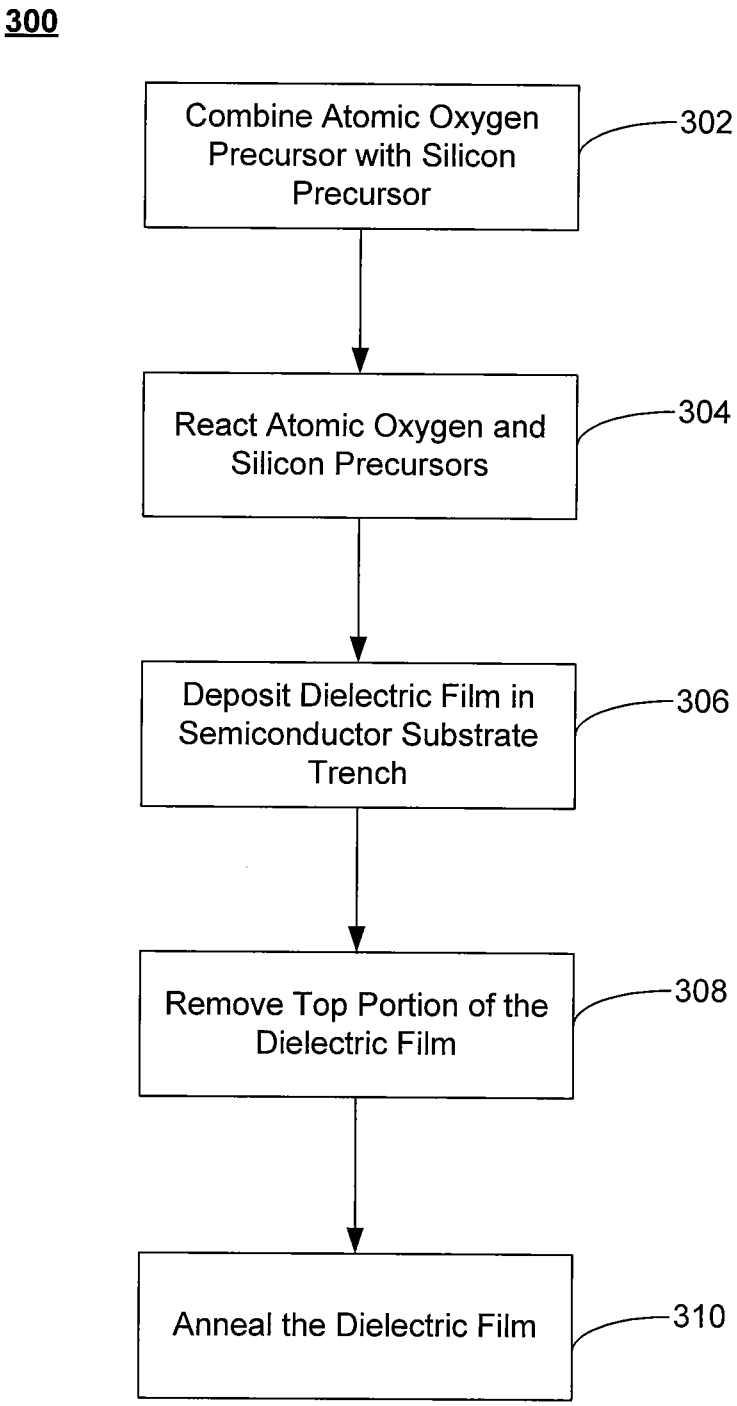

300
Combine Atomic Oxygen Precursor with Silicon Precursor
302
React Atomic Oxygen and Silicon Precursors
304
Deposit Dielectric Film in Semiconductor Substrate Trench
306
Remove Top Portion of the Dielectric Film
308
Anneal the Dielectric Film
310

Fig. 3

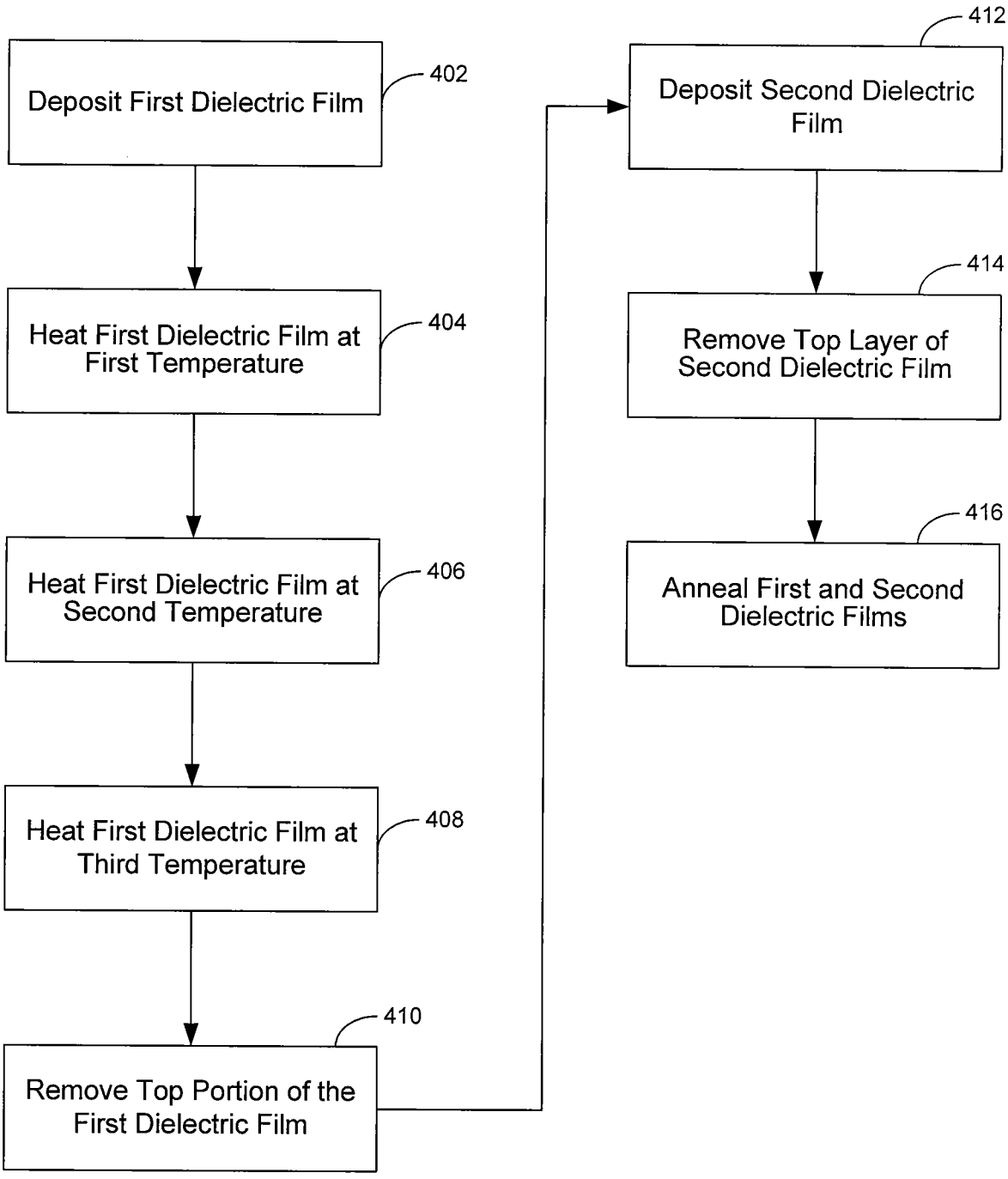

400
Deposit First Dielectric Film
402
Heat First Dielectric Film at First Temperature
404
Heat First Dielectric Film at Second Temperature
406
Heat First Dielectric Film at Third Temperature
408
Remove Top Portion of the First Dielectric Film
410
Deposit Second Dielectric Film
412
Remove Top Layer of Second Dielectric Film
414
Anneal First and Second Dielectric Films
416

Fig. 4

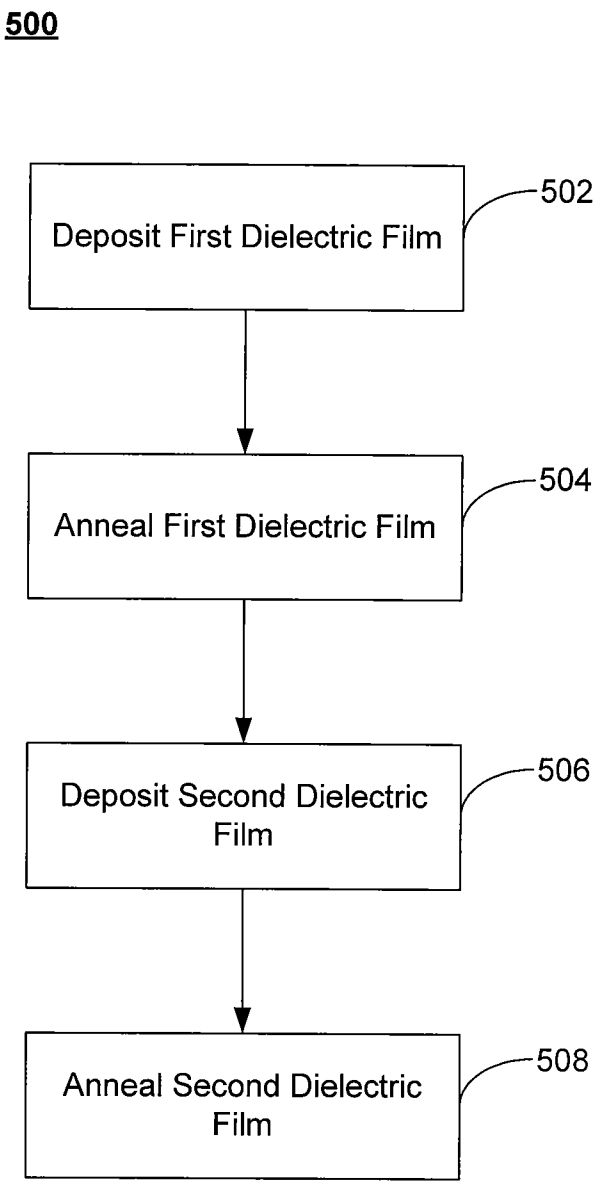

500
Deposit First Dielectric Film
502
Anneal First Dielectric Film
504
Deposit Second Dielectric Film
506
Anneal Second Dielectric Film
508

Fig. 5A

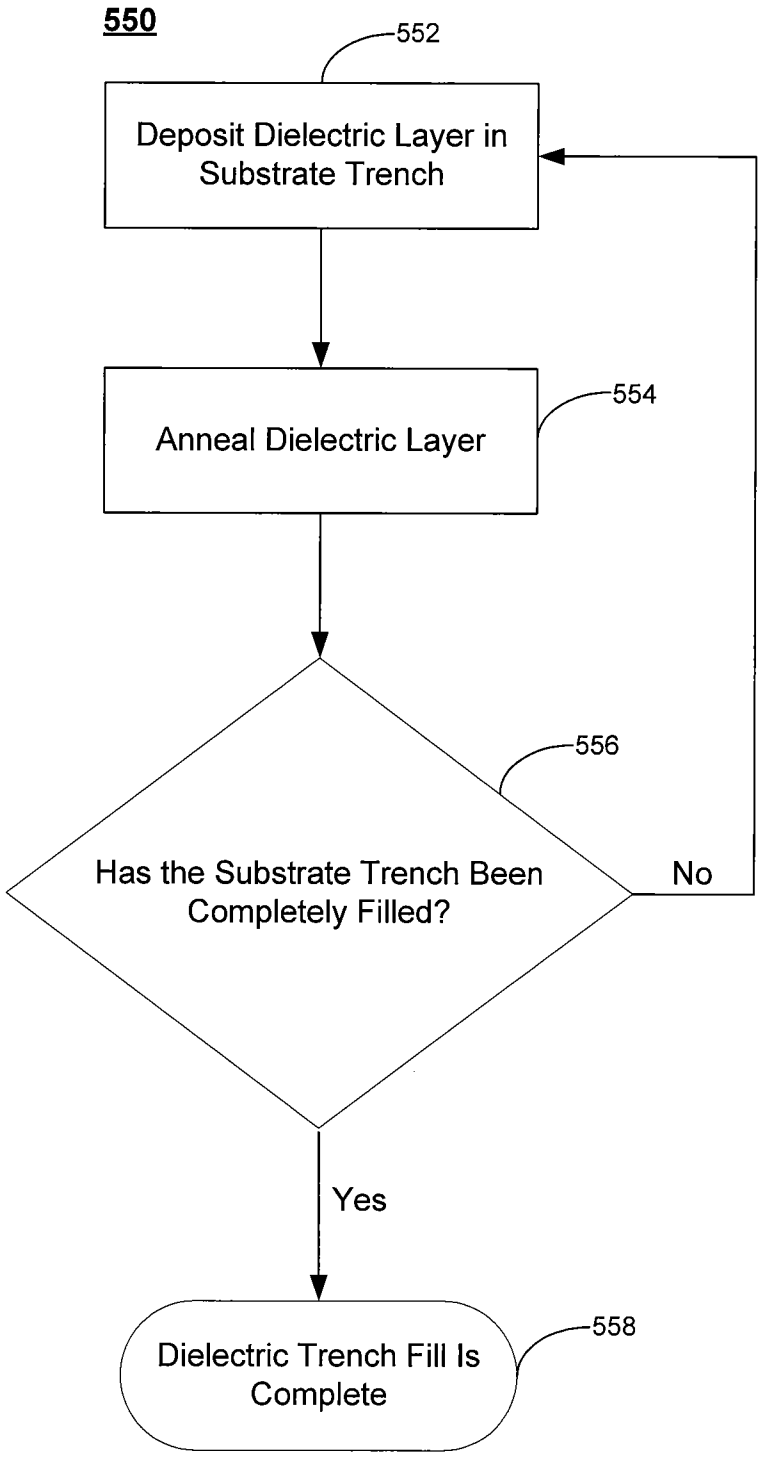

550
552
Deposit Dielectric Layer in Substrate Trench
Anneal Dielectric Layer
554
556
Has the Substrate Trench Been Completely Filled?
No
Yes
Dielectric Trench Fill Is Complete
558

Fig. 5B

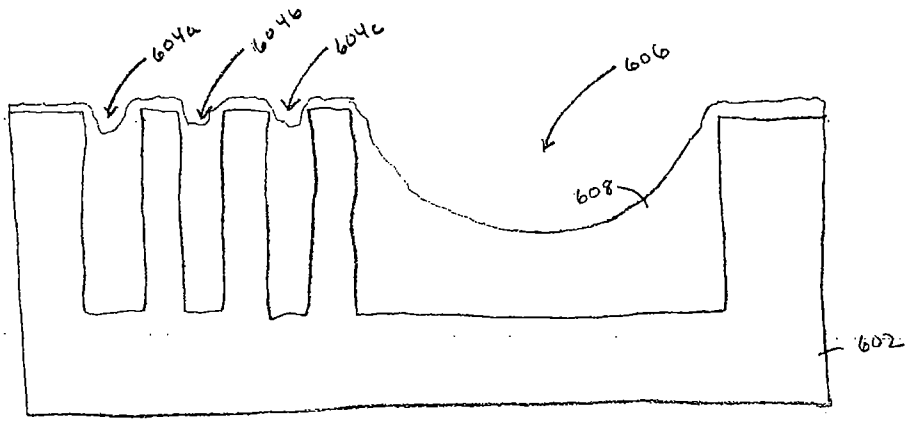


FIG. 6A

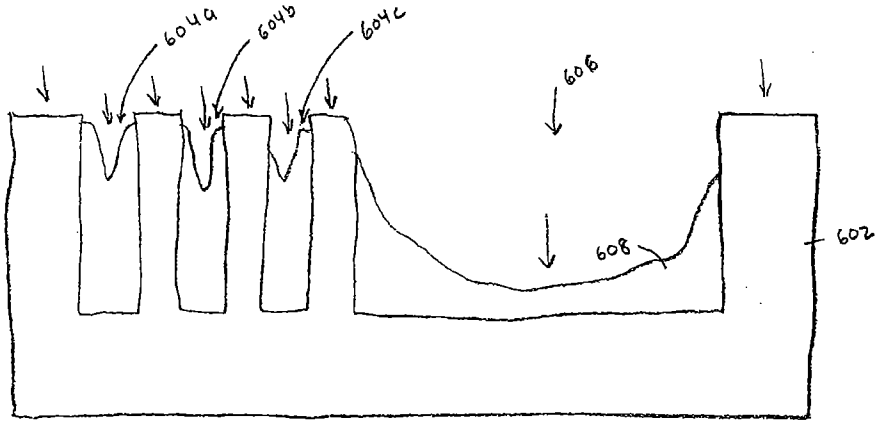


FIG. 6B

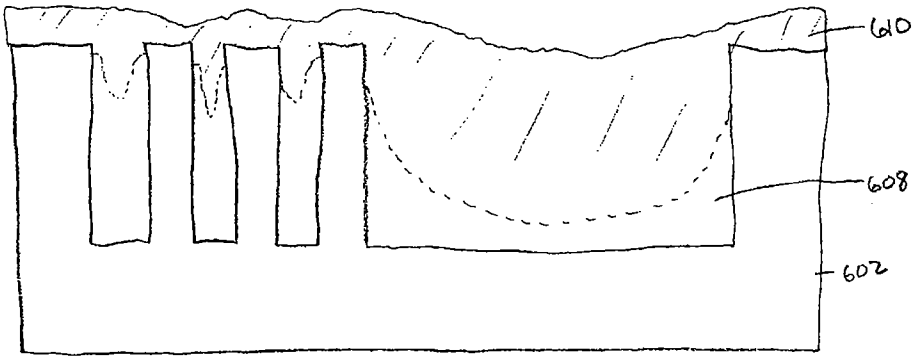


FIG. 6C

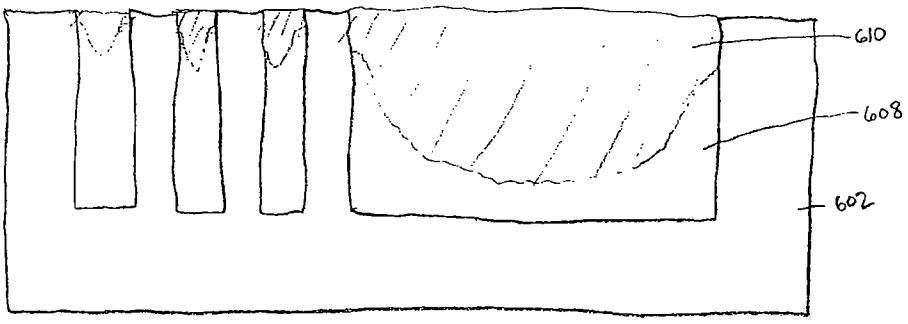


FIG. 6D

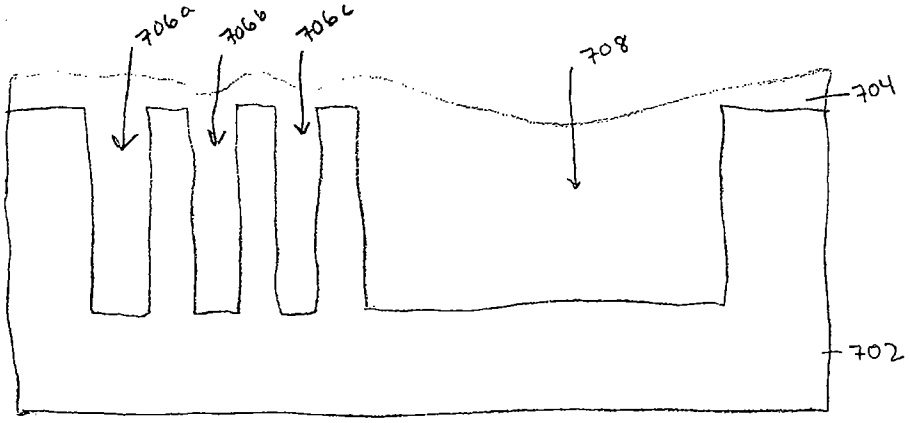


FIG. 7A

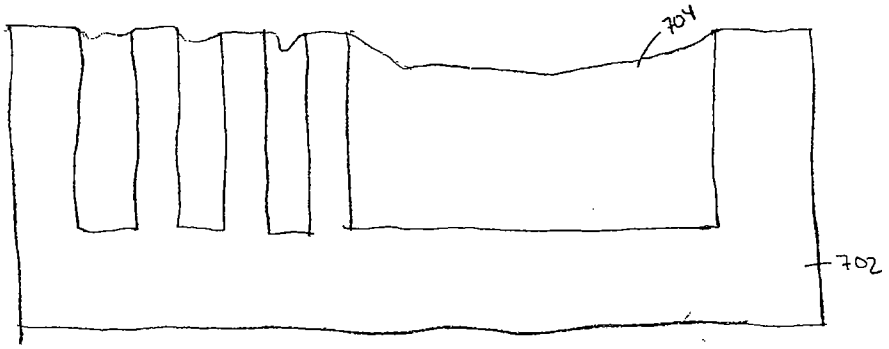


FIG. 7B

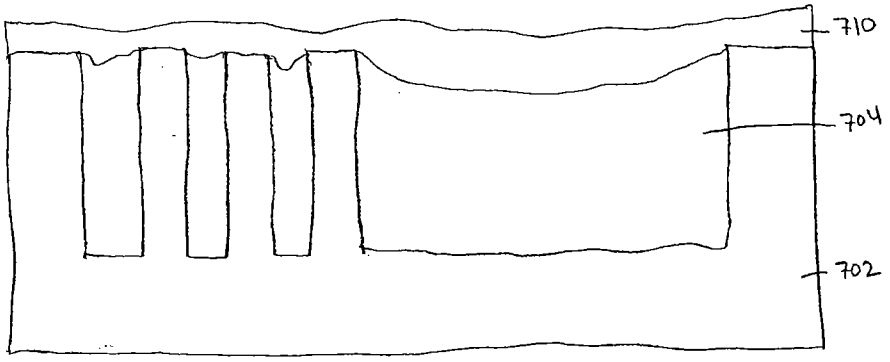


FIG. 7C

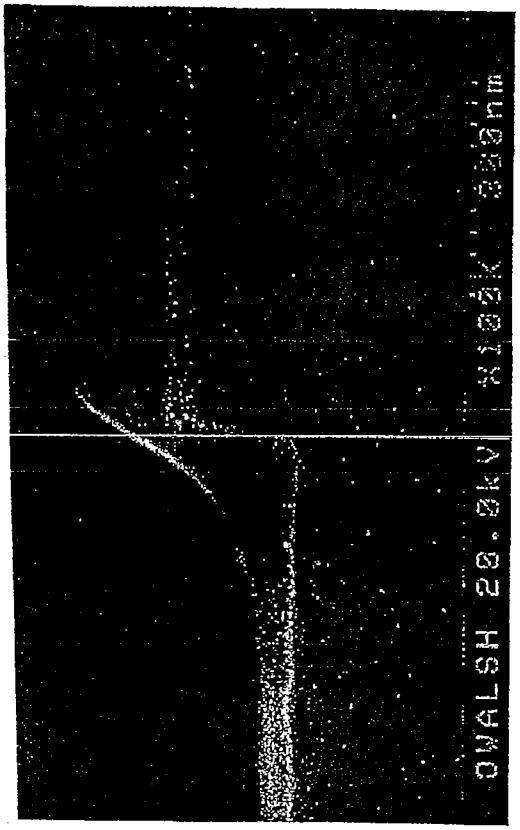


FIG. 8B

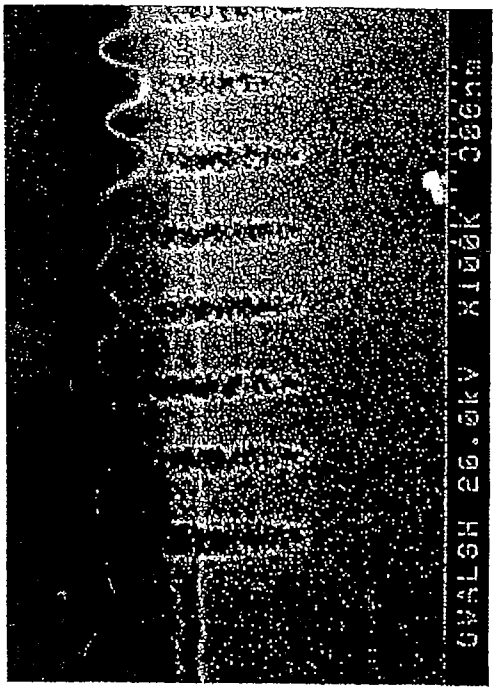


FIG. 8A

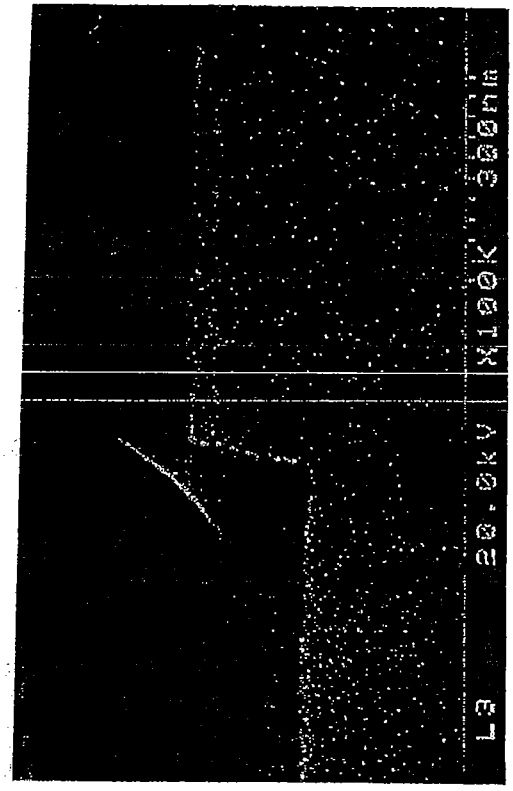


FIG. 9B

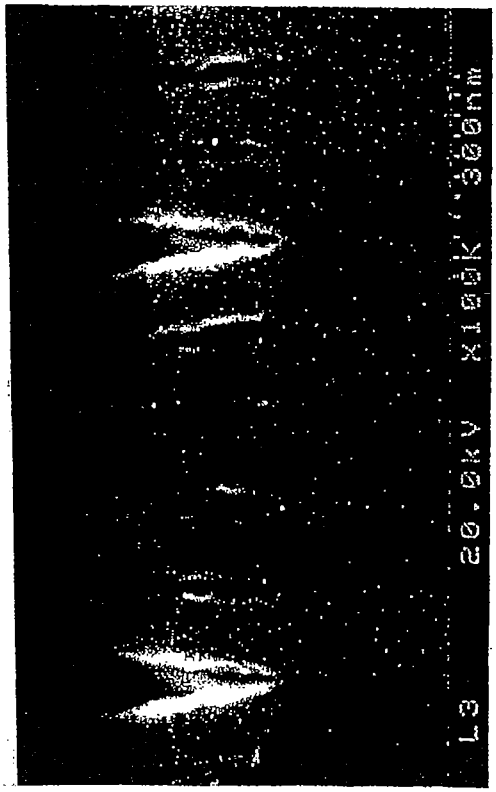


FIG. 9A