FIG. 1A

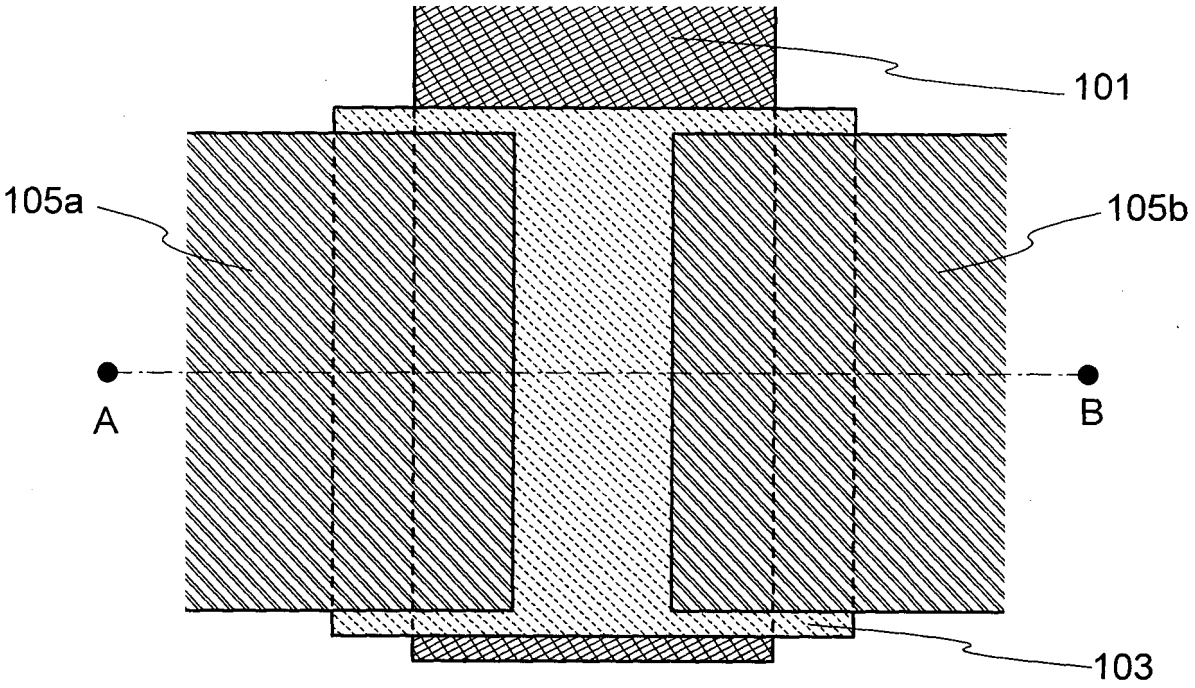

101
105a
105b
A
B
103

FIG. 1B

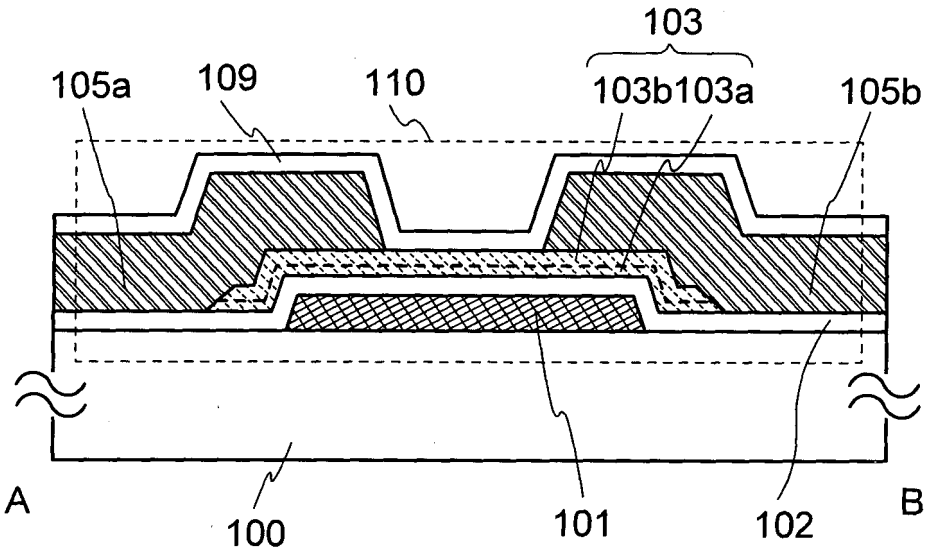

103
105a
109
110
103b103a
105b
A
100
101
102
B

FIG. 2A

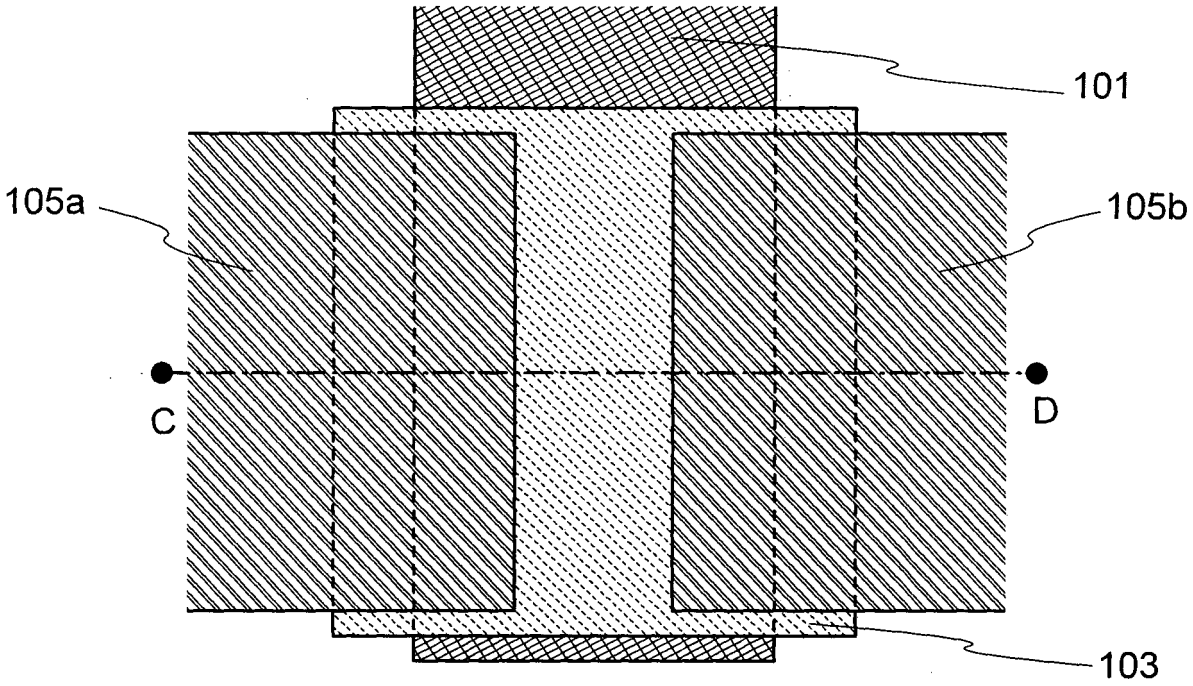

101
105a
105b
C
D
103

FIG. 2B

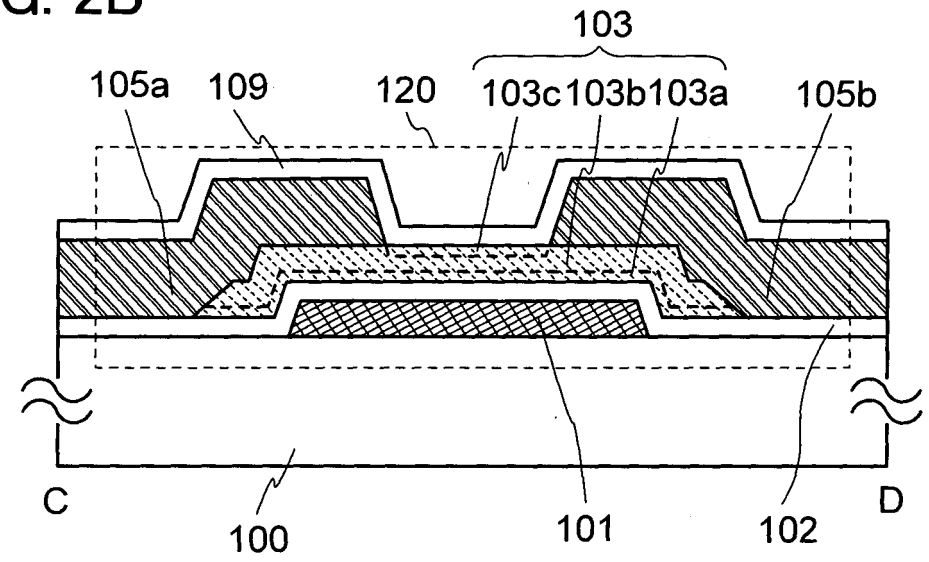

103
105a
109
120
103c
103b
103a
105b
C
D
100
101
102

FIG. 3A

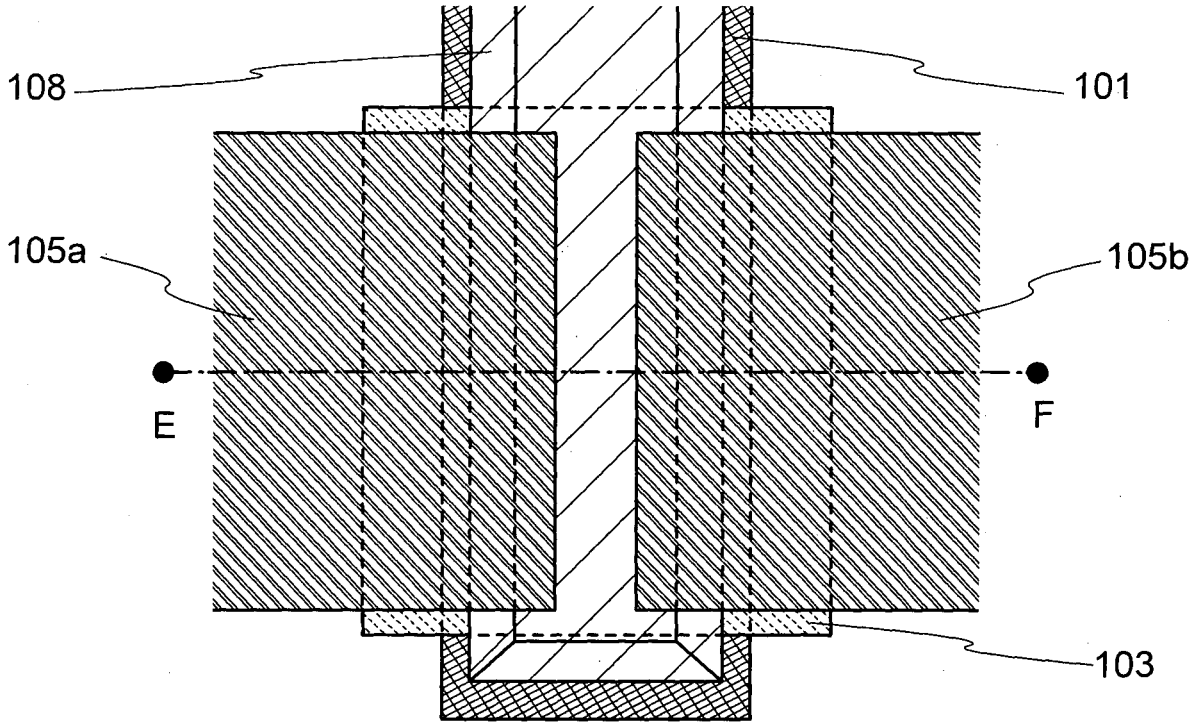

108
101
105a
105b
E
F
103

FIG. 3B

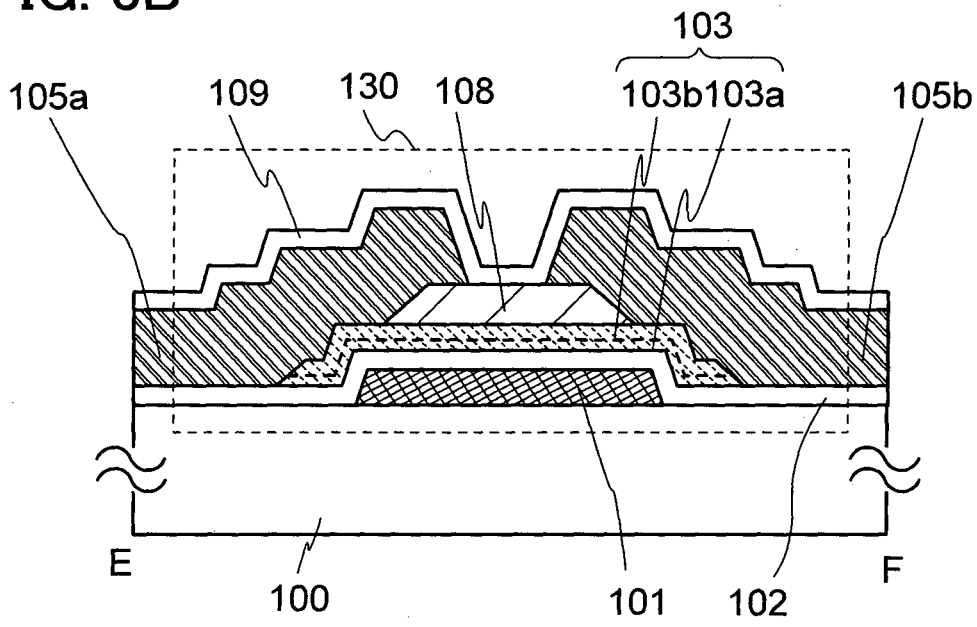

103
105a
109
130
108
103b
103a
105b
E
100
101
102
F

FIG. 4A

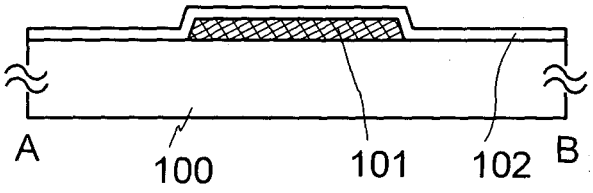


FIG. 4B

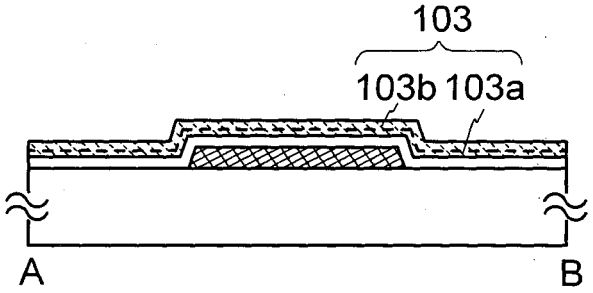


FIG. 4C

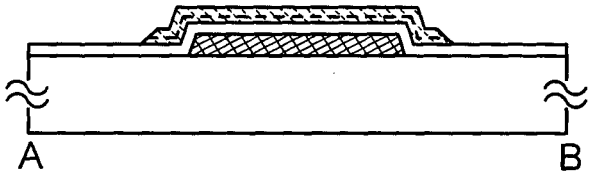


FIG. 4D

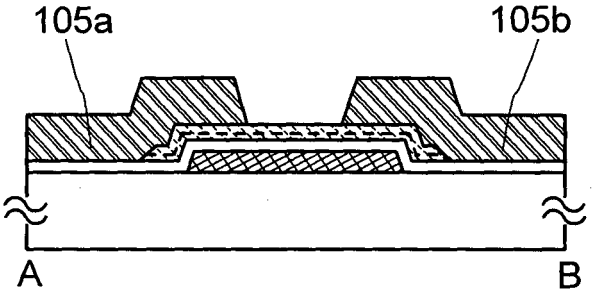


FIG. 4E

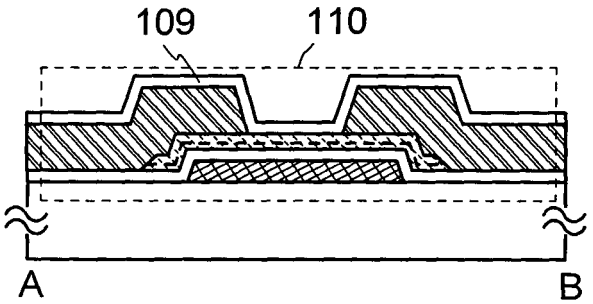


FIG. 5A

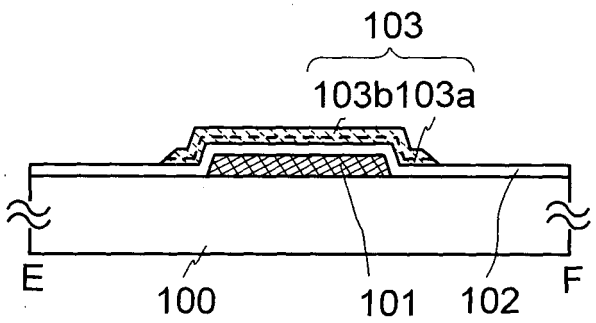


FIG. 5B

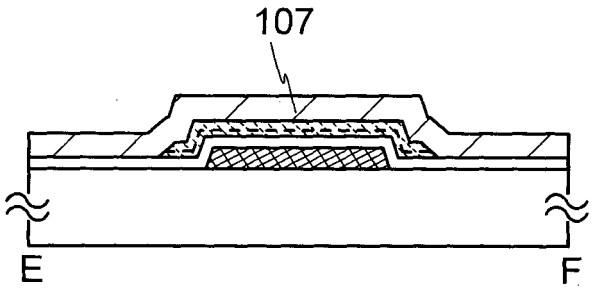


FIG. 5C

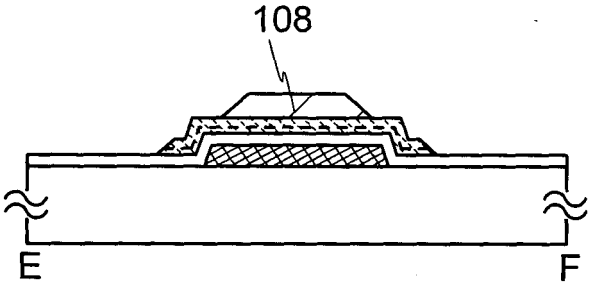


FIG. 5D

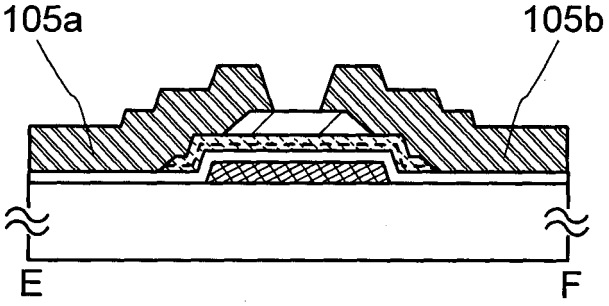


FIG. 5E

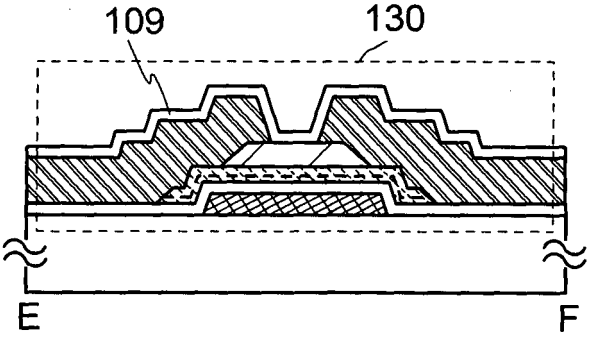
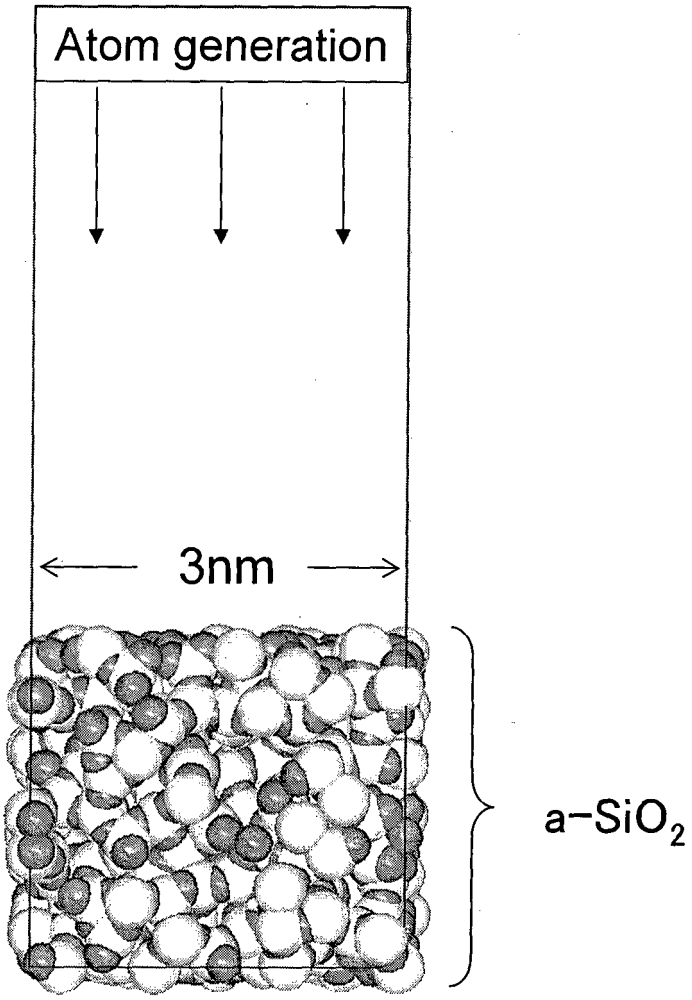
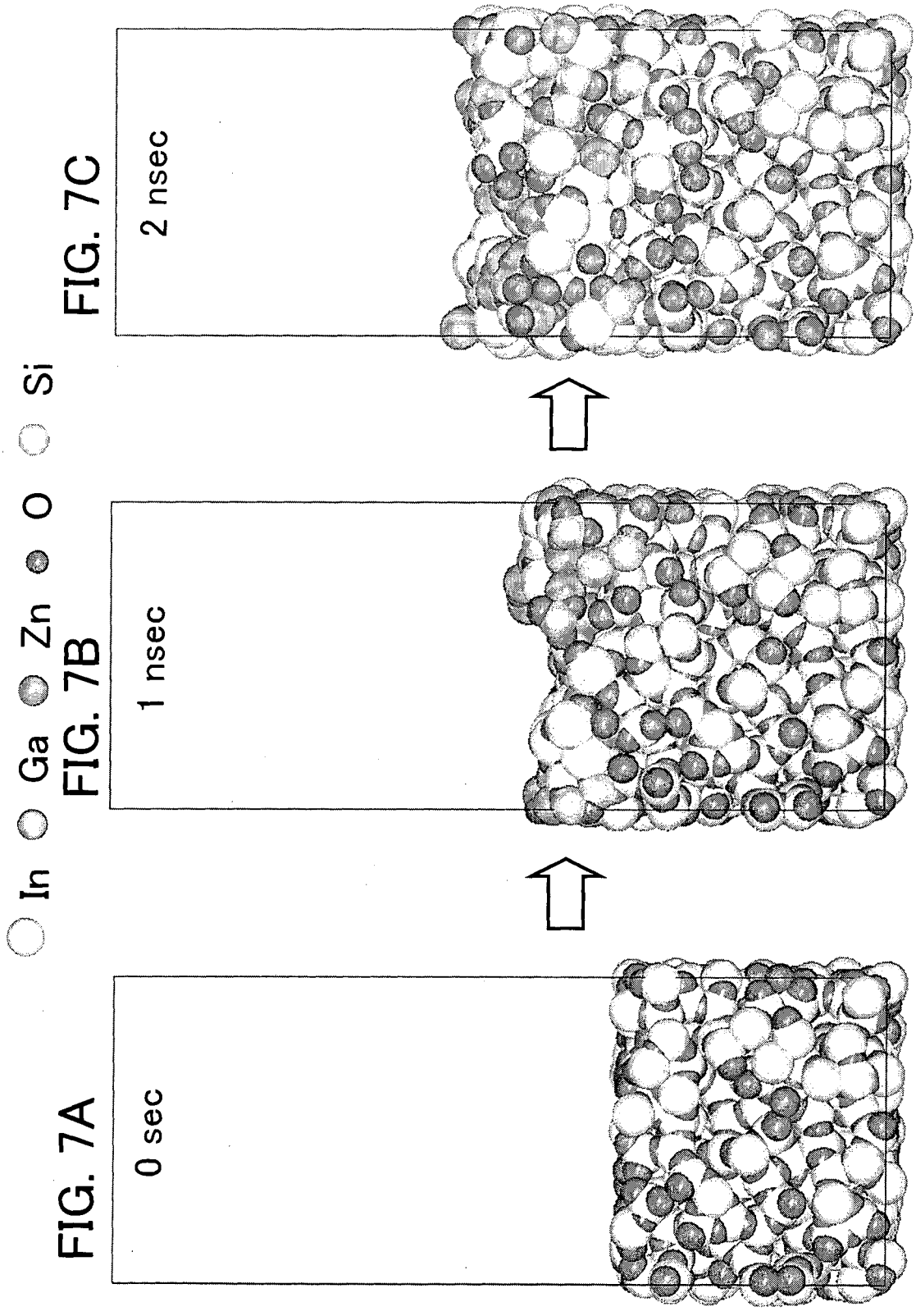


FIG. 6




In
Ga
Zn
O
Si
FIG. 7A
0 sec
FIG. 7B
1 nsec
FIG. 7C
2 nsec

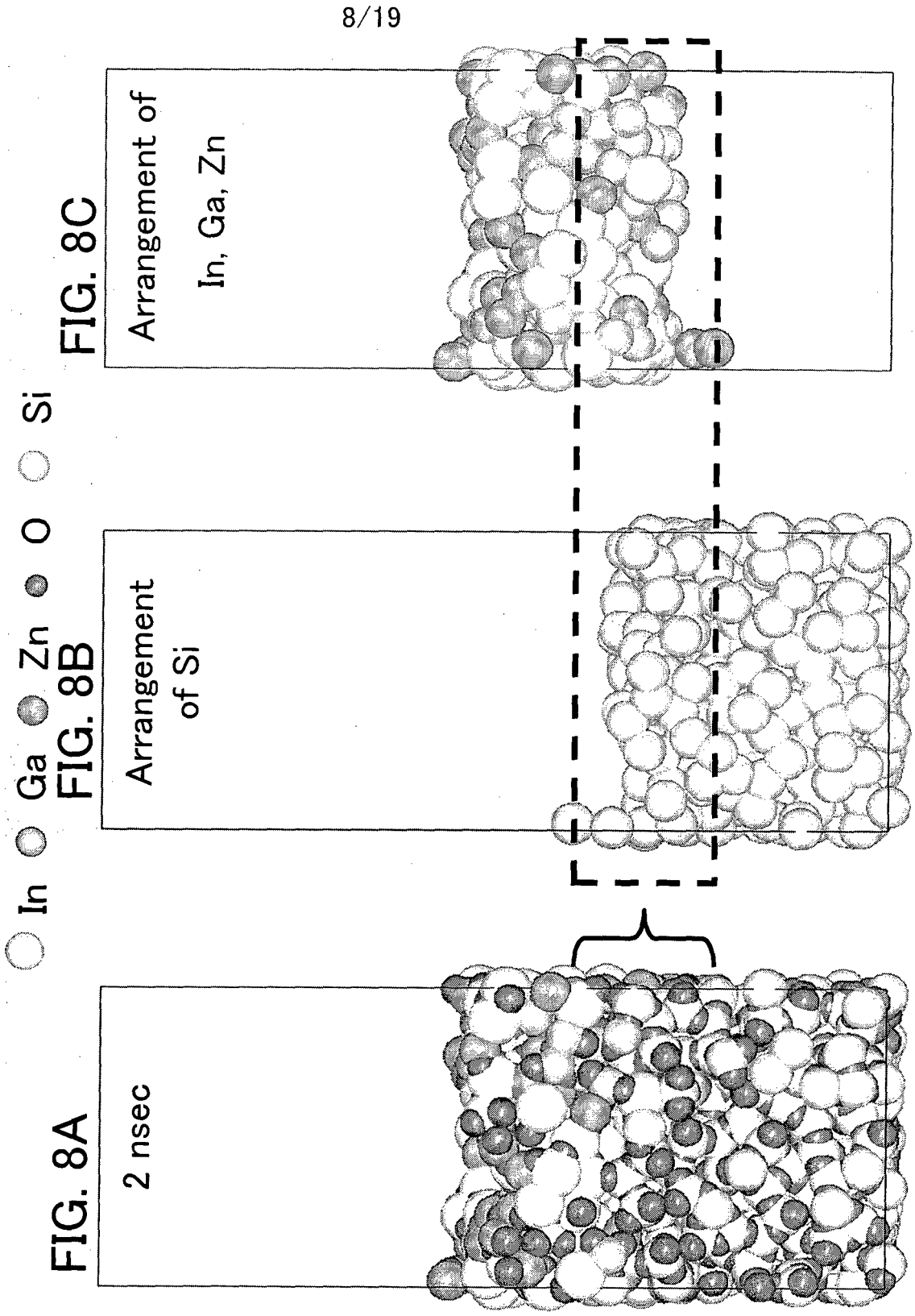

In
Ga
Zn
O
Si
FIG. 8A
2 nsec
FIG. 8B
Arrangement of Si
FIG. 8C
Arrangement of In, Ga, Zn

FIG. 9A

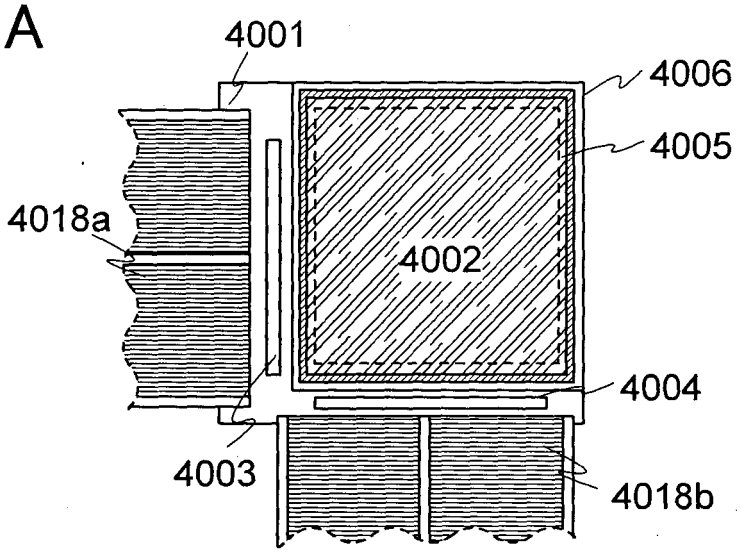


FIG. 9B

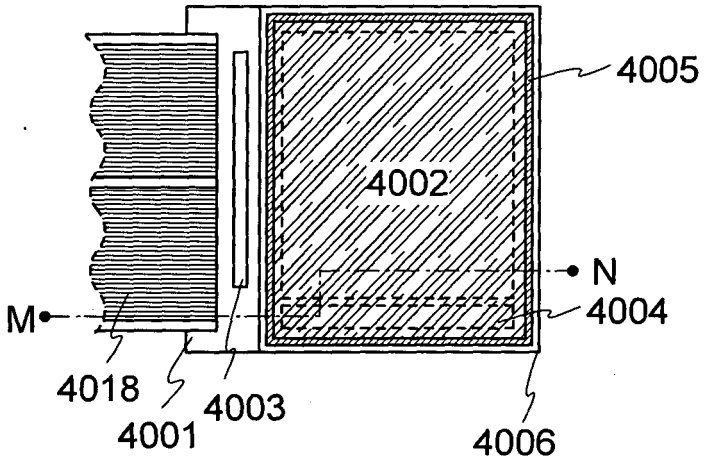
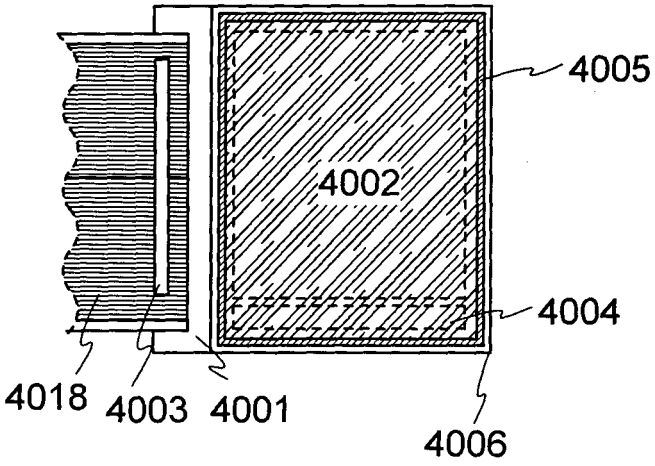


FIG. 9C



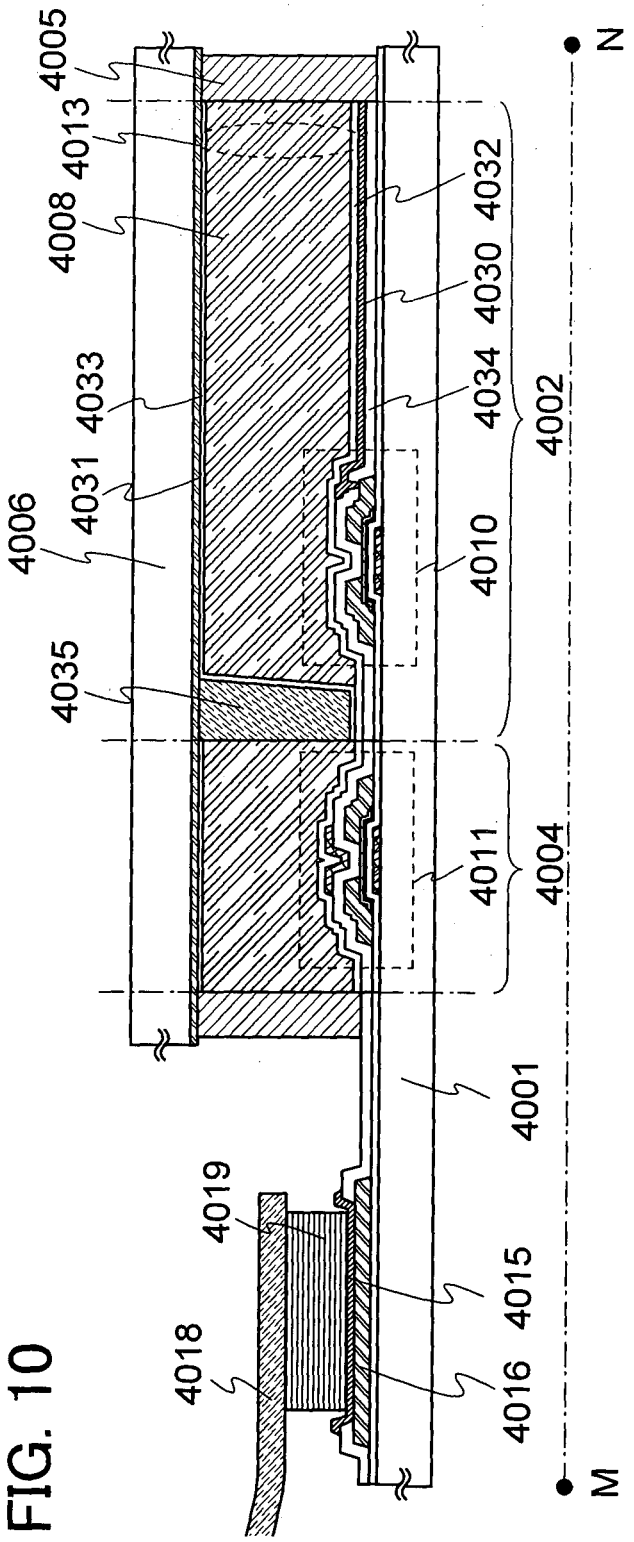

4005
4013
4008
4032
4030
4033
4034
4002
4031
4006
4010
4035
4011
4004
4001
4019
4015
4018
4016
N
M

FIG. 10

FIG. 11

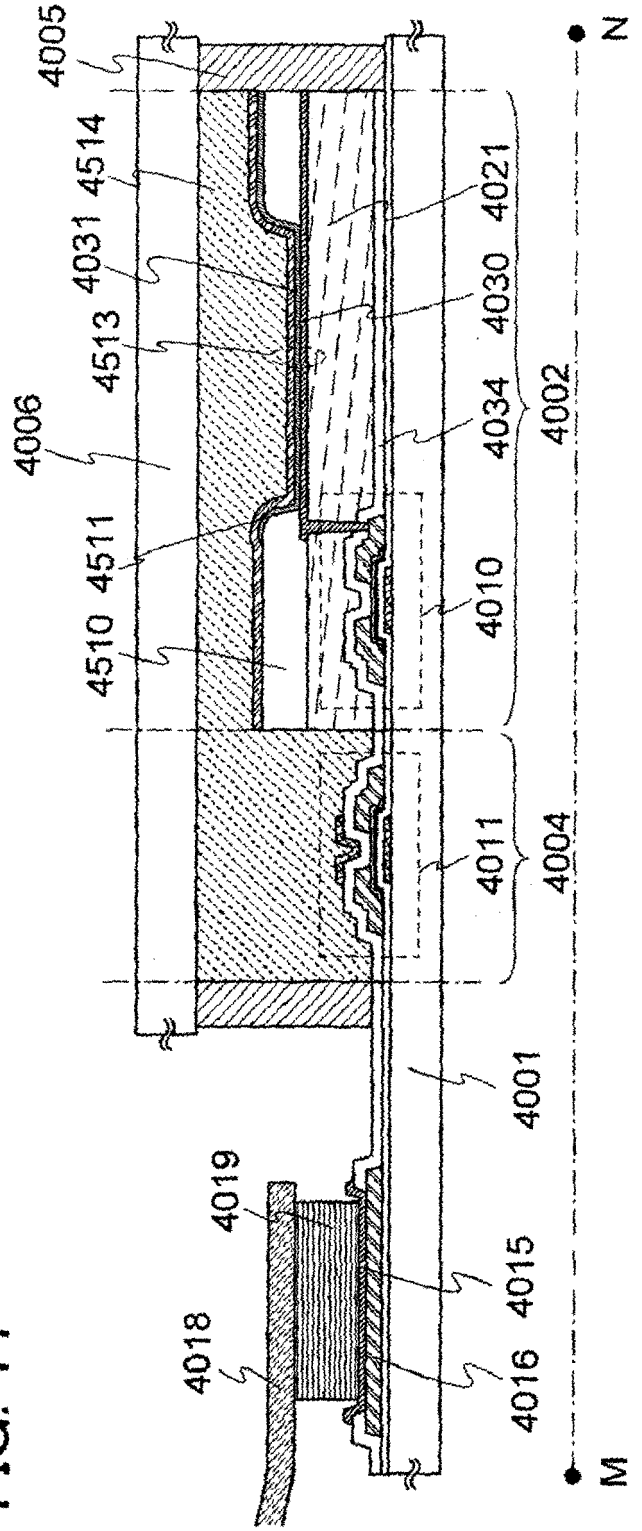

4005
4514
4031
4513
4006
4511
4510
4021
4030
4034
4002
4010
4011
4004
4001
4019
4015
4018
4016
N
M

FIG. 12

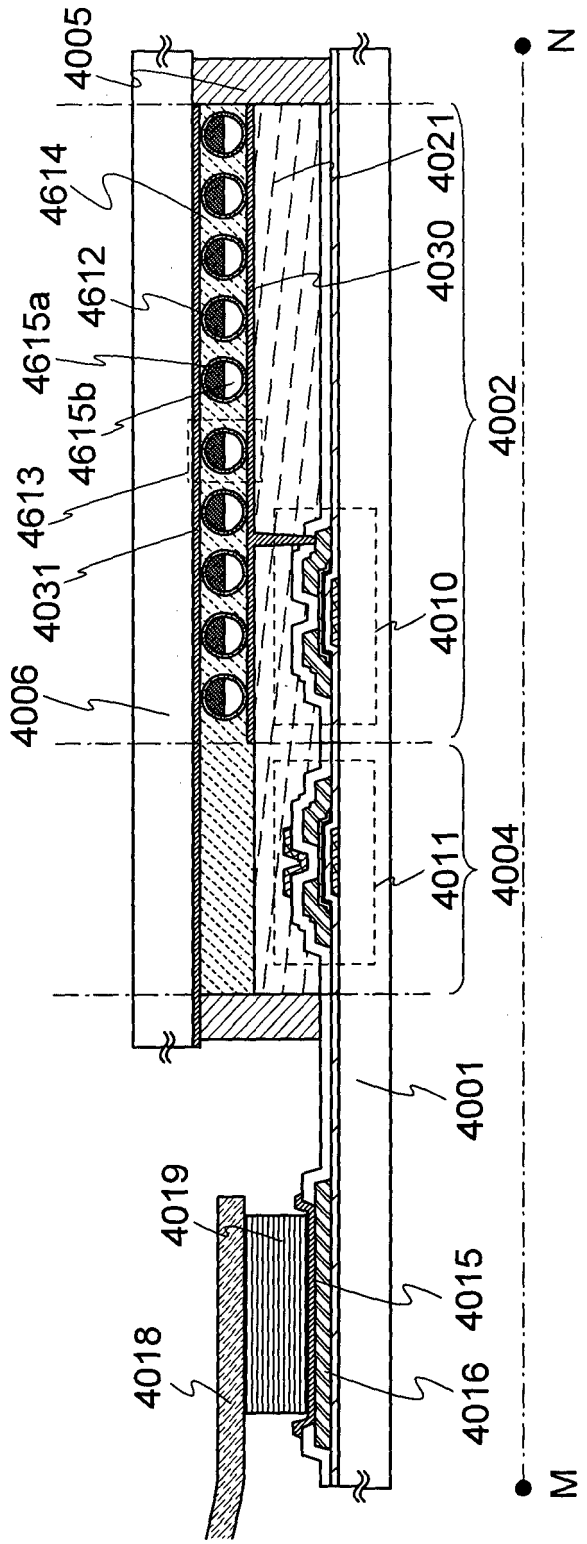

4005
4614
4612
4615a
4615b
4613
4031
4006
4021
4030
4002
4010
4011
4004
4001
4019
4015
4018
4016
N
M

FIG. 13A

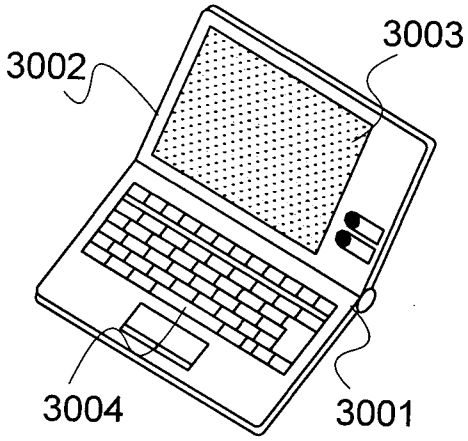


FIG. 13B

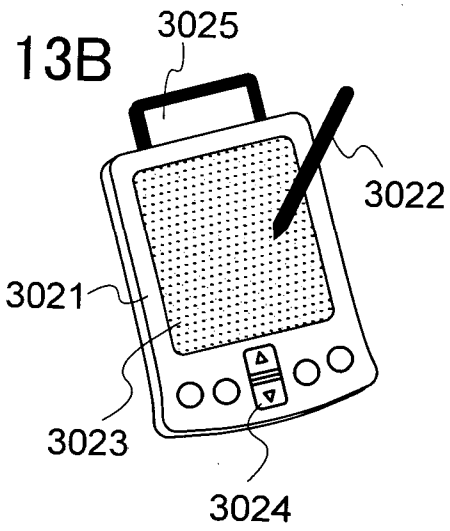


FIG. 13C

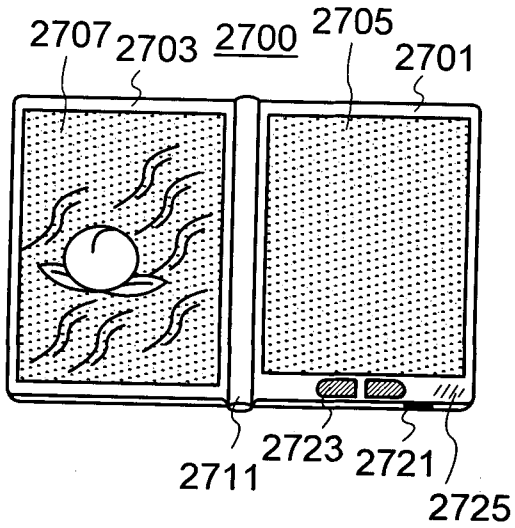


FIG. 13D

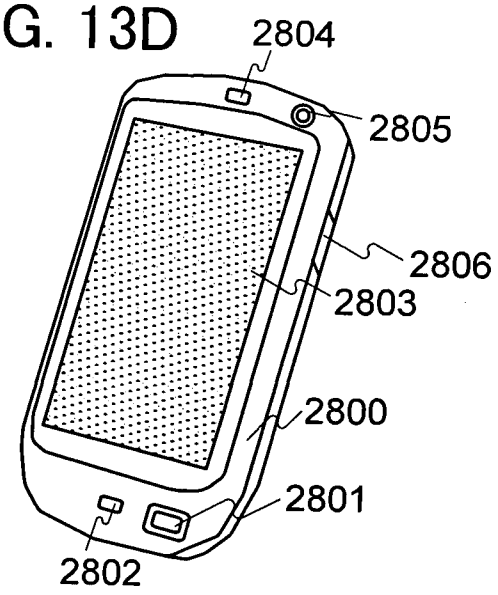


FIG. 13E

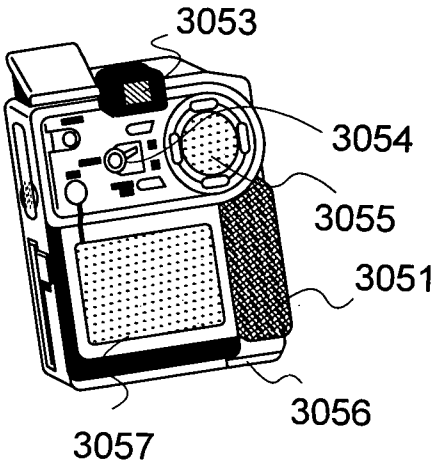


FIG. 13F

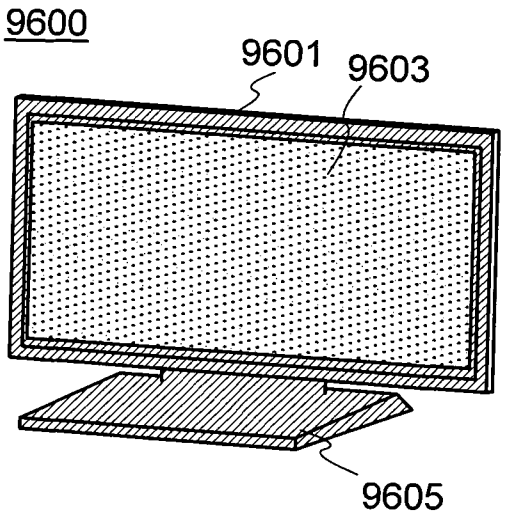


FIG. 14

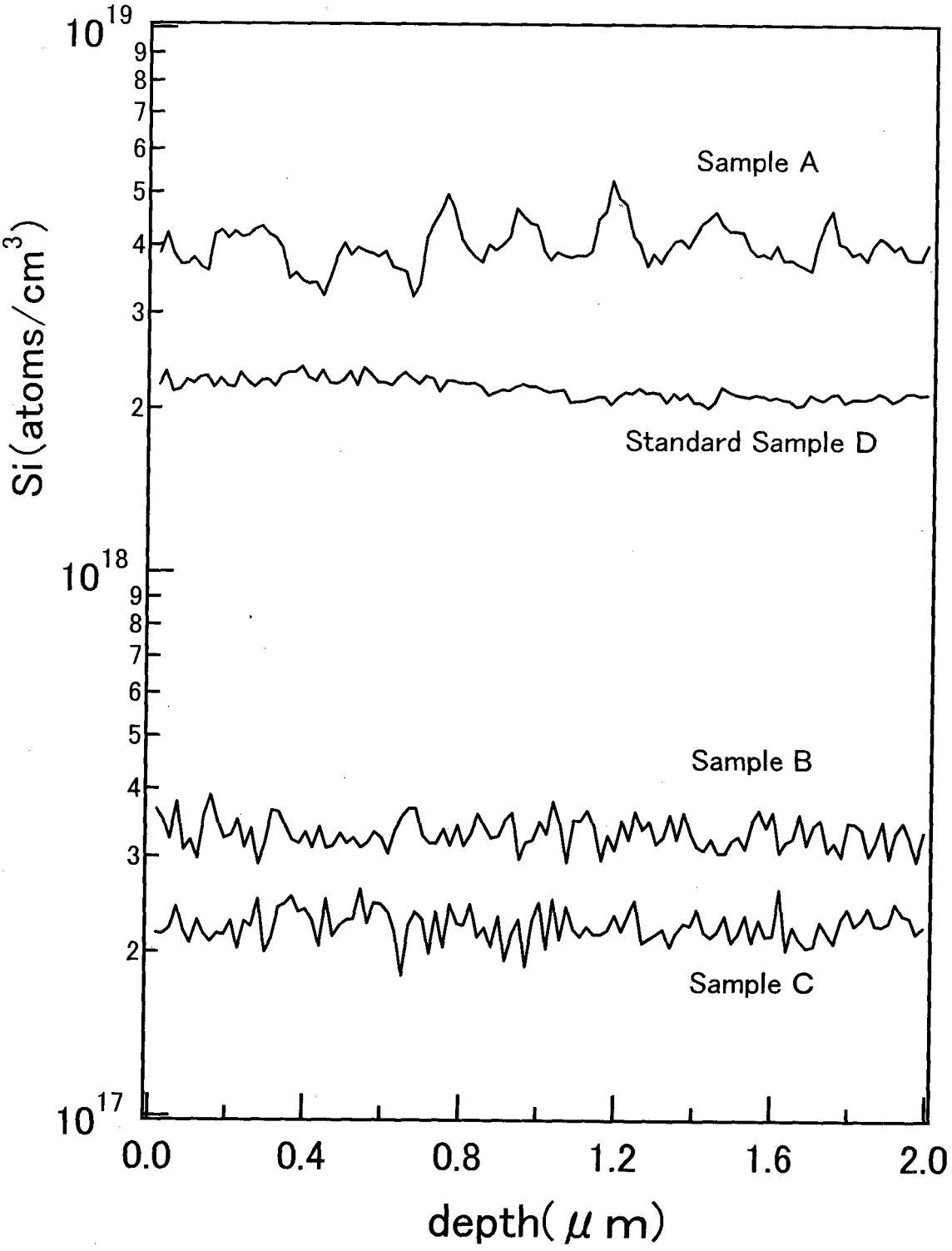

Si(atoms/cm3)
10^19
9
8
7
6
5
4
3
2
Sample A
Standard Sample D
10^18
9
8
7
6
5
4
3
2
Sample B
Sample C
10^17
0.0
0.4
0.8
1.2
1.6
2.0
depth(μm)

FIG. 15

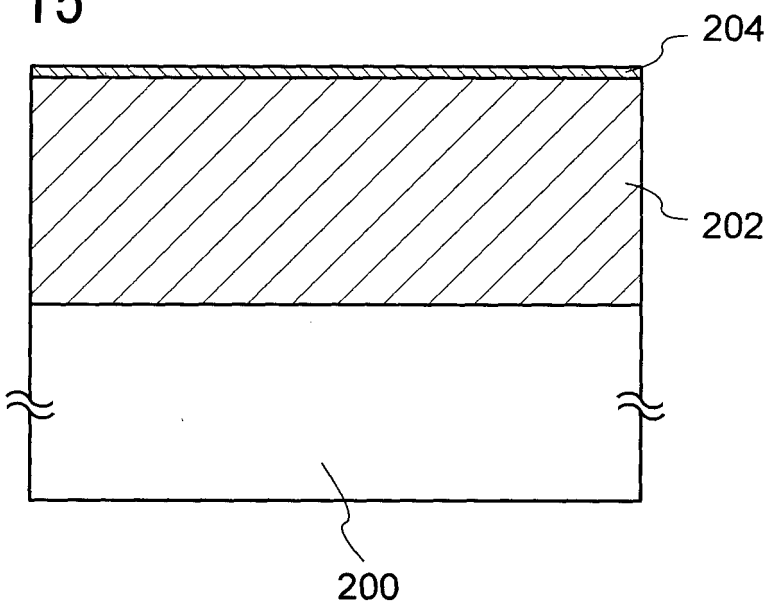


FIG. 16

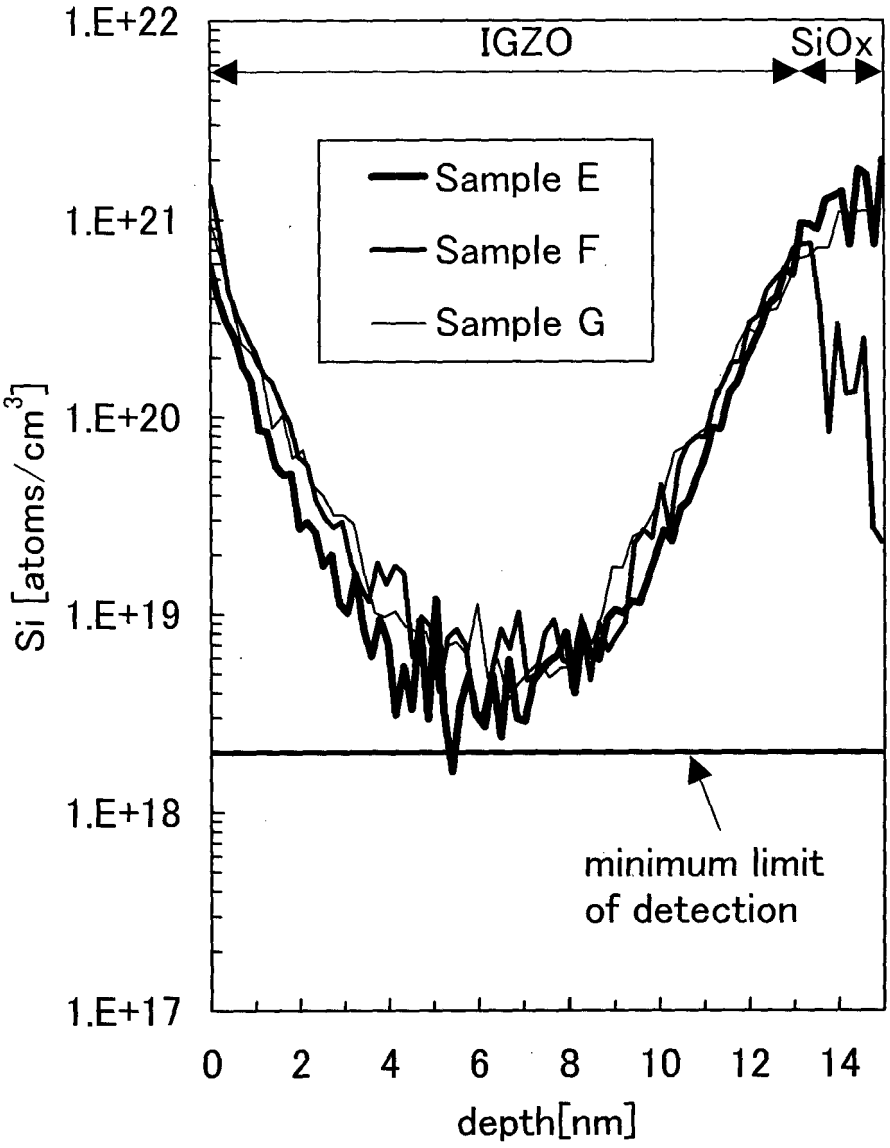

IGZO
SiOx
Sample E
Sample F
Sample G
1.E+22
1.E+21
1.E+20
1.E+19
1.E+18
1.E+17
Si [atoms/cm3]
minimum limit
of detection
0
2
4
6
8
10
12
14
depth[nm]

FIG. 17

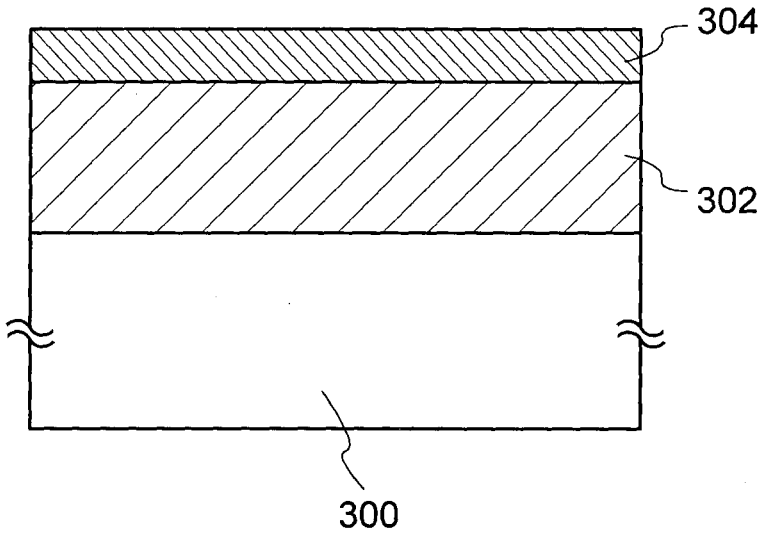


FIG. 18A

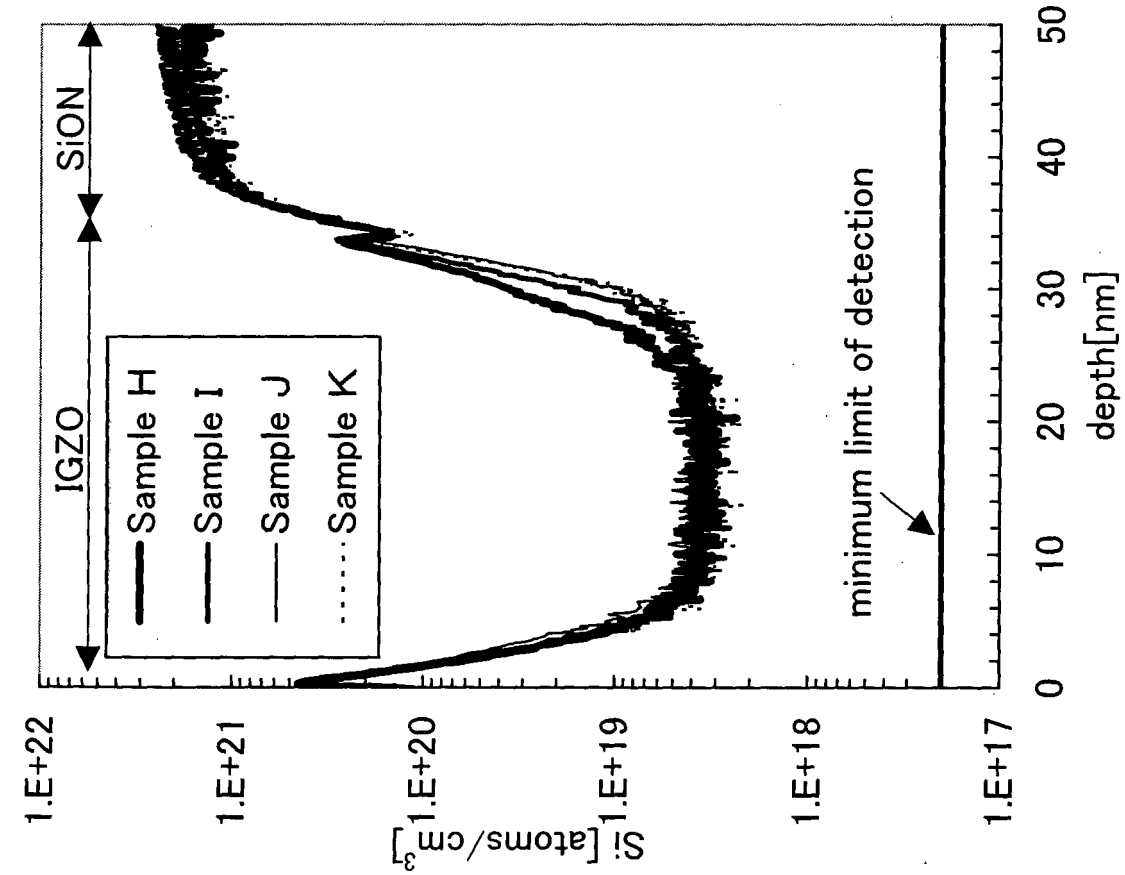


FIG. 18B

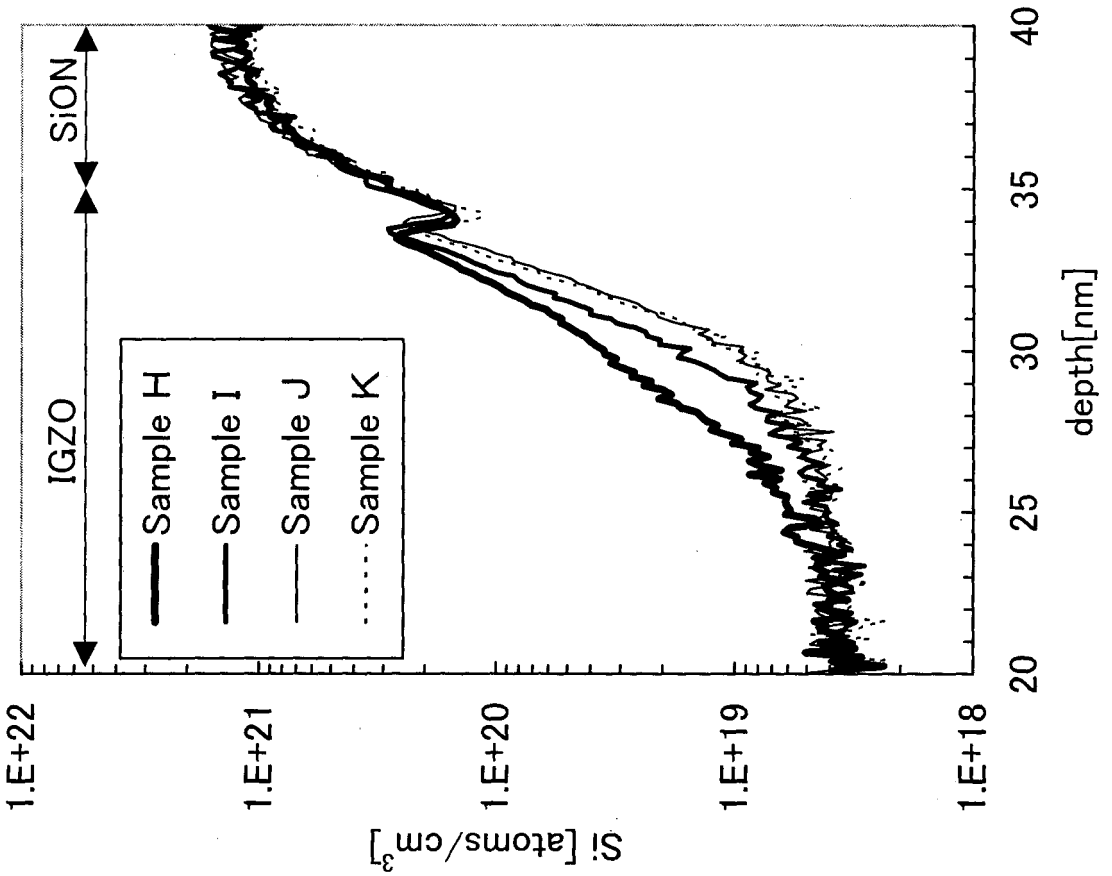
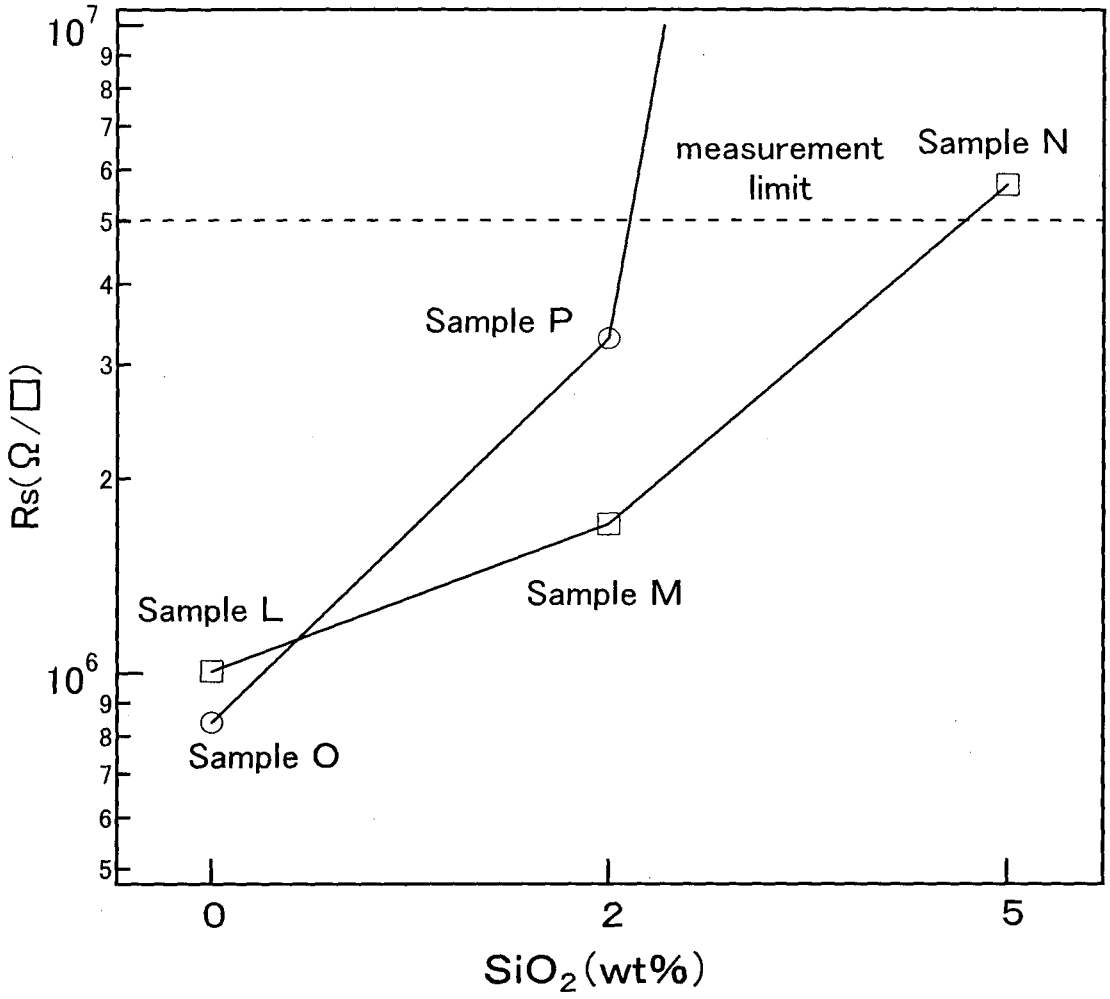


FIG. 19


10^7
9
8
7
6
5
4
3
2
10^6
9
8
7
6
5
Rs(Ω/□)
measurement limit
Sample N
Sample P
Sample M
Sample L
Sample O
0
2
5
SiO_2(wt%)