FIG. 1

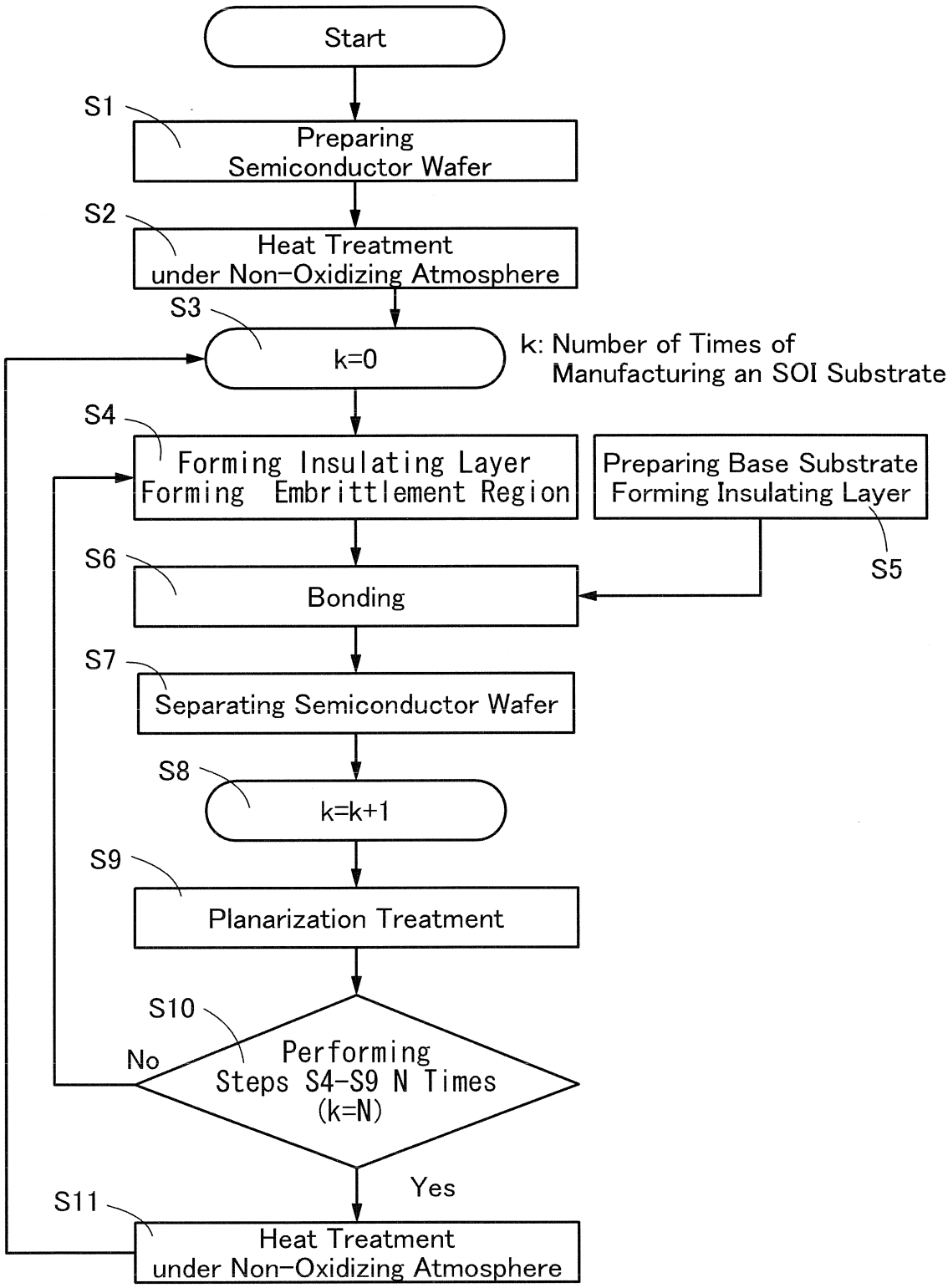

Start
S1
Preparing Semiconductor Wafer
S2
Heat Treatment under Non-Oxidizing Atmosphere
S3
k=0
k: Number of Times of Manufacturing an SOI Substrate
S4
Forming Insulating Layer Forming Embrittlement Region
Preparing Base Substrate Forming Insulating Layer
S5
S6
Bonding
S7
Separating Semiconductor Wafer
S8
k=k+1
S9
Planarization Treatment
S10
Performing Steps S4-S9 N Times (k=N)
No
Yes
S11
Heat Treatment under Non-Oxidizing Atmosphere

FIG. 2A

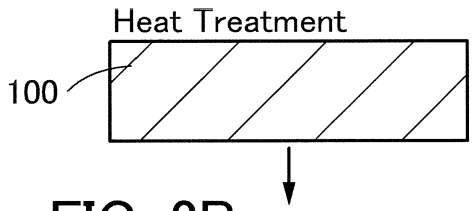


FIG. 2B

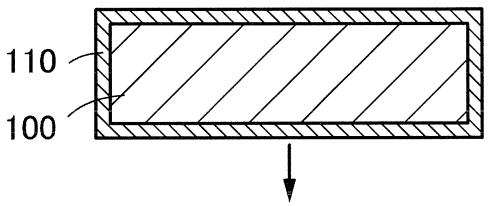


FIG. 2C

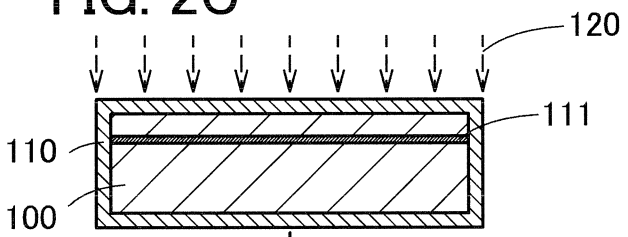


FIG. 2D

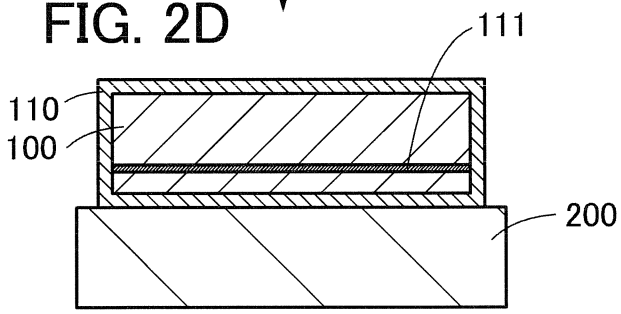
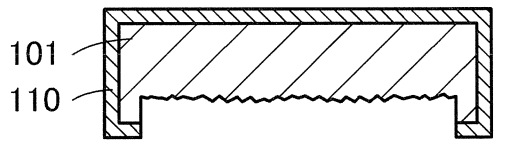


FIG. 2E



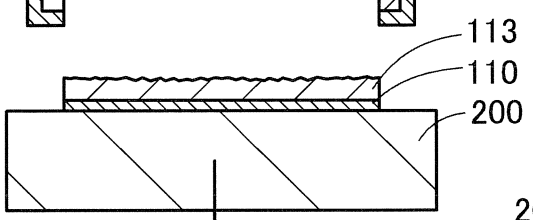


FIG. 2F

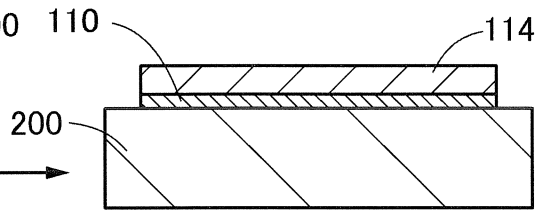


FIG. 2G

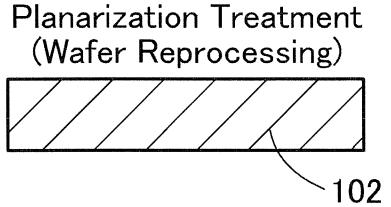


FIG. 2H

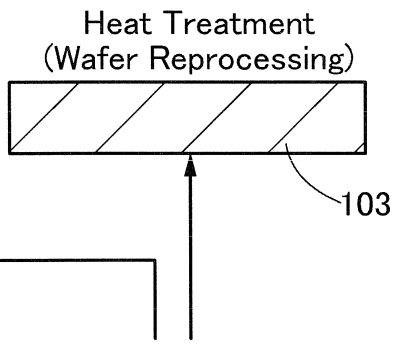


FIG. 3A

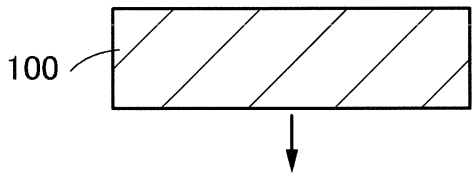


FIG. 3B

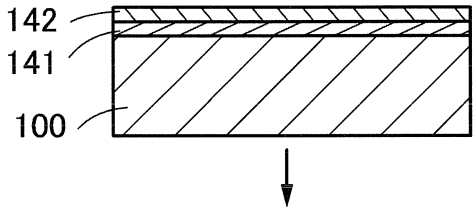


FIG. 3C

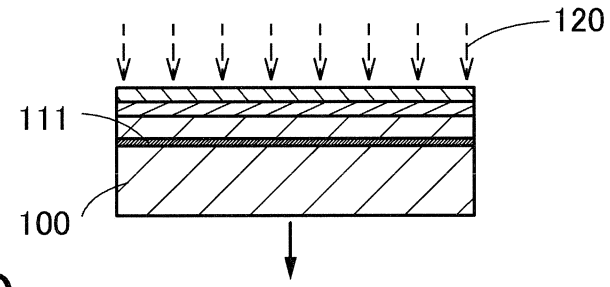


FIG. 3D

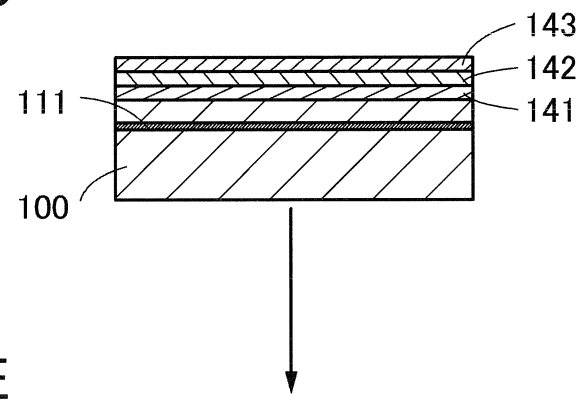


FIG. 3E

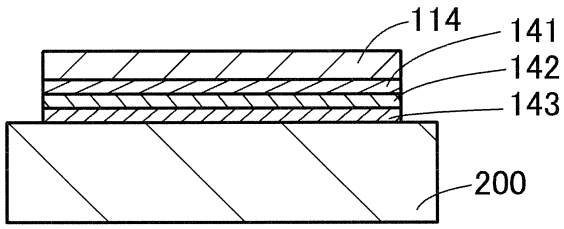


FIG. 4

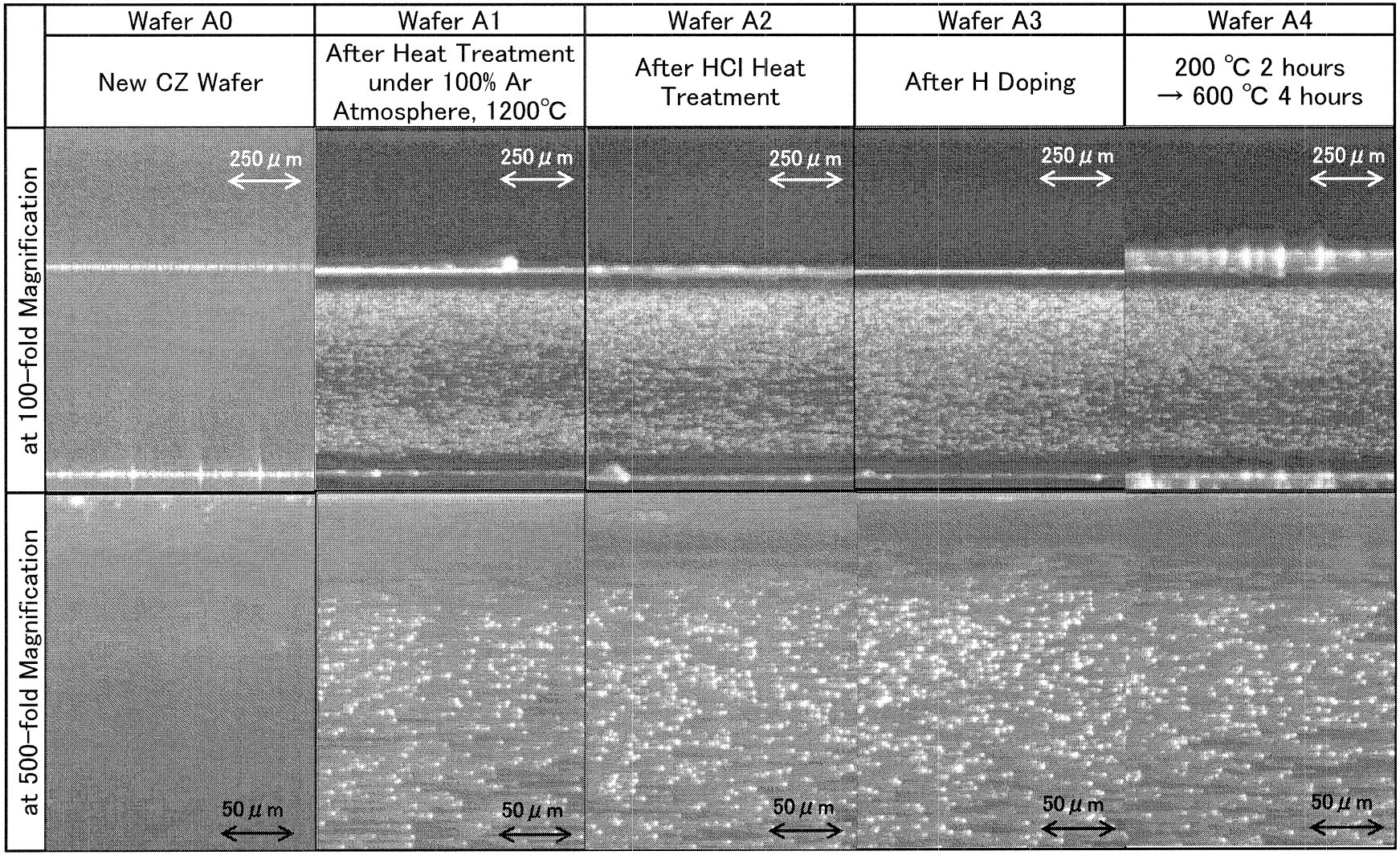

Wafer A0
New CZ Wafer
Wafer A1
After Heat Treatment under 100% Ar Atmosphere, 1200°C
Wafer A2
After HCl Heat Treatment
Wafer A3
After H Doping
Wafer A4
200 °C 2 hours → 600 °C 4 hours
at 100-fold Magnification
at 500-fold Magnification
250 μm
50 μm

FIG. 5A

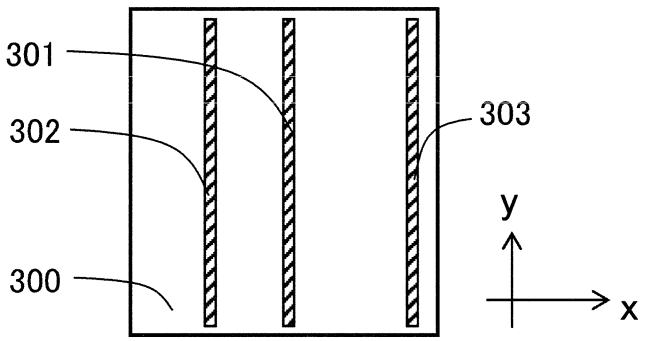


FIG. 5B

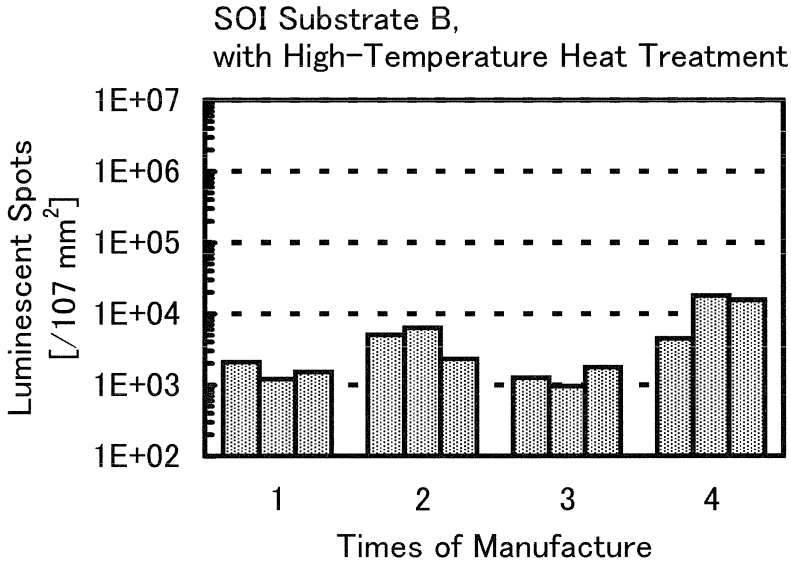


FIG. 5C

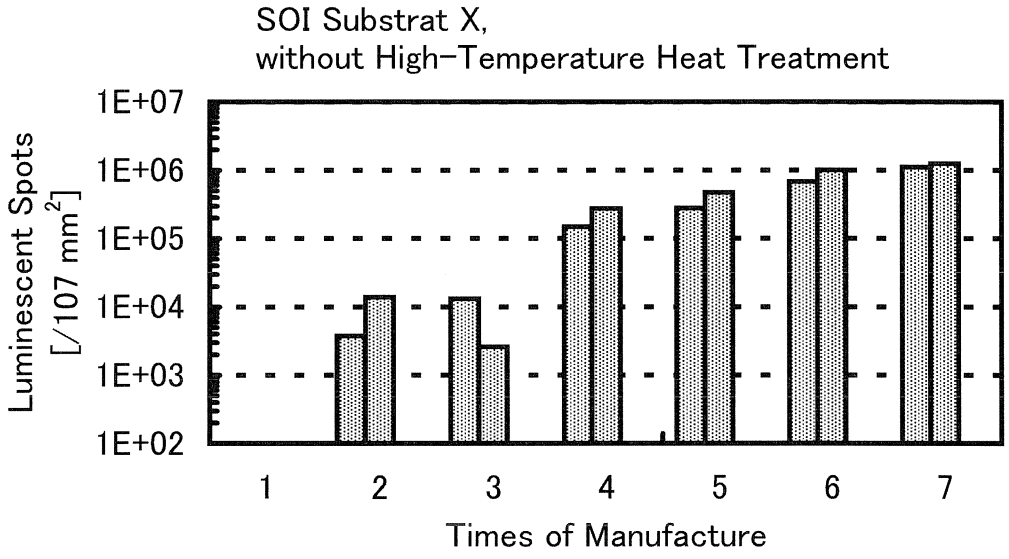


FIG. 6

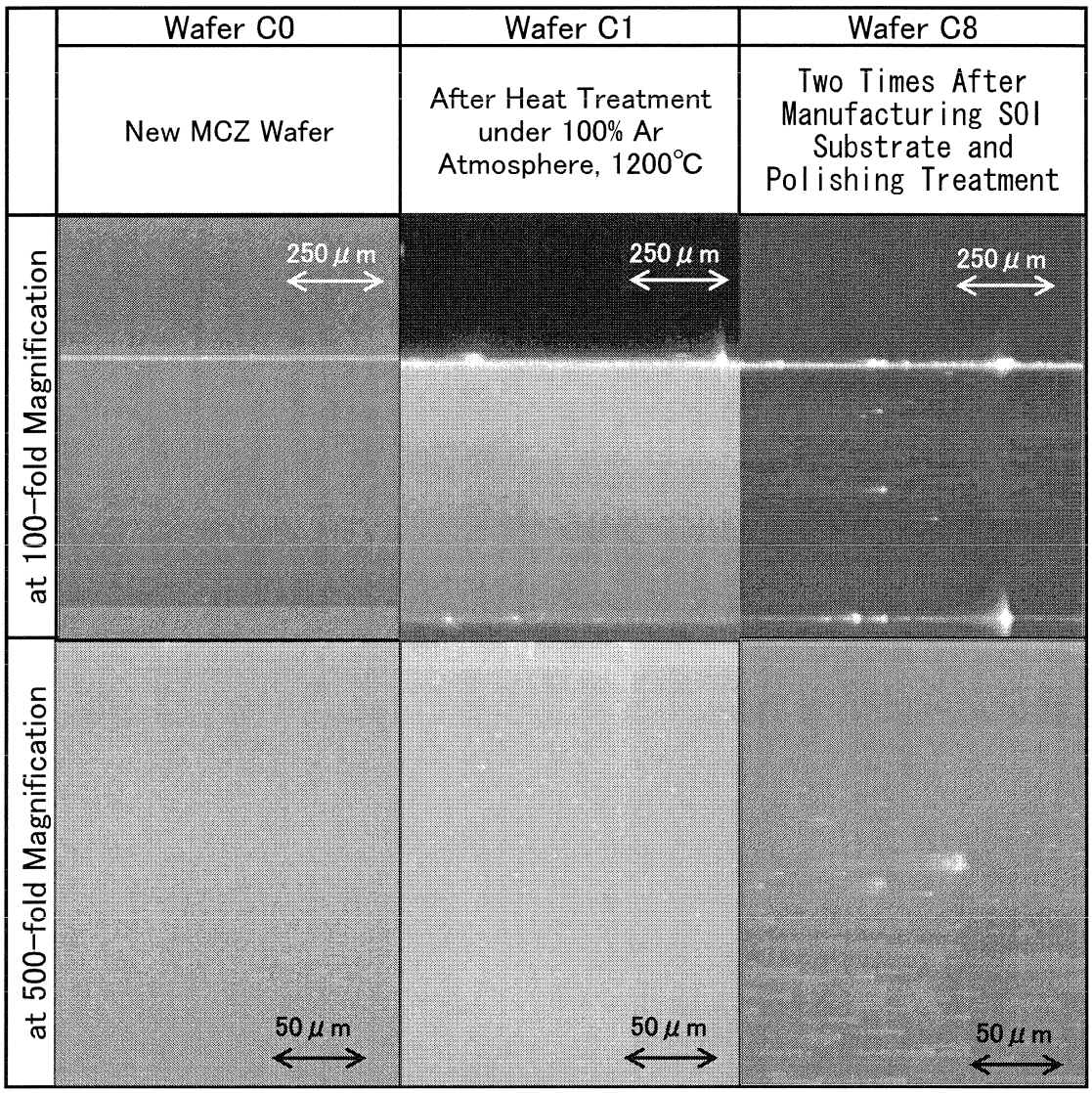

Wafer C0
New MCZ Wafer
Wafer C1
After Heat Treatment under 100% Ar Atmosphere, 1200°C
Wafer C8
Two Times After Manufacturing SOI Substrate and Polishing Treatment
at 100-fold Magnification
at 500-fold Magnification
250 μm
250 μm
250 μm
50 μm
50 μm
50 μm

FIG. 7A

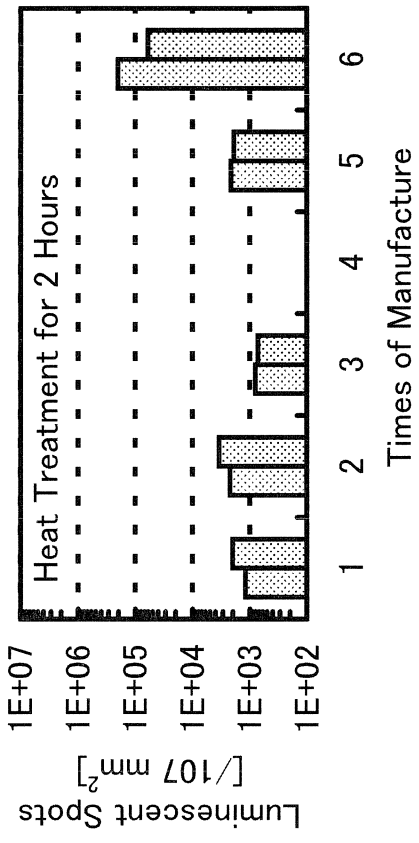


FIG. 7B

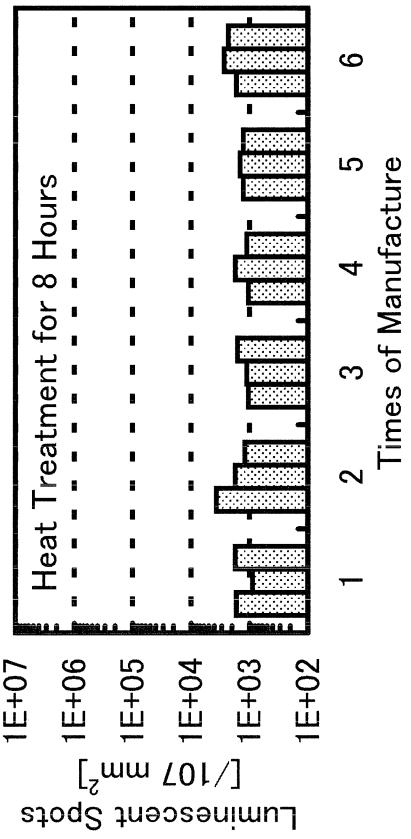


FIG. 7C

FIG. 8

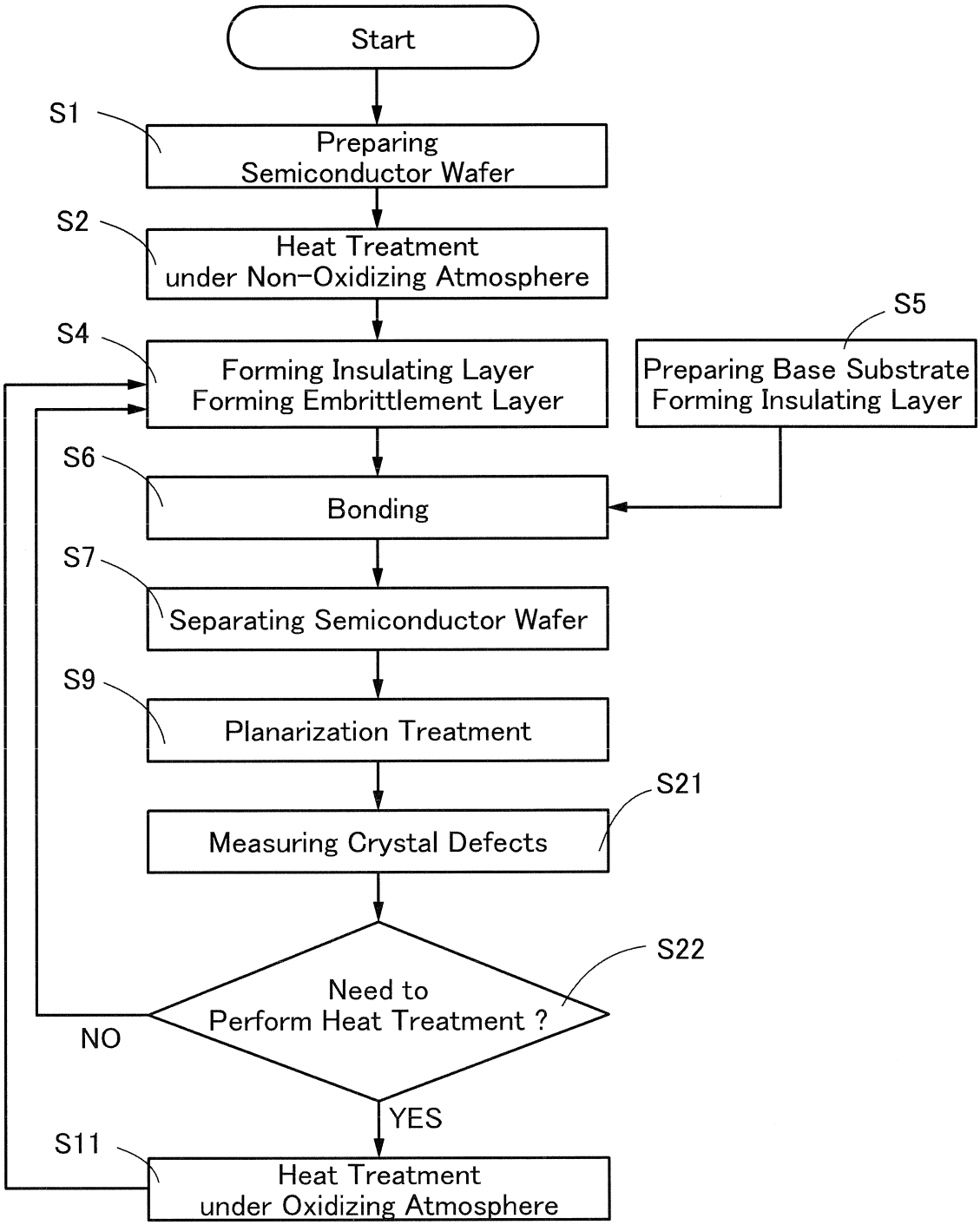

Start
S1
Preparing Semiconductor Wafer
S2
Heat Treatment under Non-Oxidizing Atmosphere
S4
Forming Insulating Layer Forming Embrittlement Layer
S5
Preparing Base Substrate Forming Insulating Layer
S6
Bonding
S7
Separating Semiconductor Wafer
S9
Planarization Treatment
S21
Measuring Crystal Defects
S22
Need to Perform Heat Treatment ?
NO
YES
S11
Heat Treatment under Oxidizing Atmosphere

FIG. 9

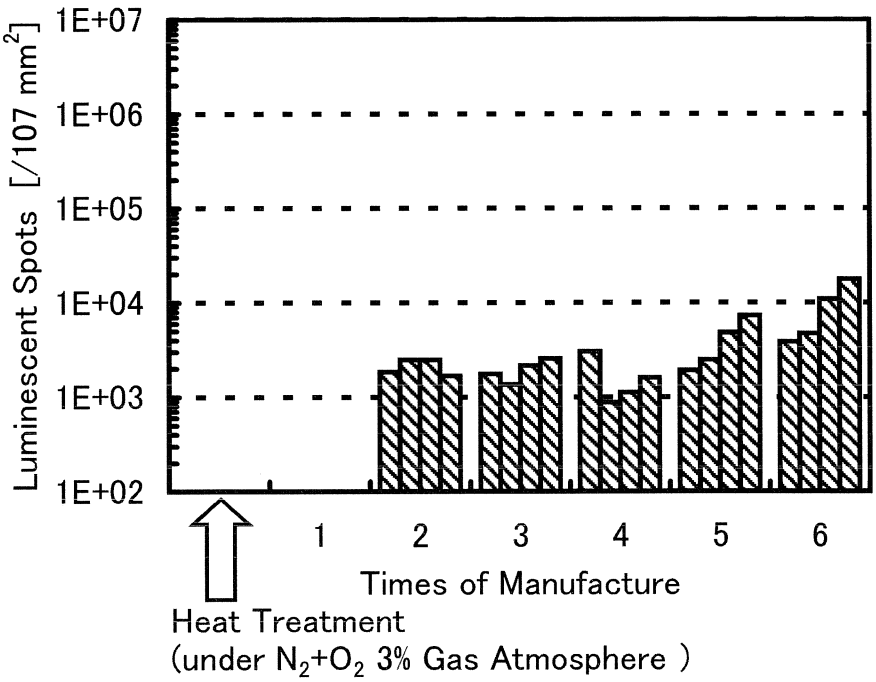

Luminescent Spots [/107 mm2]
1E+07
1E+06
1E+05
1E+04
1E+03
1E+02
1
2
3
4
5
6
Times of Manufacture
Heat Treatment
(under N2+O2 3% Gas Atmosphere)

FIG. 10

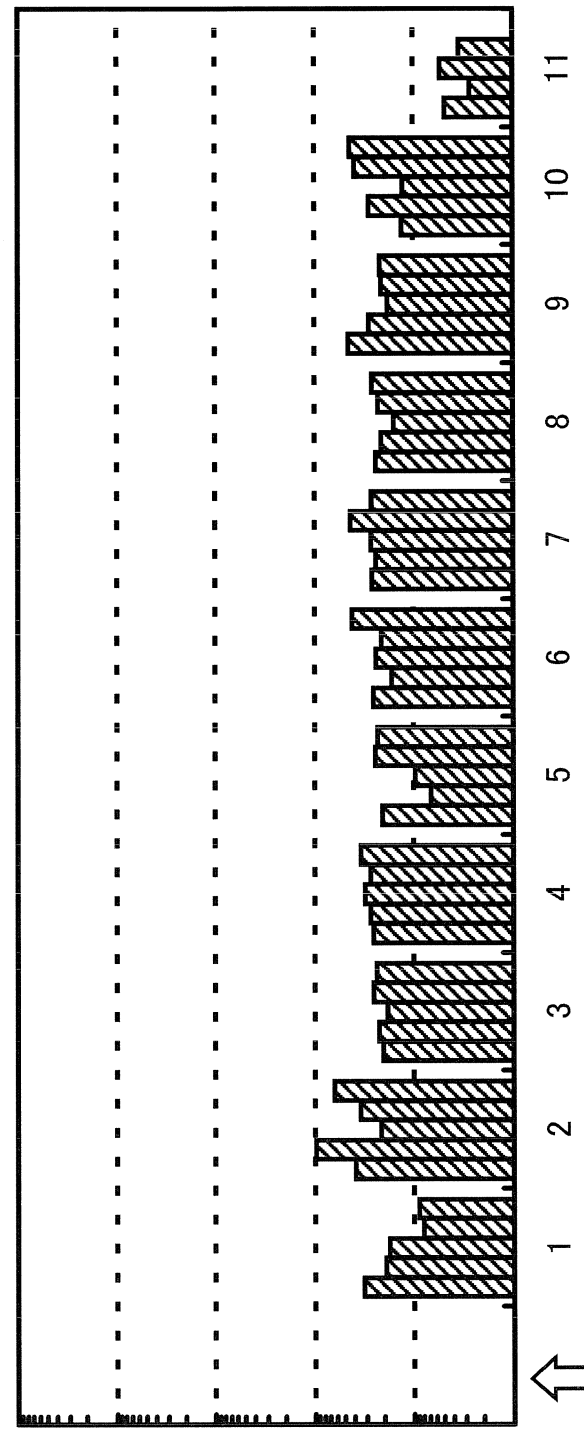

Luminescent Spots [/107 mm2]
1E+07
1E+06
1E+05
1E+04
1E+03
1E+02
1
2
3
4
5
6
7
8
9
10
11
Times of Manufacture
Heat Treatment
(1200 °C, 16 Hours)

FIG. 11

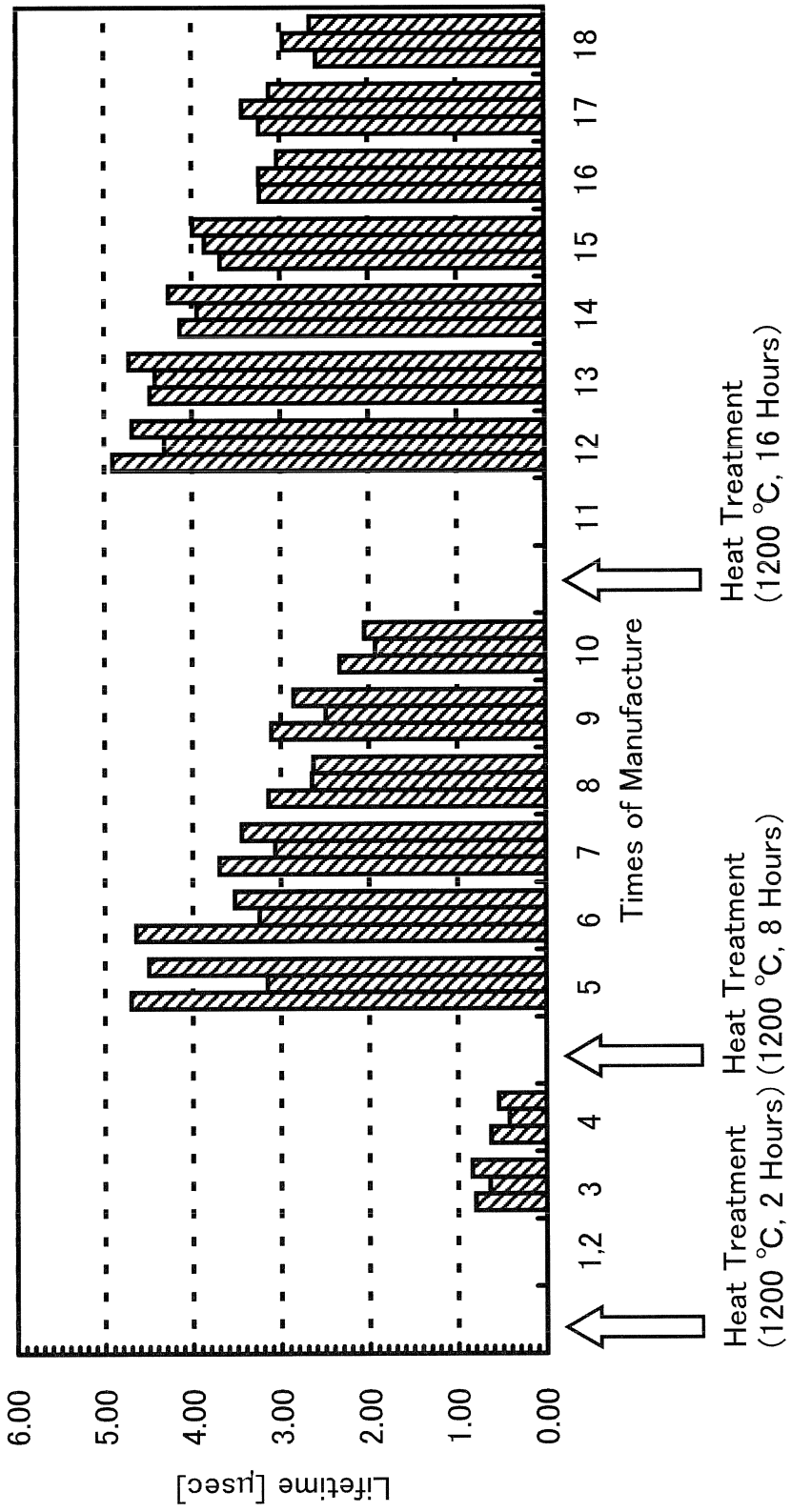
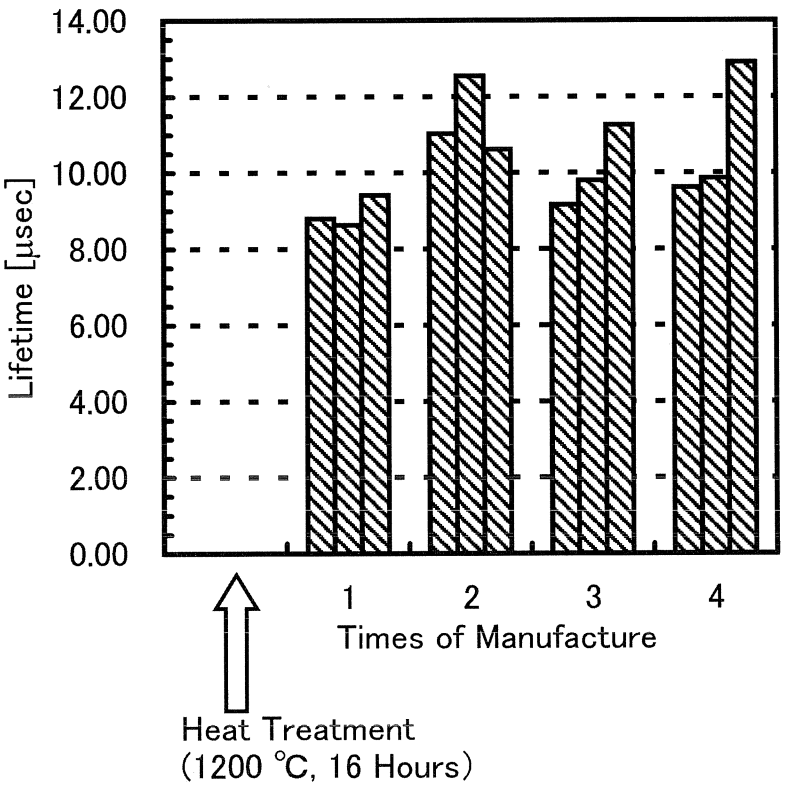

6.00
5.00
4.00
3.00
2.00
1.00
0.00
Lifetime [μsec]
1,2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
Times of Manufacture
Heat Treatment
(1200 °C, 2 Hours)
Heat Treatment
(1200 °C, 8 Hours)
Heat Treatment
(1200 °C, 16 Hours)

FIG. 12


14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
Lifetime [μsec]
1
2
3
4
Times of Manufacture
Heat Treatment
(1200 °C, 16 Hours)