FIG. 1

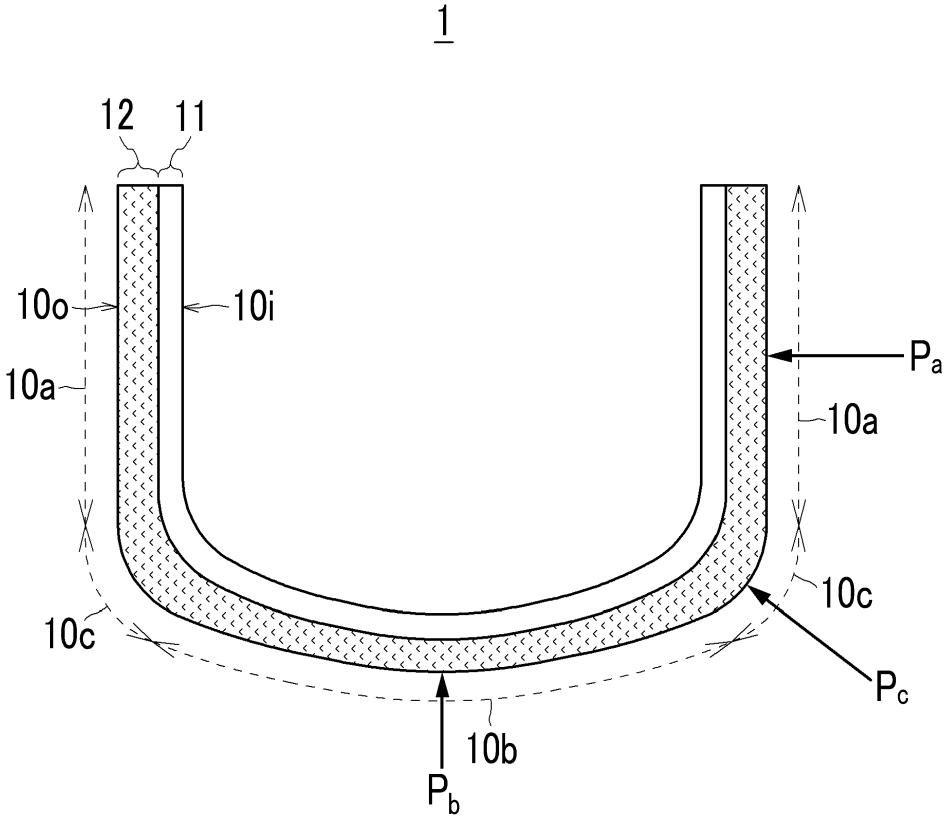


FIG. 2

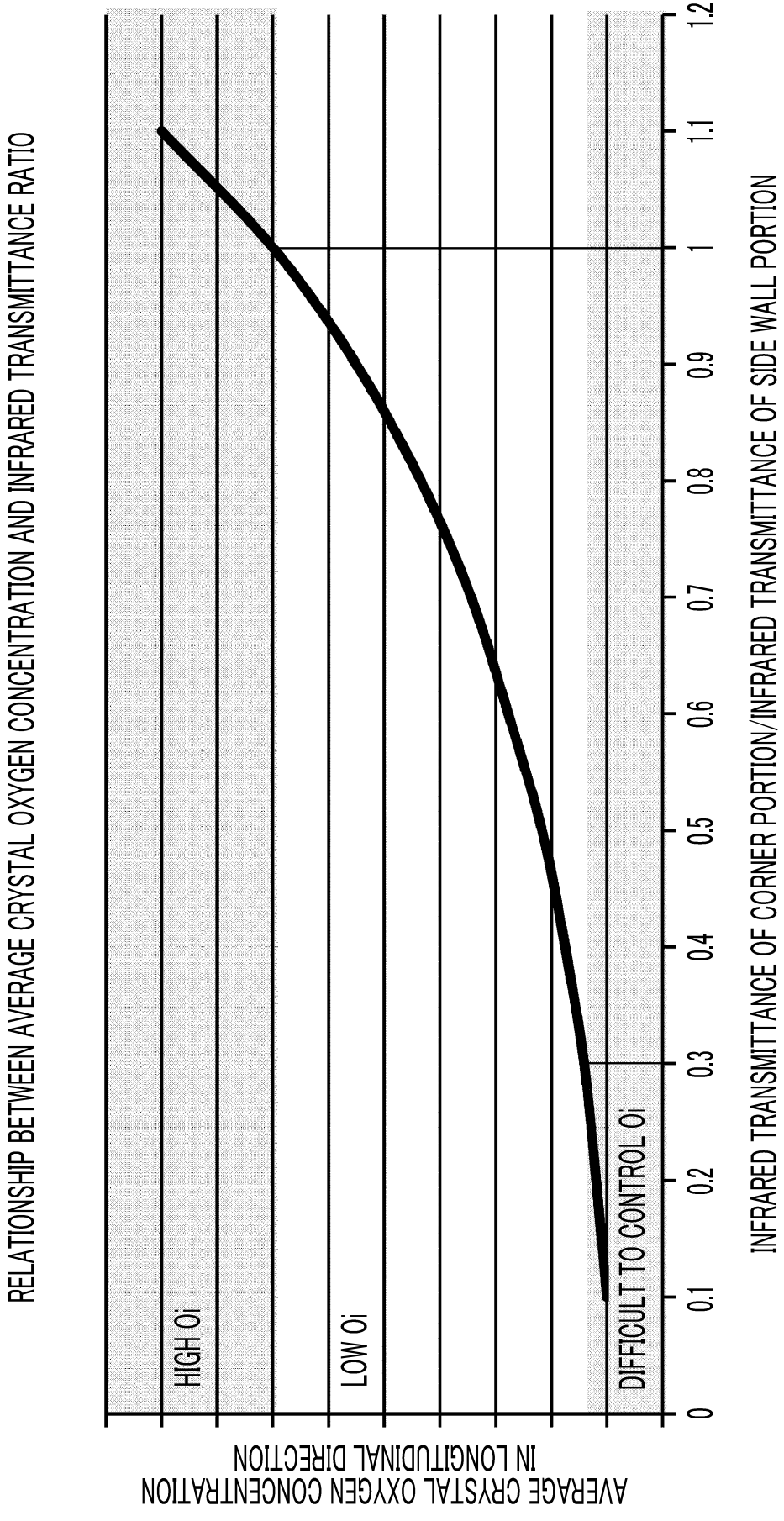

RELATIONSHIP BETWEEN AVERAGE CRYSTAL OXYGEN CONCENTRATION AND INFRARED TRANSMITTANCE RATIO
AVERAGE CRYSTAL OXYGEN CONCENTRATION IN LONGITUDINAL DIRECTION
HIGH Oi
LOW Oi
DIFFICULT TO CONTROL Oi
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
INFRARED TRANSMITTANCE OF CORNER PORTION/INFRARED TRANSMITTANCE OF SIDE WALL PORTION

FIG. 3

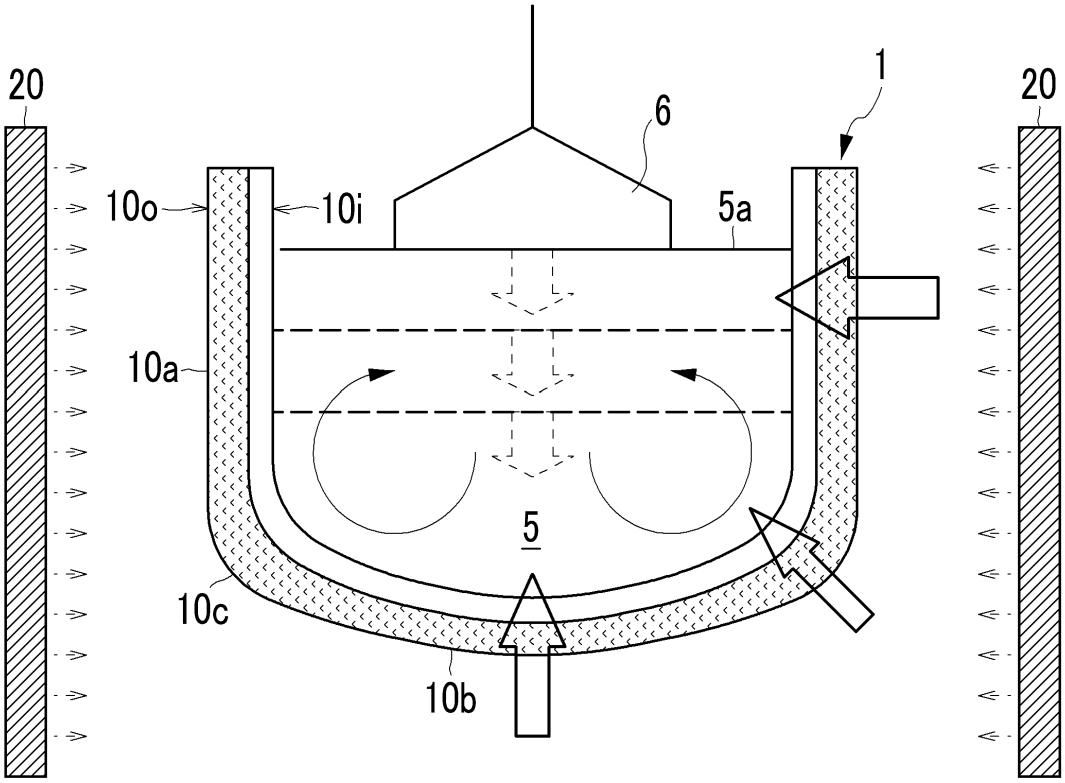

20
1
6
20
10o
10i
5a
10a
5
10c
10b

FIG. 4

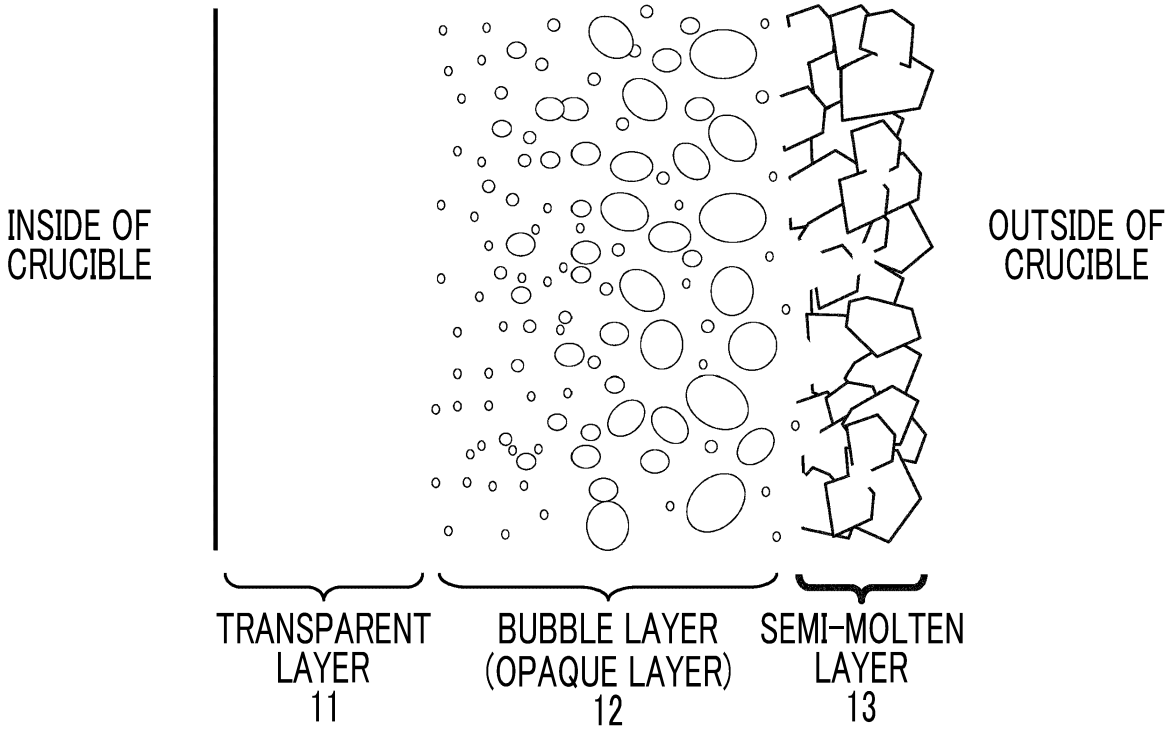

INSIDE OF CRUCIBLE
OUTSIDE OF CRUCIBLE
TRANSPARENT LAYER 11
BUBBLE LAYER (OPAQUE LAYER) 12
SEMI-MOLTEN LAYER 13

FIG. 5

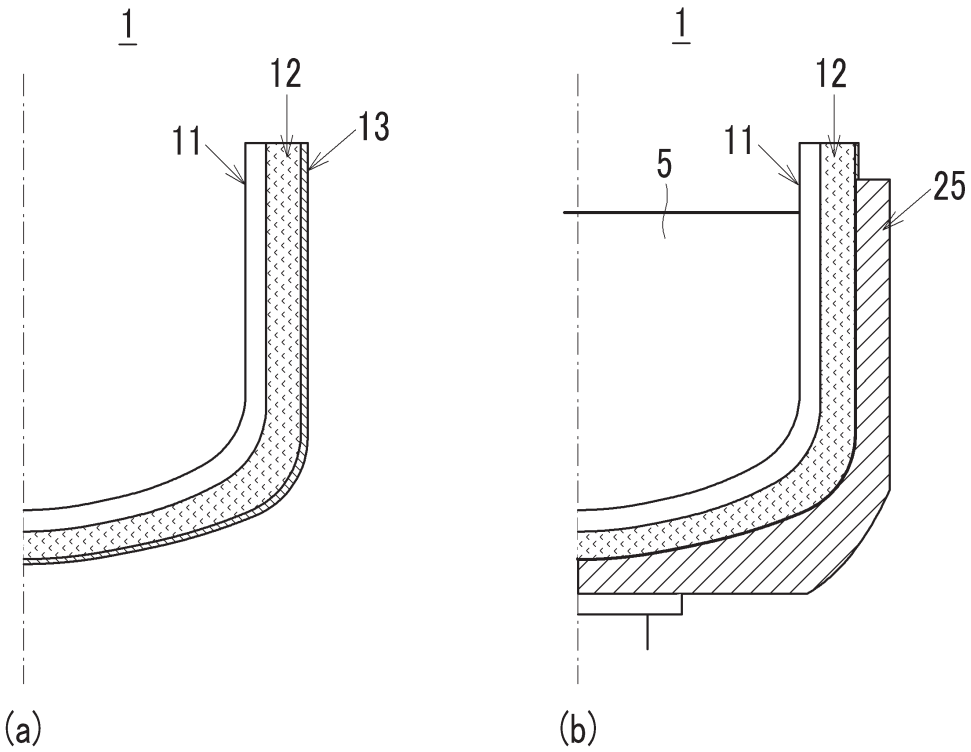

1
12
11
13
(a)
1
12
11
5
25
(b)

FIG. 6

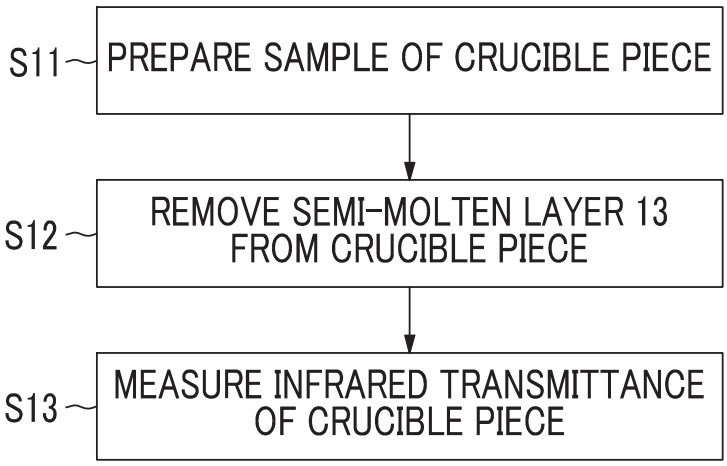

S11
PREPARE SAMPLE OF CRUCIBLE PIECE
S12
REMOVE SEMI-MOLTEN LAYER 13 FROM CRUCIBLE PIECE
S13
MEASURE INFRARED TRANSMITTANCE OF CRUCIBLE PIECE

FIG. 7

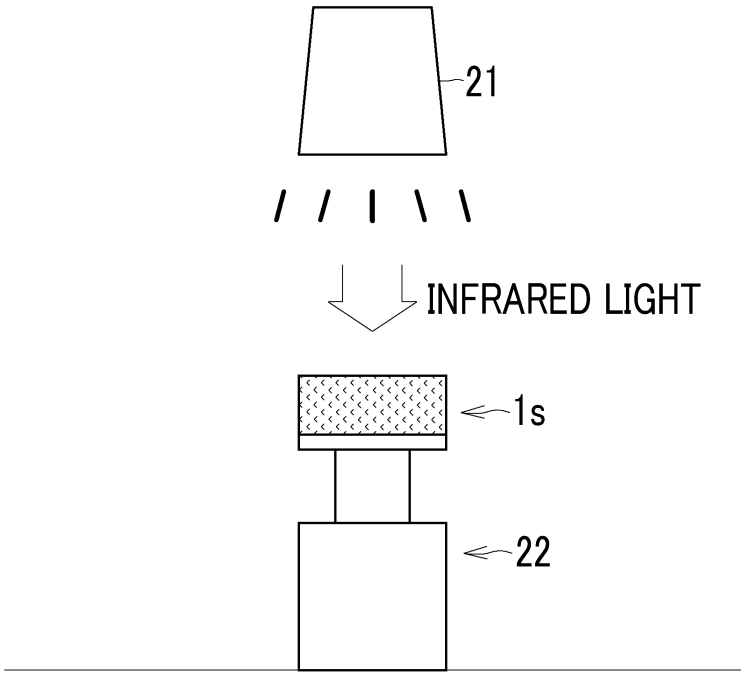

21
INFRARED LIGHT
1s
22

FIG. 8

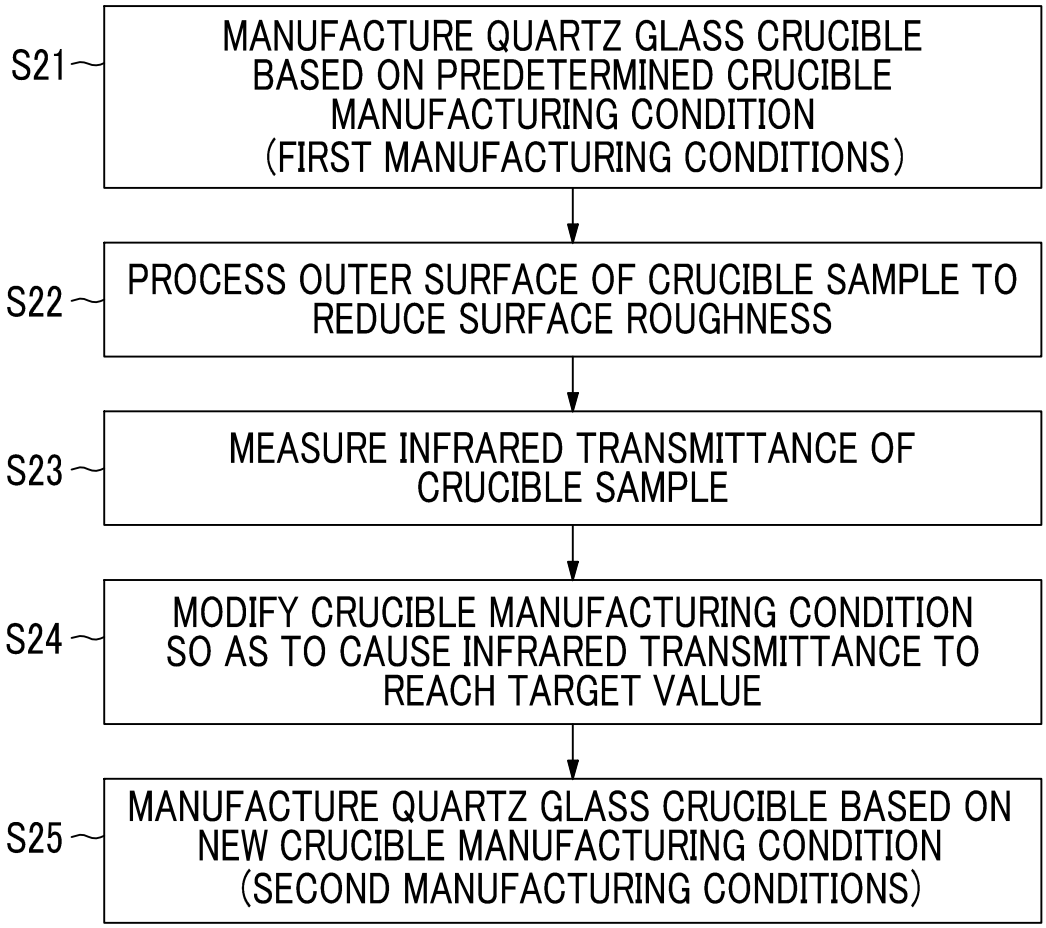

S21
MANUFACTURE QUARTZ GLASS CRUCIBLE BASED ON PREDETERMINED CRUCIBLE MANUFACTURING CONDITION (FIRST MANUFACTURING CONDITIONS)
S22
PROCESS OUTER SURFACE OF CRUCIBLE SAMPLE TO REDUCE SURFACE ROUGHNESS
S23
MEASURE INFRARED TRANSMITTANCE OF CRUCIBLE SAMPLE
S24
MODIFY CRUCIBLE MANUFACTURING CONDITION SO AS TO CAUSE INFRARED TRANSMITTANCE TO REACH TARGET VALUE
S25
MANUFACTURE QUARTZ GLASS CRUCIBLE BASED ON NEW CRUCIBLE MANUFACTURING CONDITION (SECOND MANUFACTURING CONDITIONS)

FIG. 9

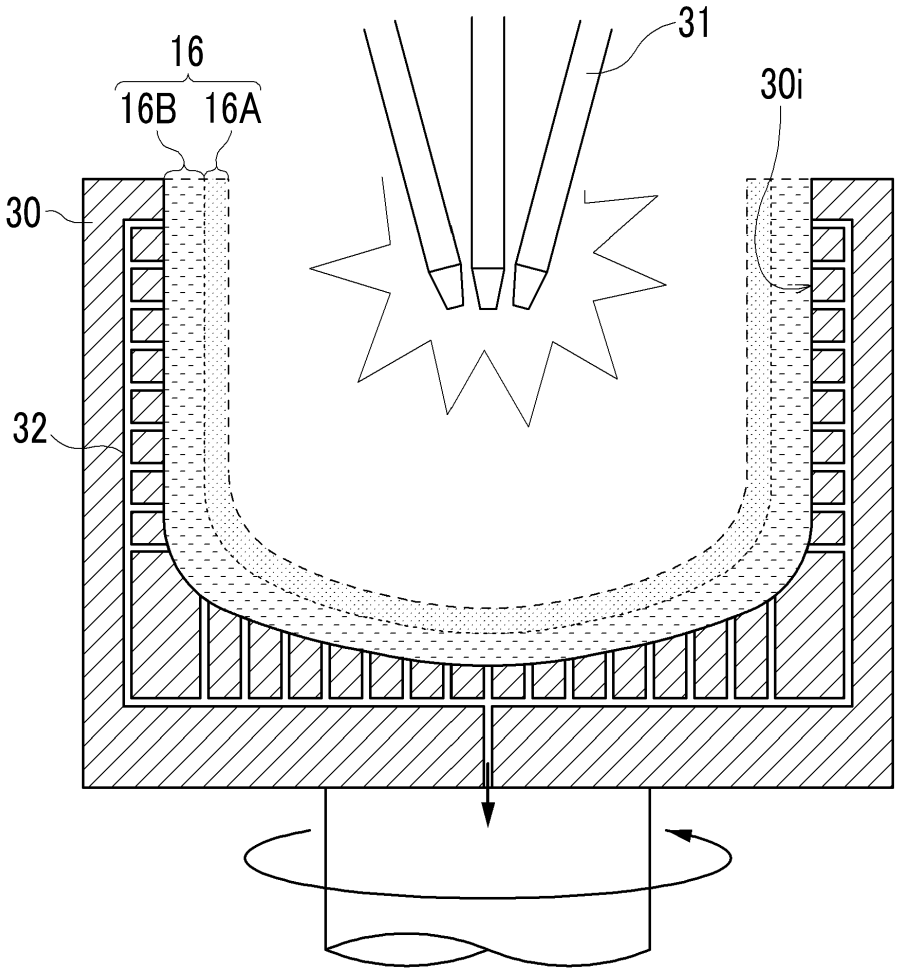
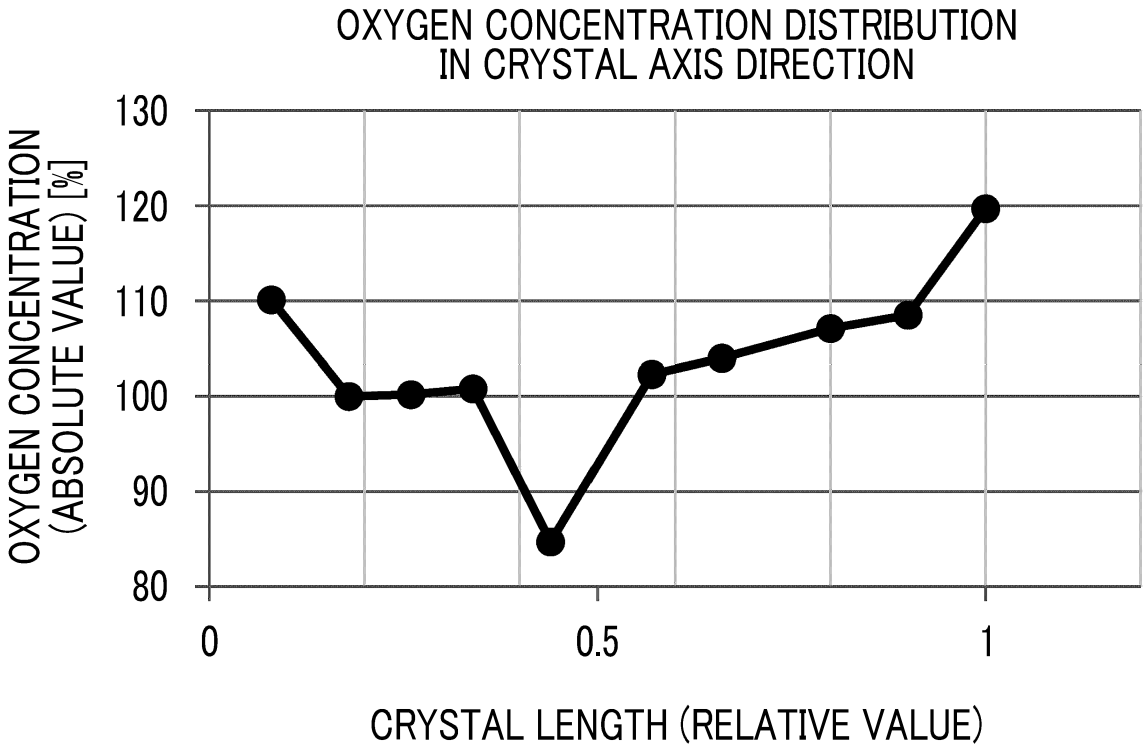


FIG. 10


OXYGEN CONCENTRATION DISTRIBUTION
IN CRYSTAL AXIS DIRECTION
OXYGEN CONCENTRATION
(ABSOLUTE VALUE) [%]
130
120
110
100
90
80
0
0.5
1
CRYSTAL LENGTH (RELATIVE VALUE)