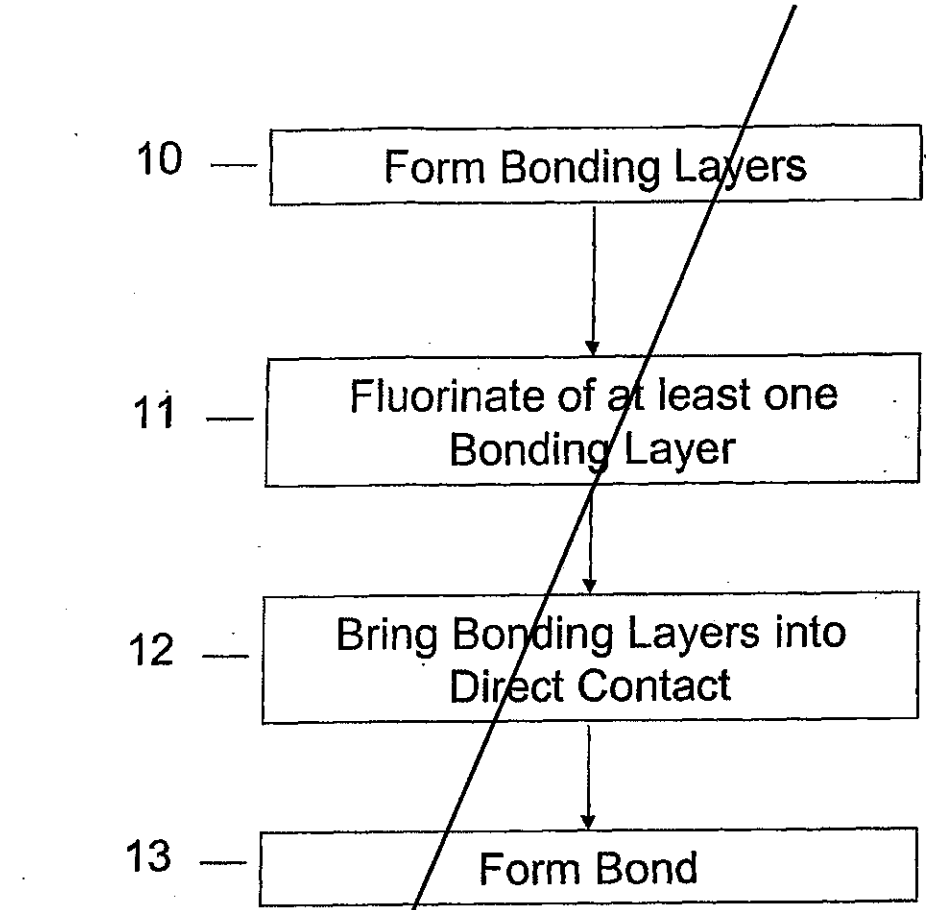

10
Form Bonding Layers
11
Fluorinate of at least one Bonding Layer
12
Bring Bonding Layers into Direct Contact
13
Form Bond

FIG. 1

FIG. 2A

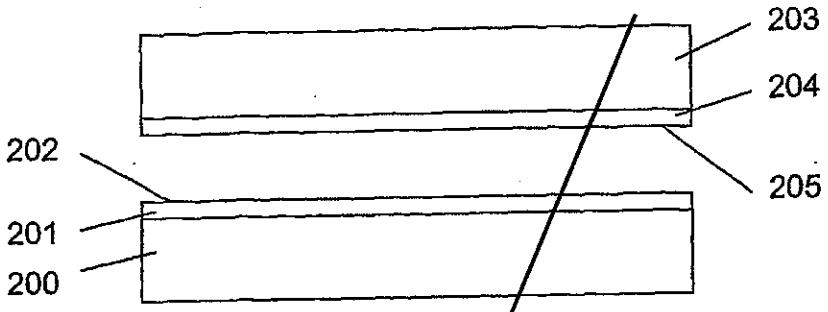


FIG. 2B



FIG. 2C

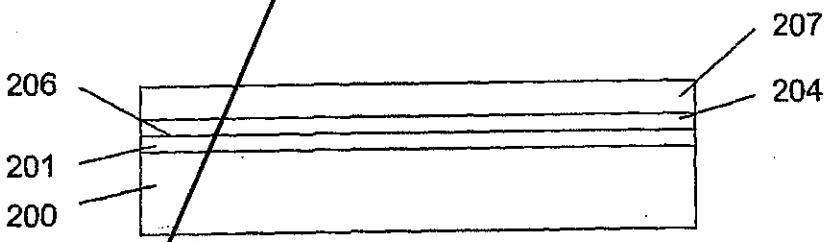
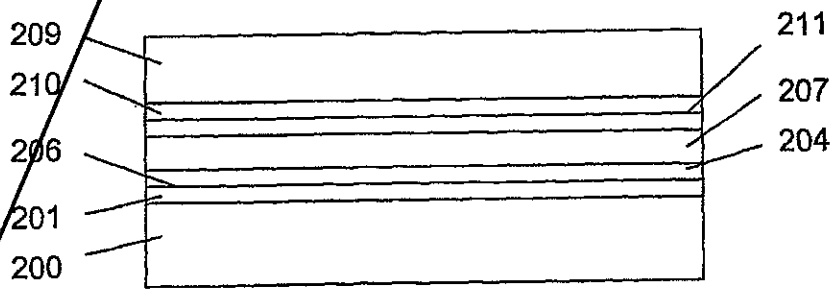


FIG. 2D



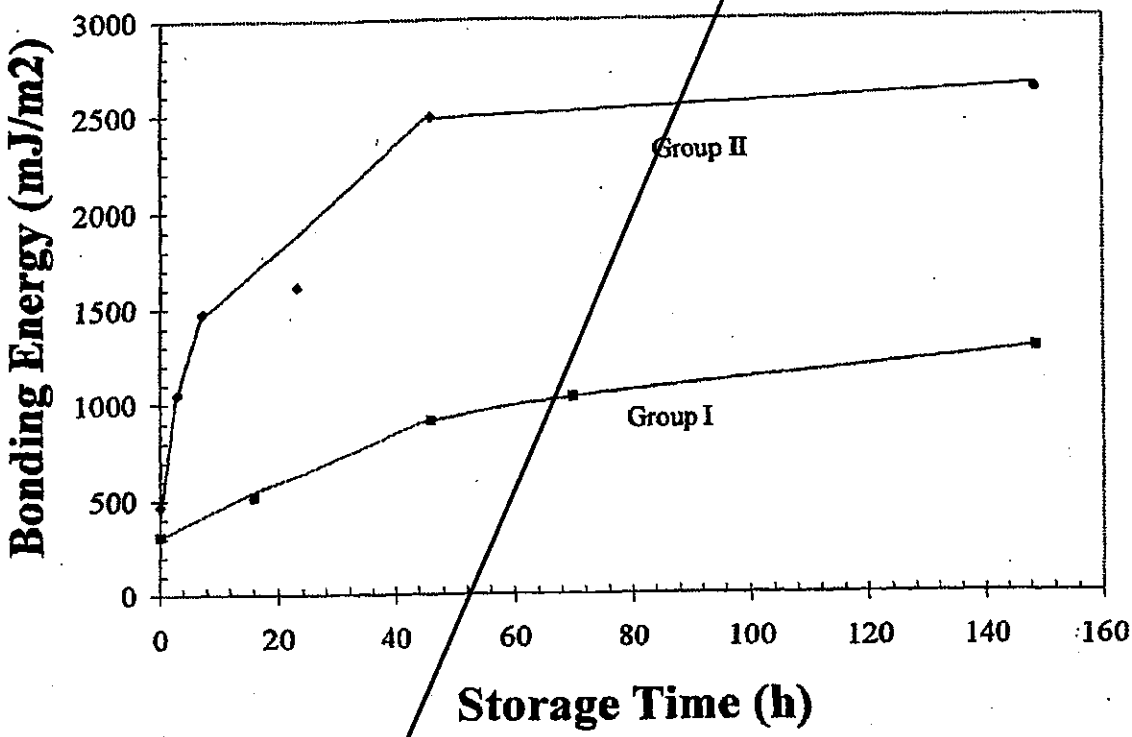

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
20
40
60
80
100
120
140
160
Storage Time (h)
Group II
Group I

FIG. 3

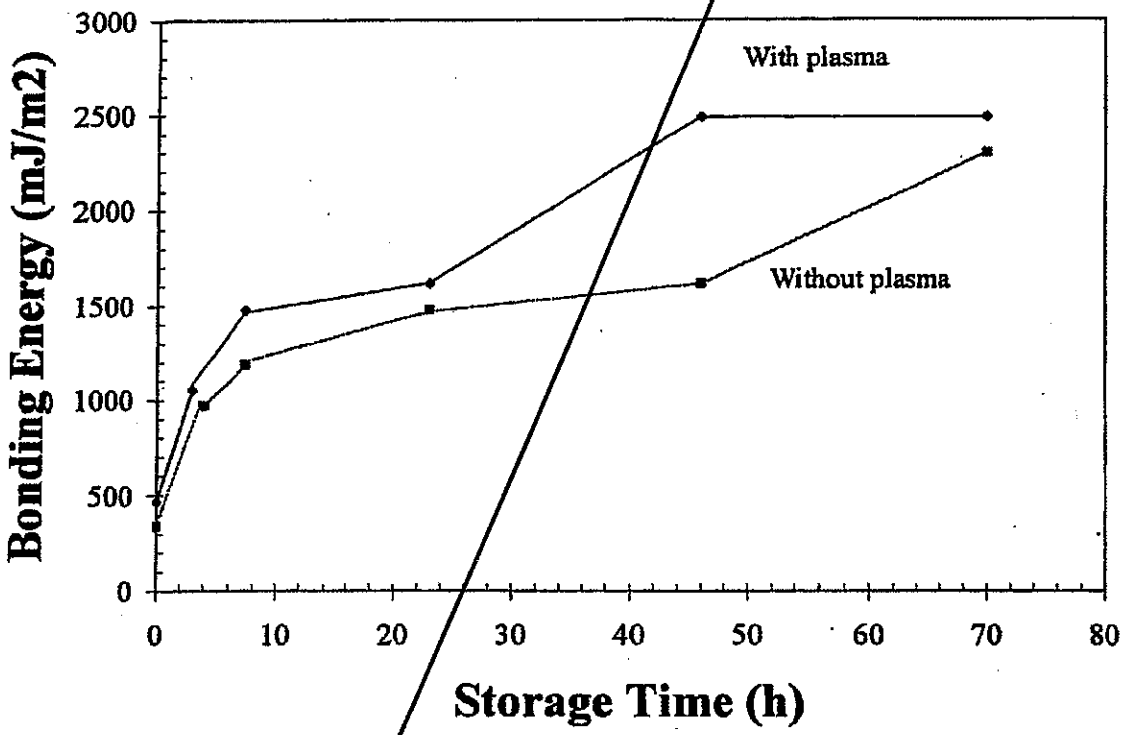

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
80
Storage Time (h)
With plasma
Without plasma

FIG. 4

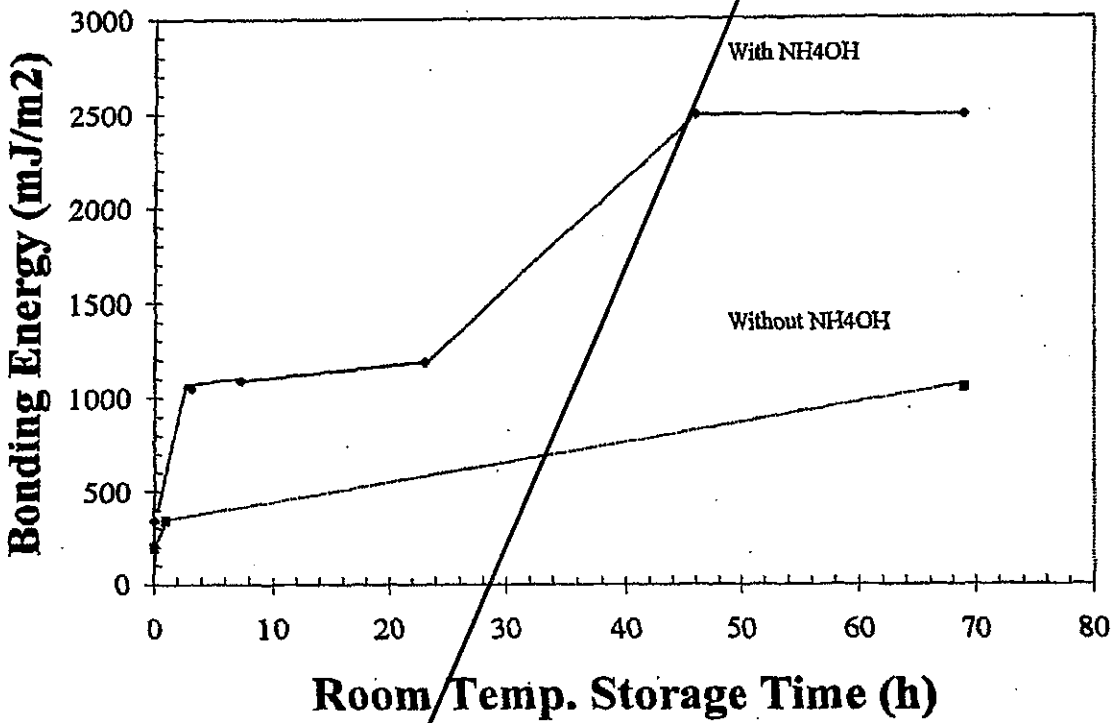

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
80
With NH4OH
Without NH4OH
Room Temp. Storage Time (h)

FIG. 5

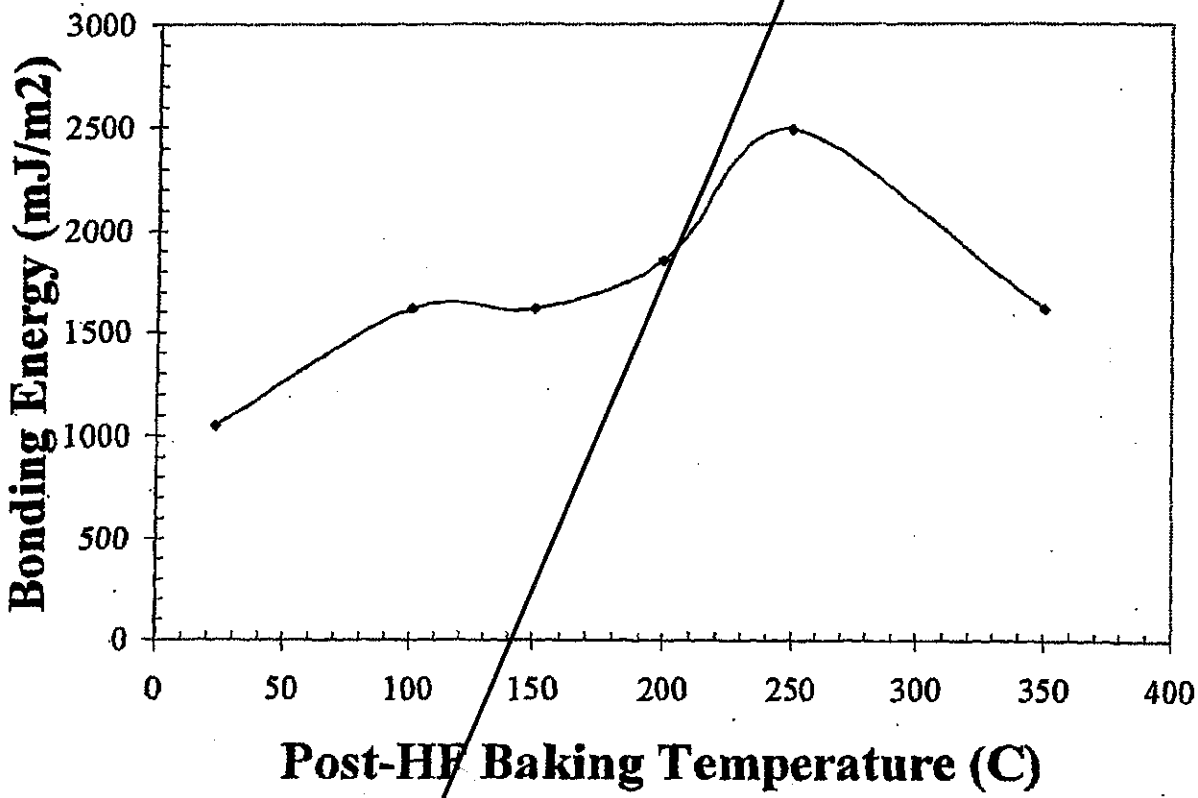

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
50
100
150
200
250
300
350
400
Post-HF Baking Temperature (C)

FIG. 6

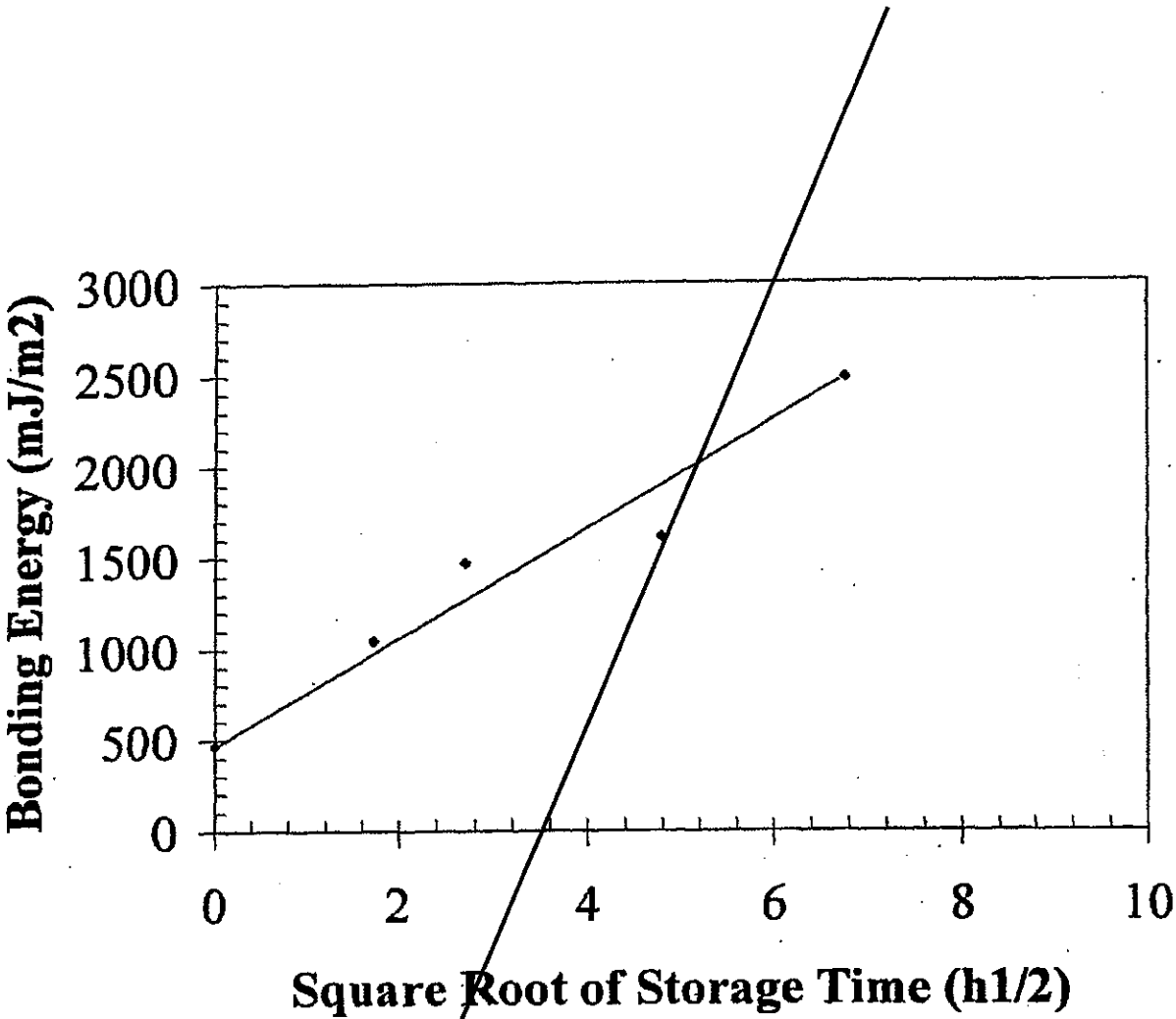

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
2
4
6
8
10
Square Root of Storage Time (h1/2)

FIG. 7

FIG. 8A

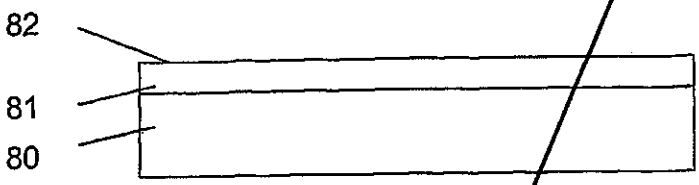
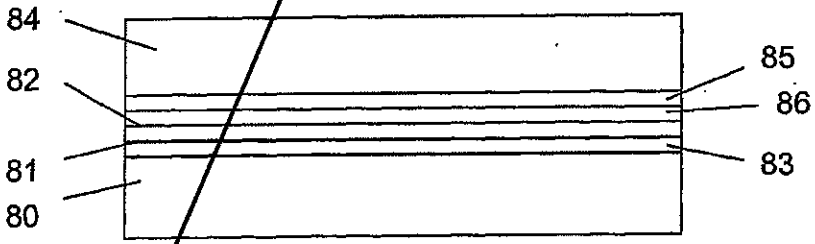


FIG. 8B



FIG. 8C



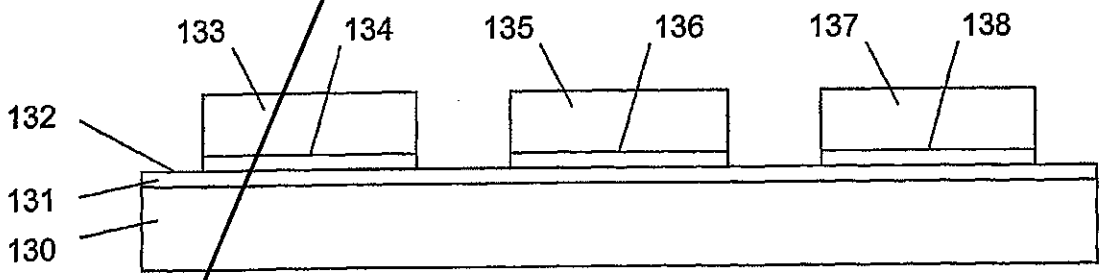


FIG. 13

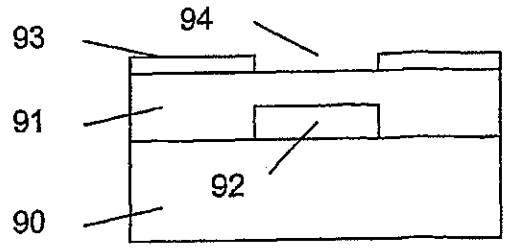


FIG. 9A

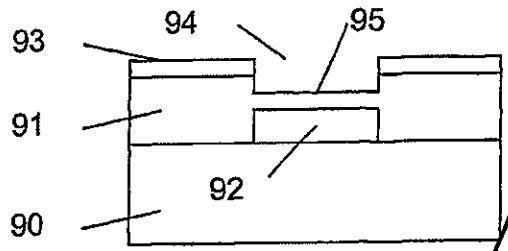


FIG. 9B

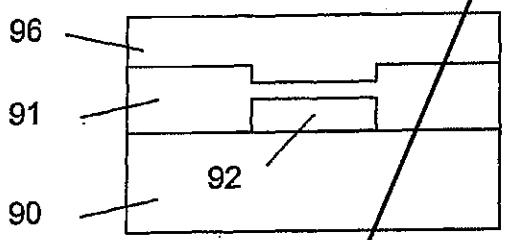


FIG. 9C

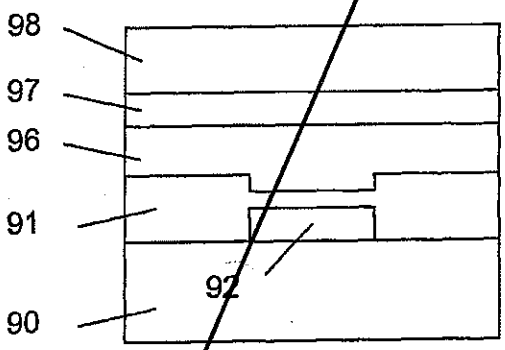


FIG. 9D

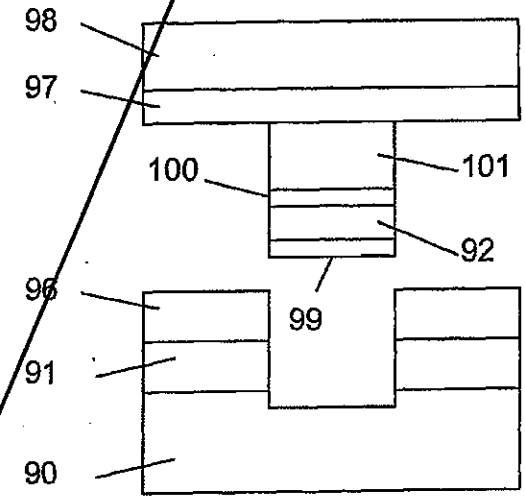


FIG. 9E



FIG. 10

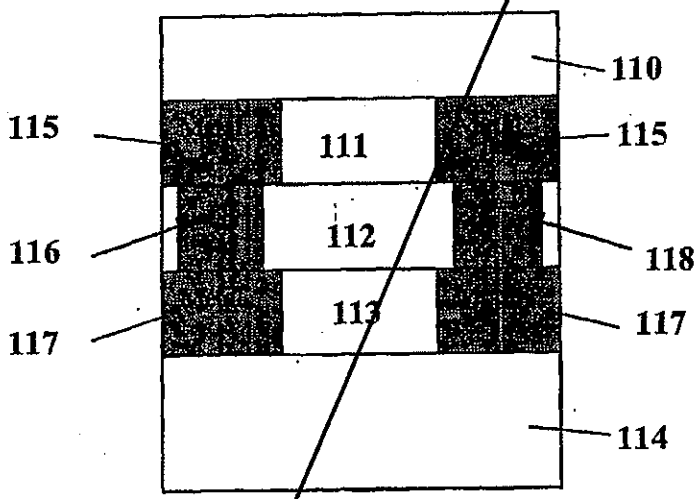


FIG. 11

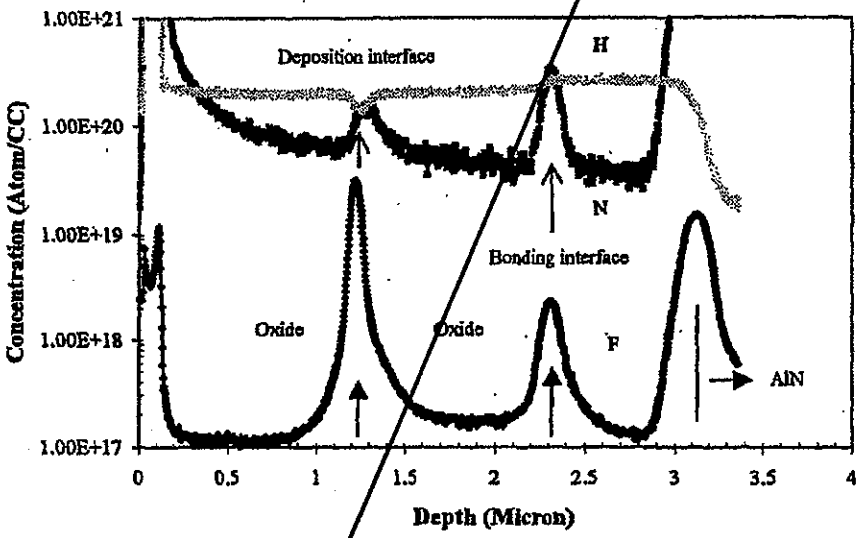

1.00E+21
1.00E+20
1.00E+19
1.00E+18
1.00E+17
Concentration (Atom/CC)
Deposition interface
H
N
Bonding interface
Oxide
Oxide
F
AlN
0
0.5
1
1.5
2
2.5
3
3.5
4
Depth (Micron)

FIG. 12

FIG. 14A

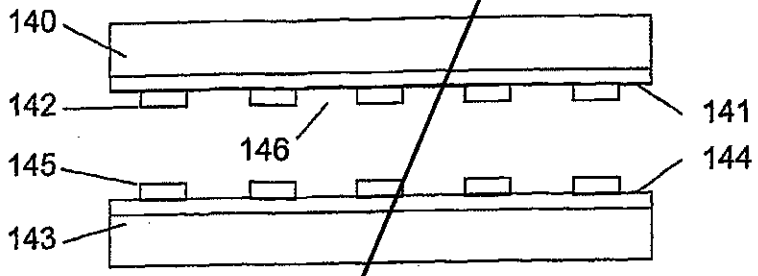


FIG. 14B

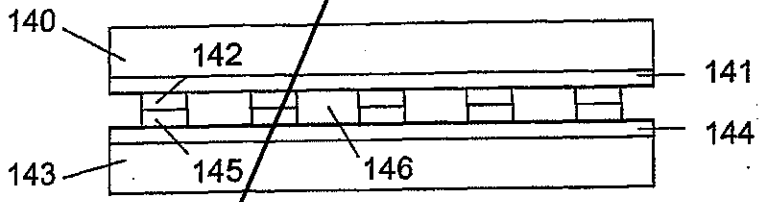


FIG. 14C

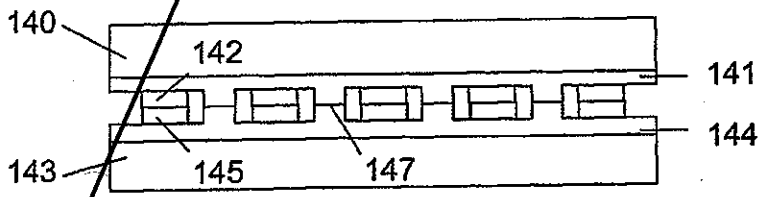
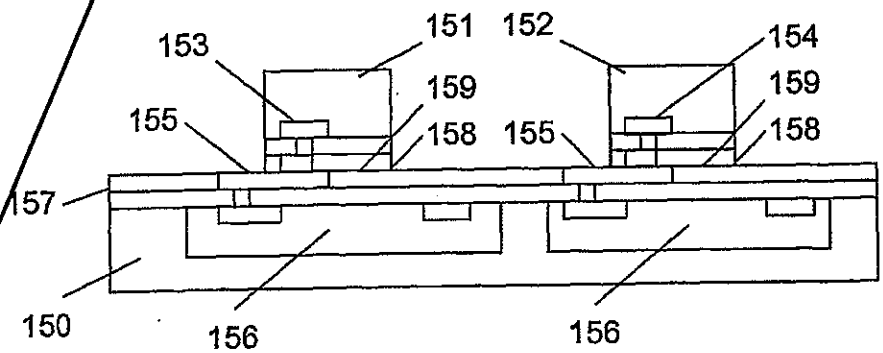


FIG. 15



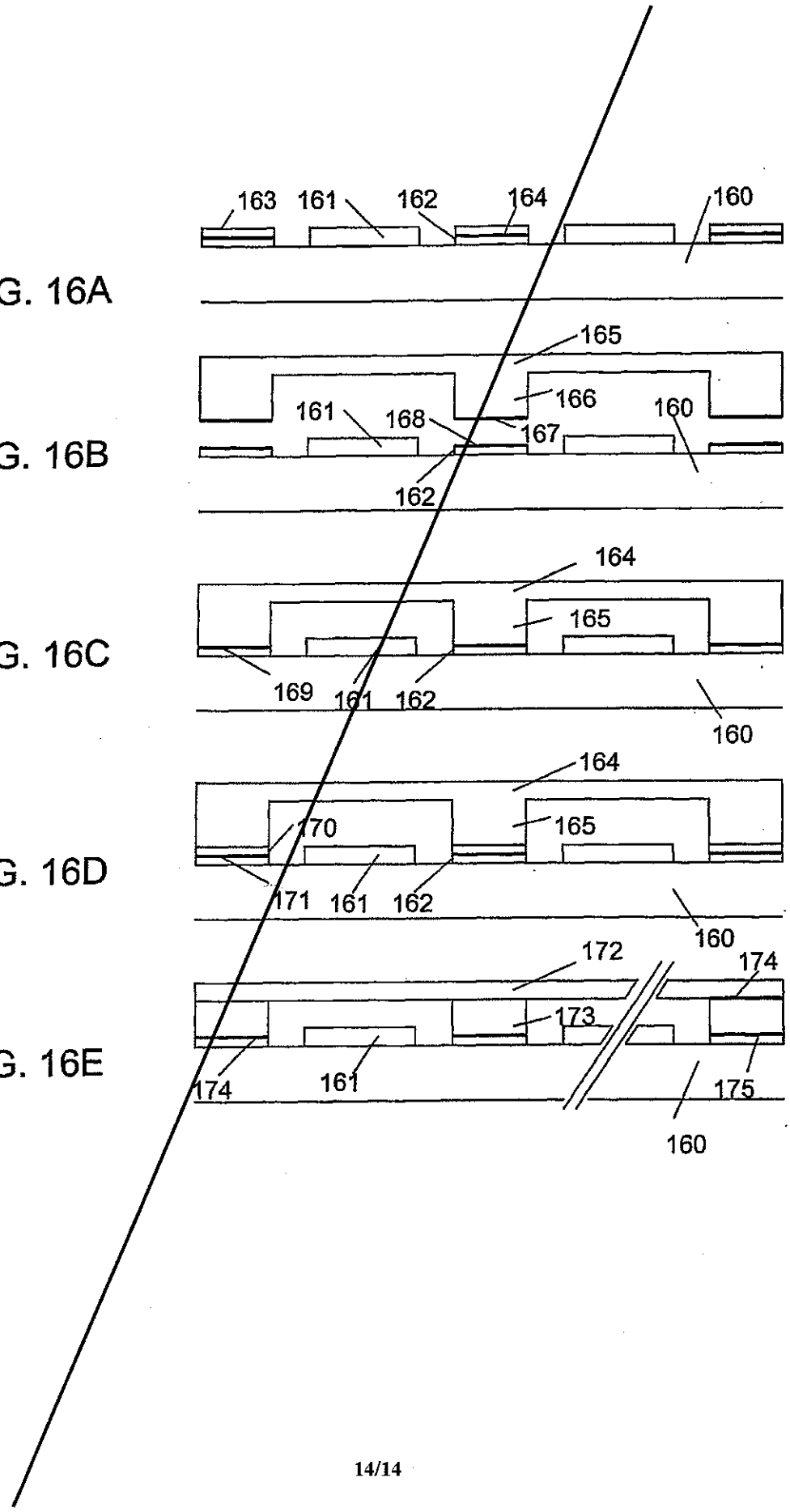


FIG. 16A

FIG. 16B

FIG. 16C

FIG. 16D

FIG. 16E

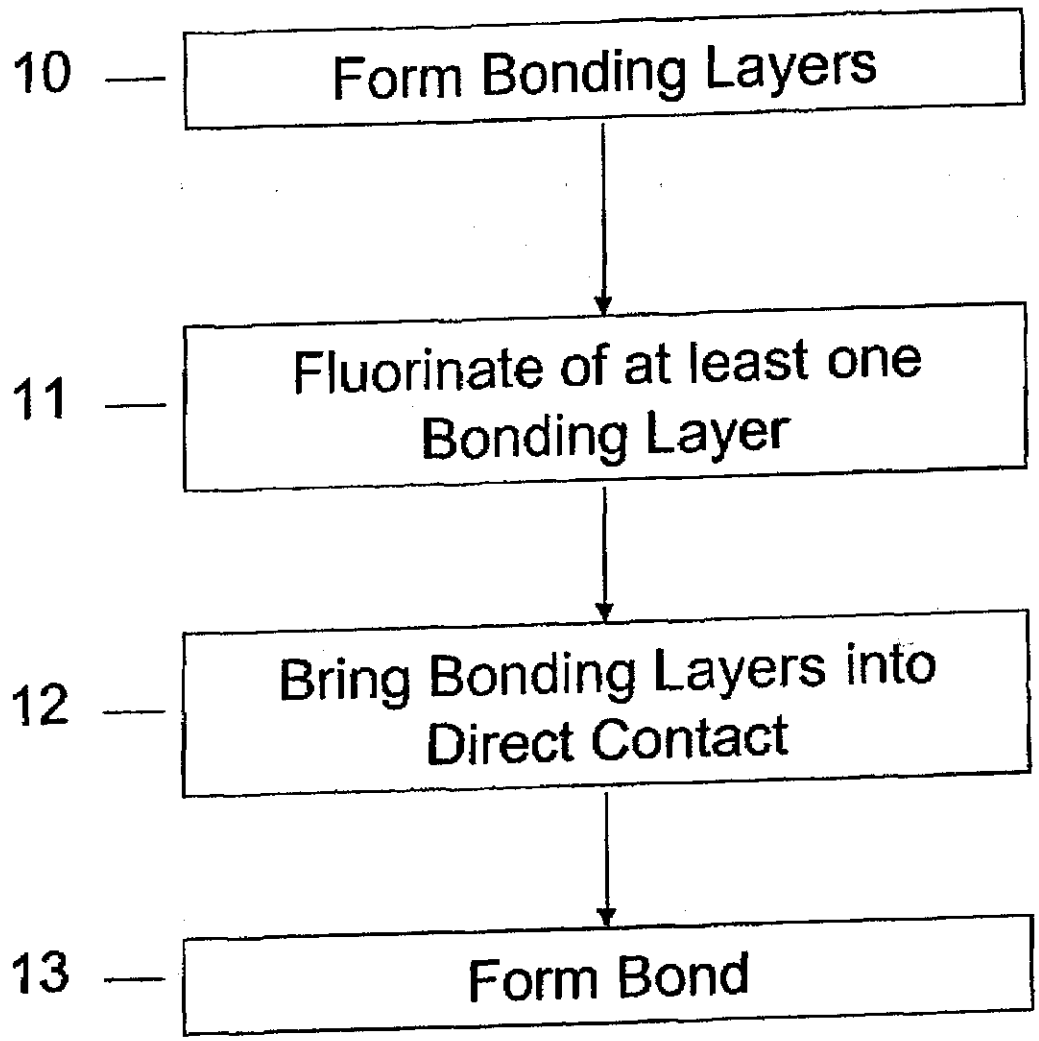

10
Form Bonding Layers
11
Fluorinate of at least one Bonding Layer
12
Bring Bonding Layers into Direct Contact
13
Form Bond

FIG. 1

FIG. 2A

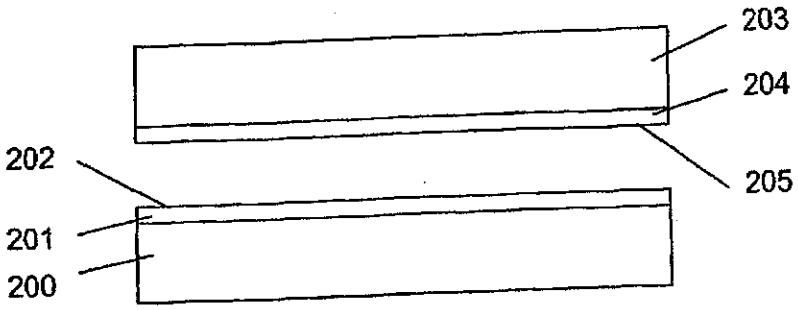


FIG. 2B

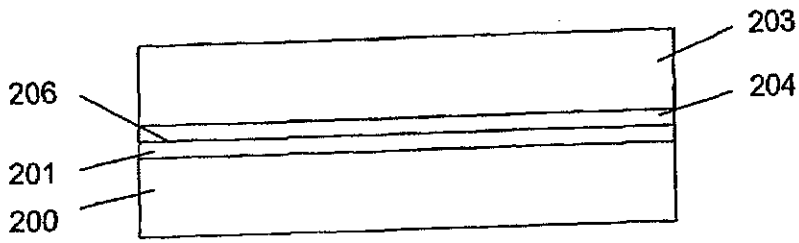


FIG. 2C

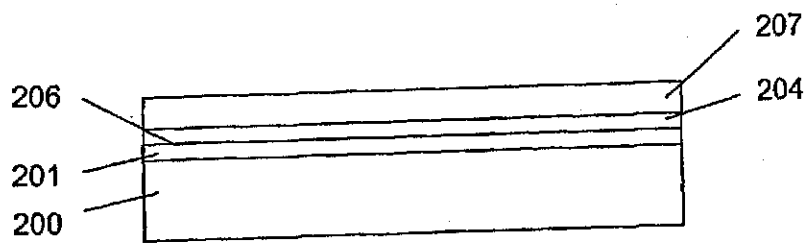
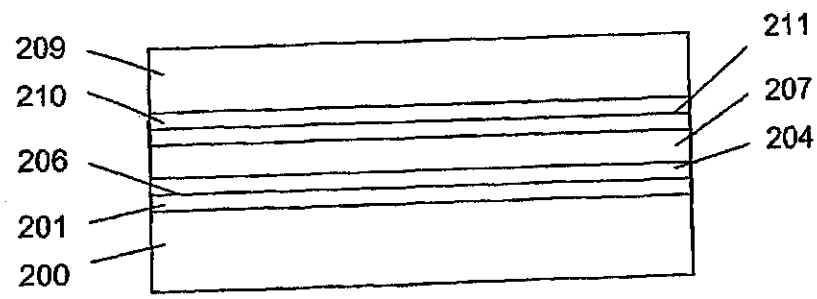


FIG. 2D



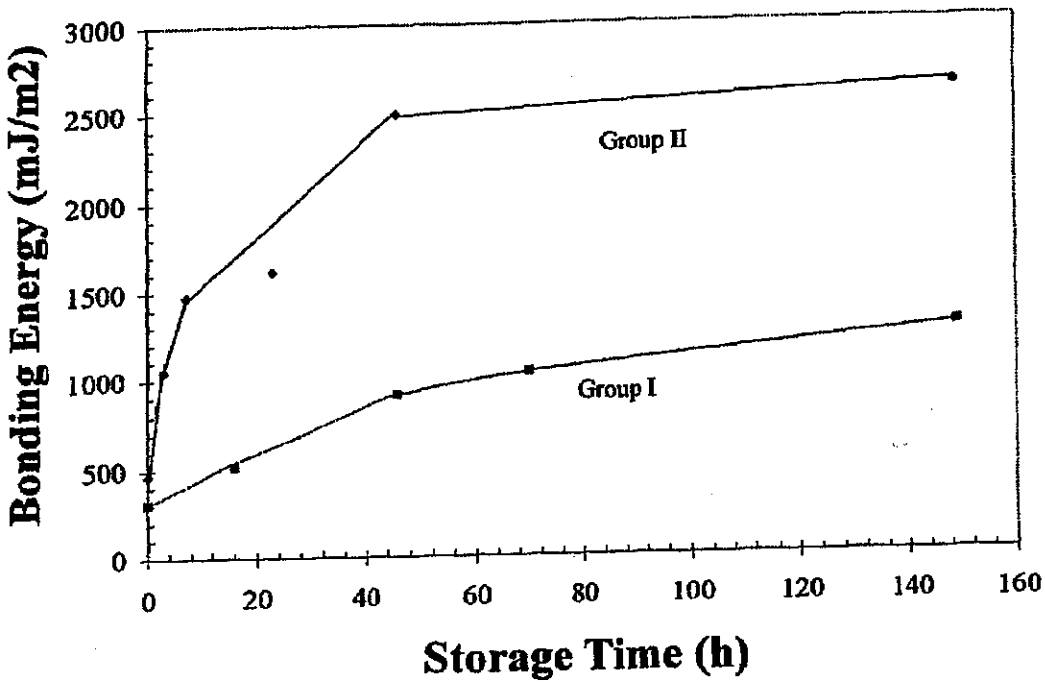

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
20
40
60
80
100
120
140
160
Storage Time (h)
Group II
Group I

FIG. 3

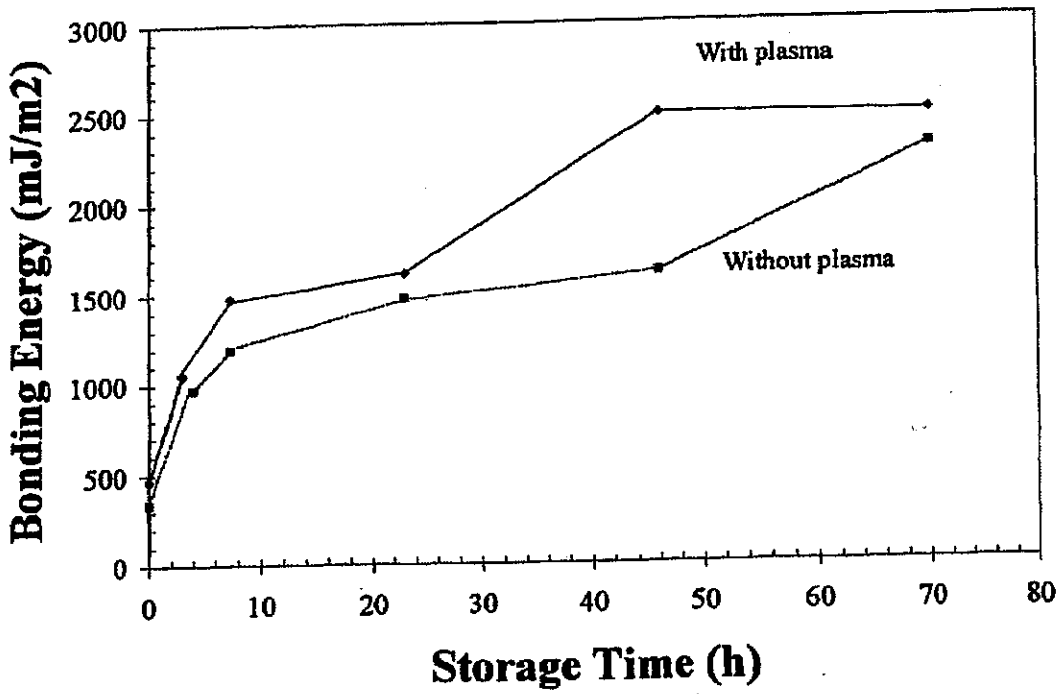

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
80
Storage Time (h)
With plasma
Without plasma

FIG. 4

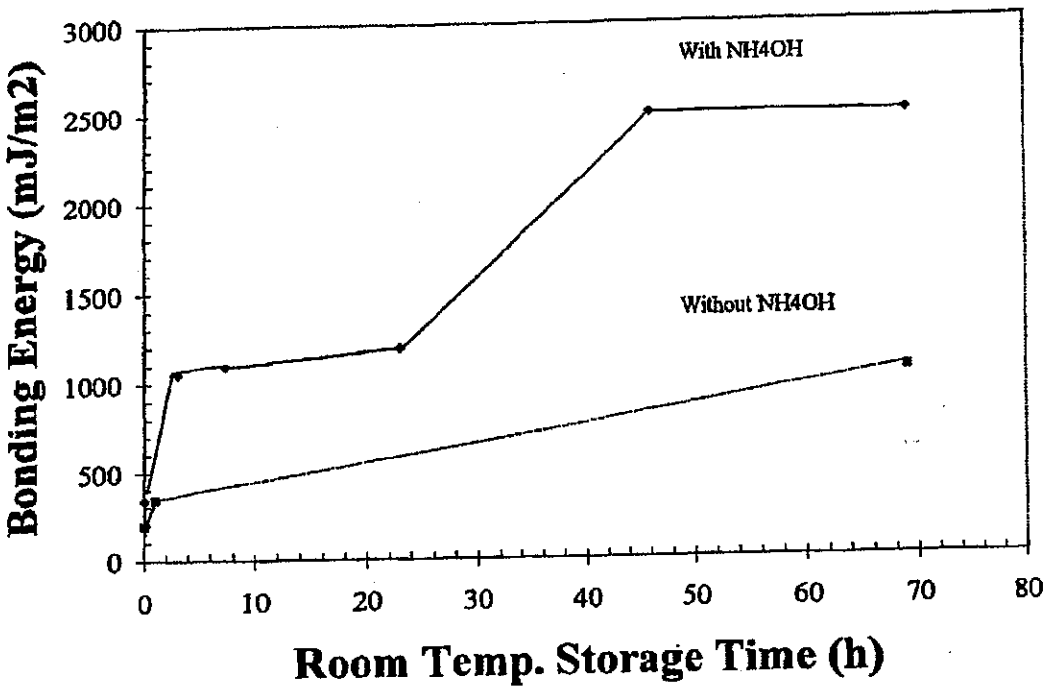

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
10
20
30
40
50
60
70
80
With NH4OH
Without NH4OH
Room Temp. Storage Time (h)

FIG. 5

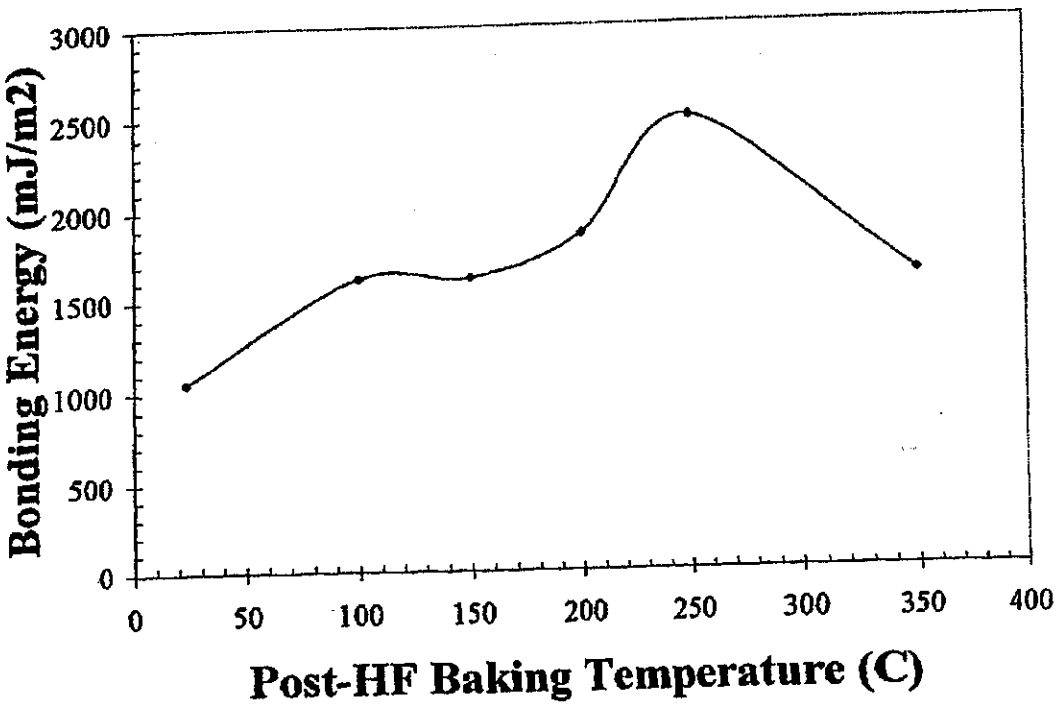

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
50
100
150
200
250
300
350
400
Post-HF Baking Temperature (C)

FIG. 6

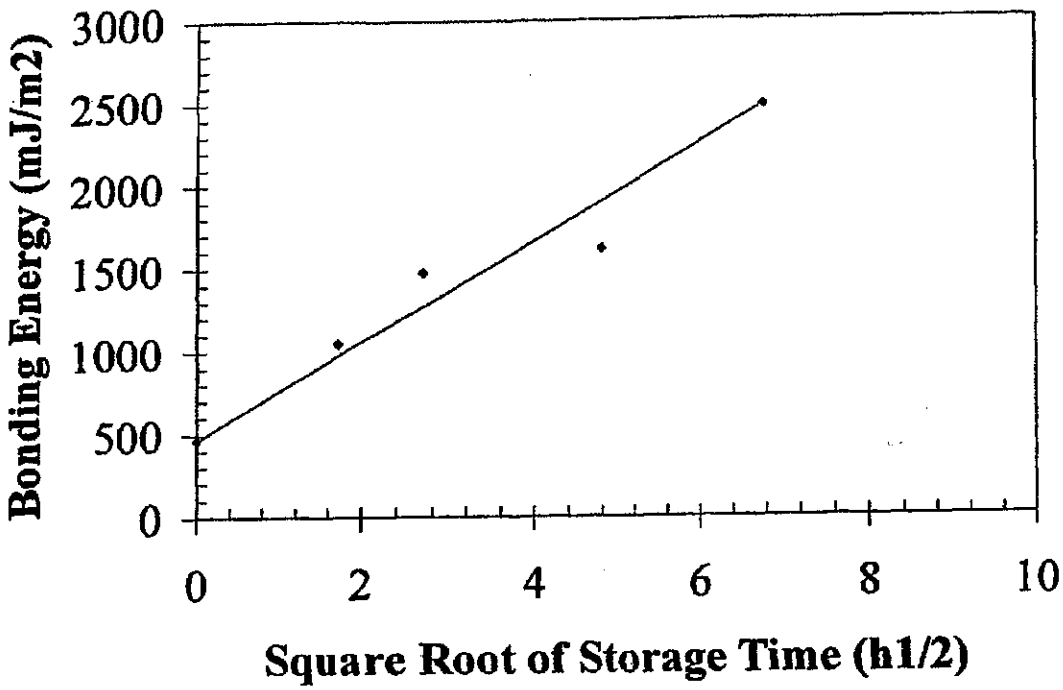

Bonding Energy (mJ/m2)
3000
2500
2000
1500
1000
500
0
0
2
4
6
8
10
Square Root of Storage Time (h1/2)

FIG. 7

FIG. 8A

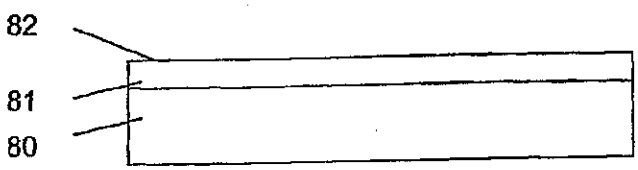


FIG. 8B

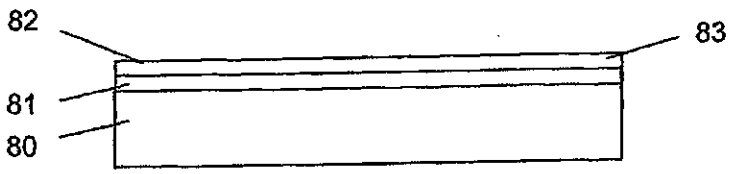
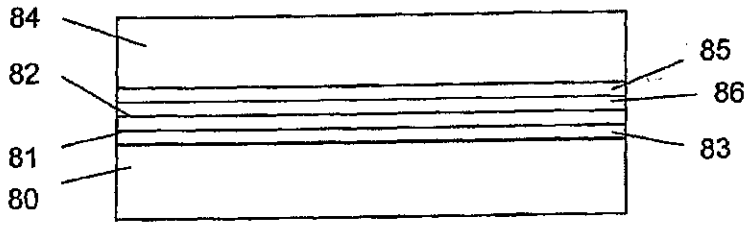


FIG. 8C



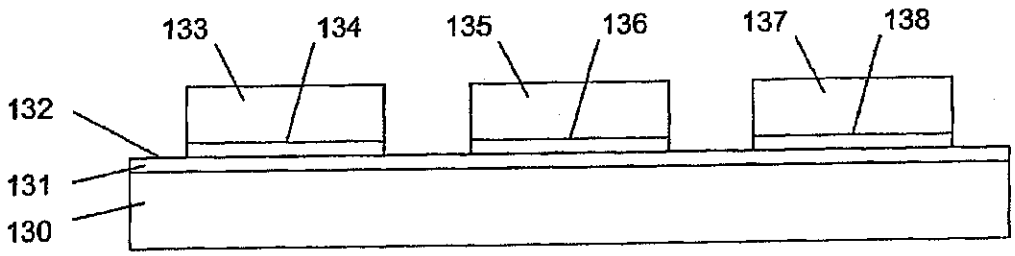


FIG. 13

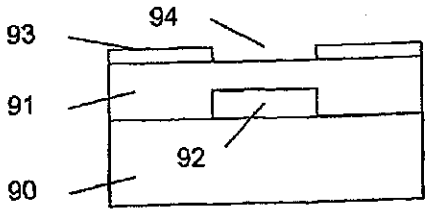


FIG. 9A

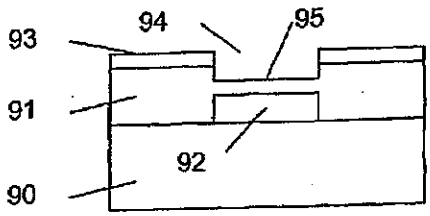


FIG. 9B

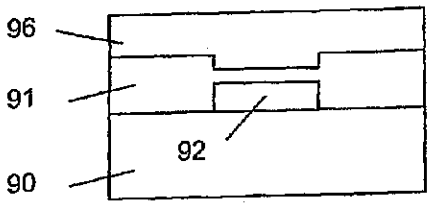


FIG. 9C

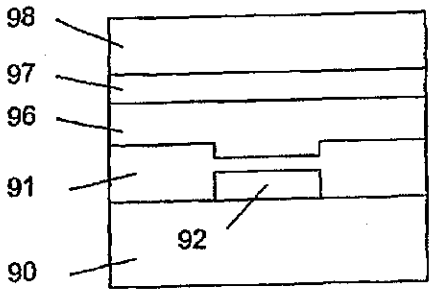


FIG. 9D

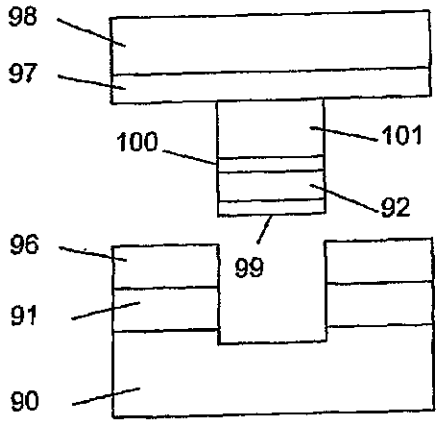


FIG. 9E



FIG. 10

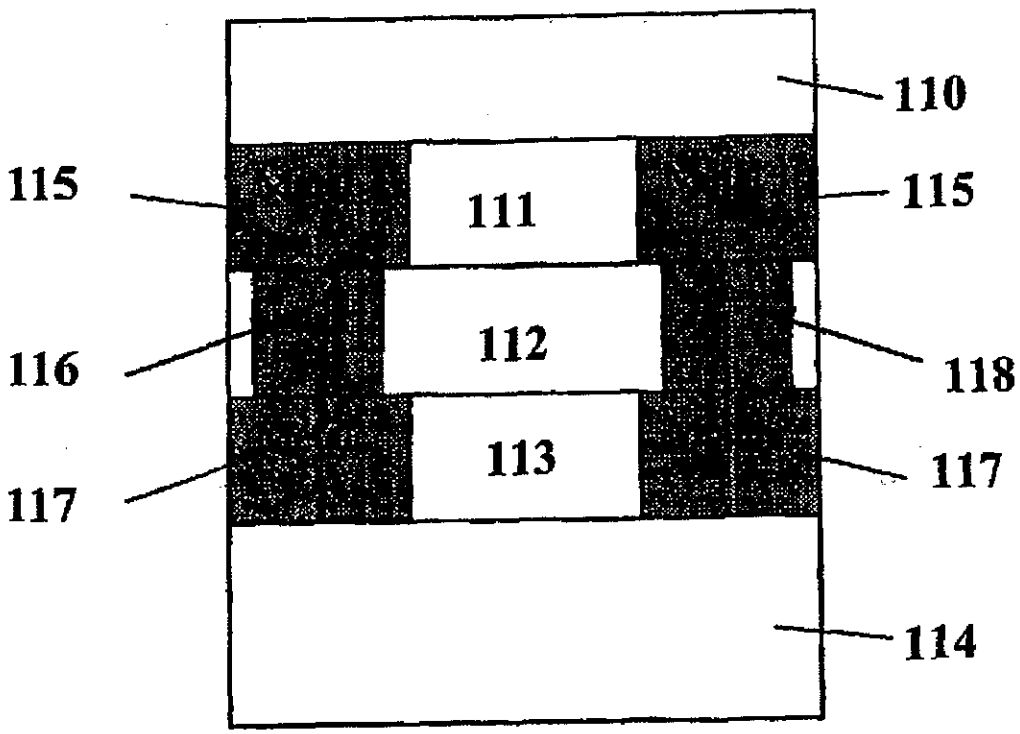


FIG. 11

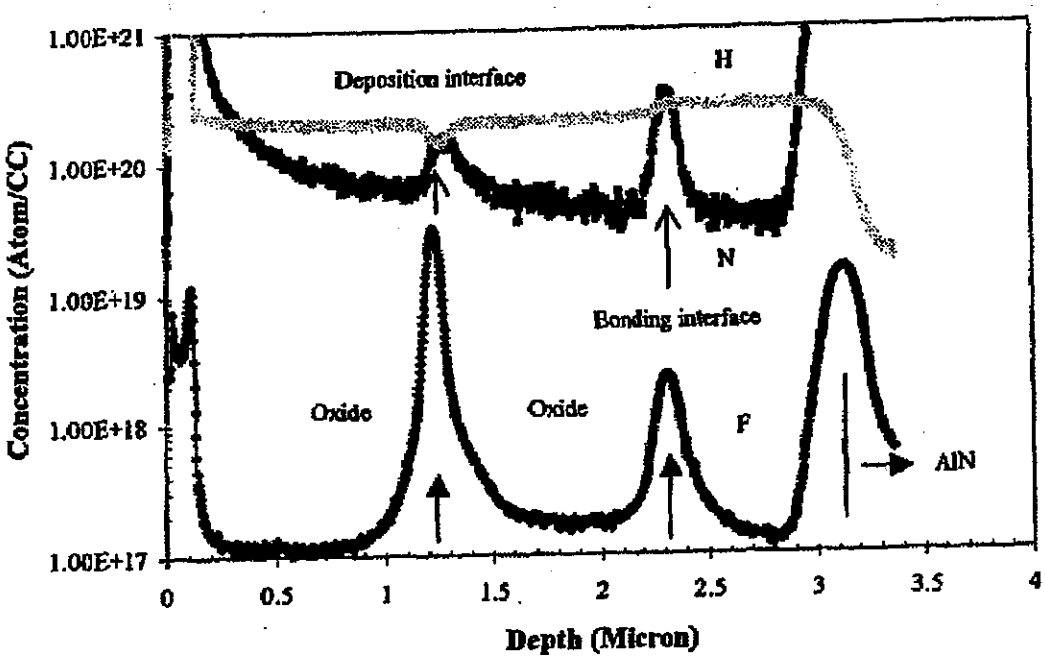

1.00E+21
1.00E+20
1.00E+19
1.00E+18
1.00E+17
Concentration (Atom/CC)
Deposition interface
H
N
Bonding interface
Oxide
Oxide
F
AlN
0
0.5
1
1.5
2
2.5
3
3.5
4
Depth (Micron)

FIG. 12

FIG. 14A

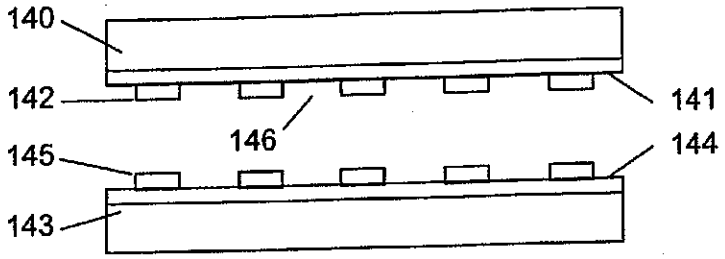


FIG. 14B

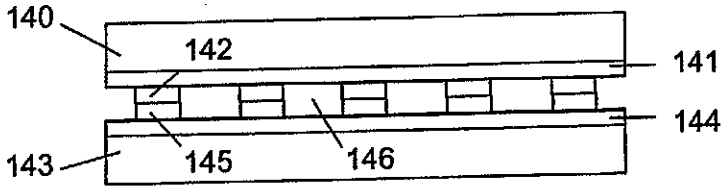


FIG. 14C

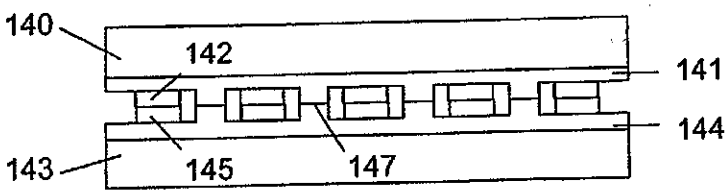
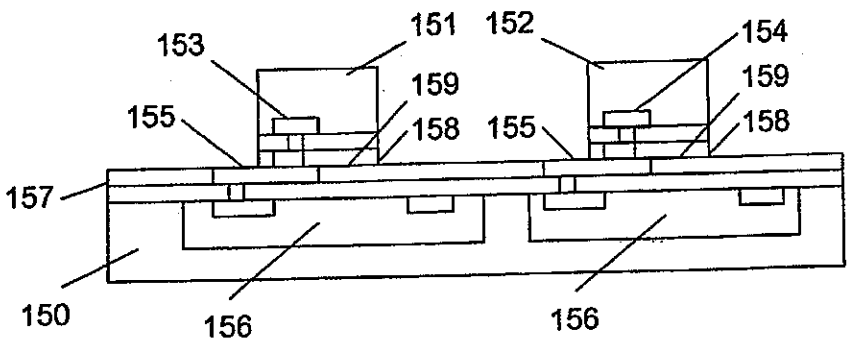


FIG. 15



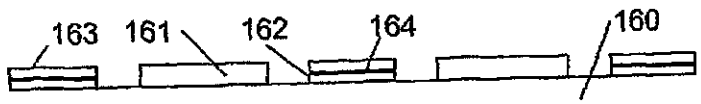


FIG. 16A

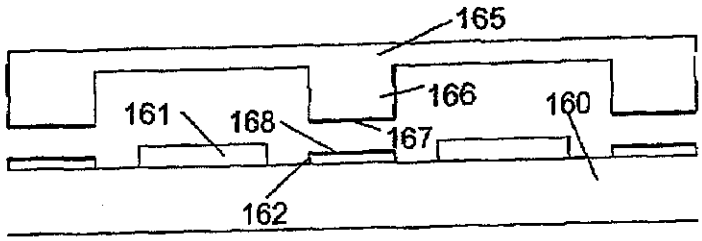


FIG. 16B

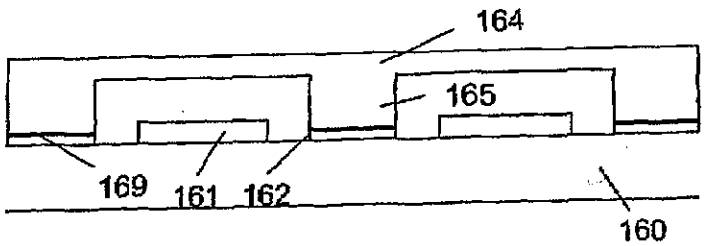


FIG. 16C

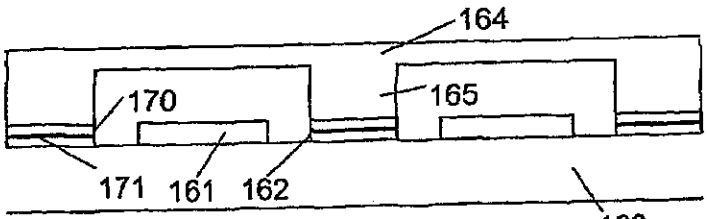


FIG. 16D

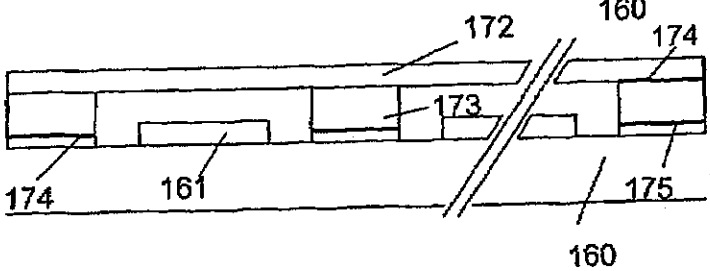


FIG. 16E