Oxidation Furnace Instruction Manual

For wet Oxidation(No.1)

English ver.1.1 (2006.Nov.17)

1.Introduction of N_2 gas

(1) Open the valve of the N_2 gas cylinder.

(2) Open the valve just before the regulator of N_2 line. Don't touch the regulator.

(3) Turn on the N_2 switch of the switch-box, which is placed between the H_2O generator and Oxidation furnace.

(4) Open "HV2" and "HV4".

(5) Set the N_2 flow rate of "wet 酸化(Oxidation)" on the H_2O generator panel to 0.05SLM.

(6) Open "HV18". After this, N_2 flows into wet oxidation furnace.

(7) Make sure that the N_2 flows rate of 0.05SLM. And open the window in the introduction room of the oxidation furnace for the exhaust gas. (1cm or less).

(8) Record the remaining quantity of N_2 in the log notebook.

2.Setting of oxidation furnace temperature sequence

(1) Make sure that the right and left main power supplies (breakers) on the panel of oxidation furnace are turned on (Turn them on if they are off). In the following operation, use the left side panel of the furnace. (No.1: wet 酸化炉用)

(2) The temperature sequence is set by following procedures, using "TEMP.SET" that exists on the upper part of the three "TEMP.SET".

(2.1) Make sure that the FNC (function) bar at the lower light of display doesn't light up. (Turn it off by pressing the FNC key when it is lighting).

(2.2) Press the MODE key , then press ∧ key twice. Display shows "MODE2 PATTERN STEP". Press the SEL key, and advance to (2.3).

(2.3) The underlined part is a changeable value. Changing of changeable part is done by > key, and changing of changeable value is done by ∧∨key. After you change values, press the ENT key.

The procedures to set the temperature sequences are as follows.

① Set the "PTN" number. Our (Ohmi-lab's) number is 17.

② Set the temperature and time for raising.

ex: Raise furnace temperature to 900℃ in 1 hour

[STP=01], [SV=900], [TIM=001:00]

③ Set the temperature and time for keeping.

ex: Keeping the furnace temperature 900℃ for 20hour

[STP=02], [SV=900], [TIM=020:00]

If you want to use oxidation furnace successively on different temperatures, set the SV and TIM for STP=03, 04・・・.

(2.4) After temperature sequence setting, press the MODE key twice to display "RESET" on display.

(2.5) Press the FNC key and display a bar at lower right of display. Set the PTN number to 17 by pressing the PTN key

3.Beginning of temperature raising of oxidation furnace

(1) Turn the right 3 CURRADJ dials fully.

(2) Turn on the switch (red button) at the lower right end of the oxidation furnace panel No.1.

(3) After confirming that “DRIVING” is lit, and a bar at the lower right part is displayed, press the RUN key. The temperature raising starts in accordance with the temperature sequence of selected PTN.

(4) After this step (beginning of temperature sequence), wash the Si wafers by using general-grade beaker.

4.Start-up of H_2O generator

(1) The N_2 gas is introduced to the H_2O generator by the following procedures.

(1.1) Open "HV9".

(1.2) Set the flow rate of O_2 on "Wet 酸化" panel to 0.02SLM.

(1.3) Open "HV12", "HV13", "HV15", and "HV19".

(1.4) Open "HV10".

(1.5) Set the flow rate of H_2 on "Wet 酸化" panel to 0.02SLM.

(1.6) Open "HV11".

(2) Turn on the "メインスイッチ (main switch)", then turn on the "スタートスイッチ (start switch)" within one minute. The “正常ランプ” (normal lamp) is turned on, the “立ち上げランプ” (starting up lamp) is blinking, and the H_2O generator starts to raise its temperature. When it doesn't go well, press the “リセットスイッチ (reset switch)” and try again.

(3) During this raising step, wash the Si wafers by using high-grade beaker.

(4) Confirm that the 8 thermometers show the same temperature as setting up temperature, and that the “立ち上げランプ” is lit.

5.Introduce O_2 and the H_2 gas into the H_2O generator. (Do just before the oxidation).

(1) The O_2 gas is introduced into the H_2O generator by the following procedures.

(1.1) Open the valve of O_2 gas cylinder.

(1.2) Open the valve just before the regulator o O_2 line. Don’t touch the regulator.

(1.3) Turn on the O_2 switch of the switch-box. As a result, O_2 gas is introduced into the H_2O generator.

(1.4) Set the O_2 flow rate of "wet 酸化(Oxidation)" on the H_2O generator panel to 0.40SLM.

(2) The H_2 gas is introduced into the H_2O generator by the following procedures.

(2.1) Open the valve of H_2 gas cylinder.

(2.2) Open the valve just before the regulator of H_2 line. Don’t touch the regulator.

(2.3) Turn on the H_2 switch of the switch-box. As a result, H_2 gas is introduced into the H_2O generator.

(2.4) Set the H_2 flow rate of "wet 酸化(Oxidation)" on the H_2O generator panel to 0.40SLM.

(3) Confirm that steam is generating from VENT2

(4) Record the remaining H_2 and O_2 gas quantity into log notebook.

6.Introduction of Si wafers

※Wear heat-resistant gloves when you touch the door inside or the quartz device .

(1) Set the N_2 flow rate of "wet 酸化(Oxidation)" on the H_2O generator panel to 0.50SLM.

(2) Open the door of introduction room. Then open the door of oxidation furnace after you wear the gloves.

(3) Put the quartz device so that it touches oxidation furnace. (Put it on the position that you can carry out the boat easily.) Don't touch the upper part of quartz device with your hand.

(4) Take off the gloves. Carry out the boat from oxidation furnace to quartz device by using press rod for wet oxidation. Return the press rod immediately after you use.

(5) Wear the heat-resistant gloves again, close the door of oxidation furnace. Draw the quartz device so that you can put the Si wafers on boat. Usually, the boat for pieces is placed in oxidation furnace, change the boat here when you introduce 2-inch wafers.

(6) Dry Si wafers completely by the N_2 blow and put them to the boat. At this time, confirm whether they are fixed firmly by the boat.

(7) Wear the gloves. Put the quartz device so that it touches oxidation furnace.

(8) Insert the boat into the oxidation furnace by using push rod. First, put the boat at the edge of furnace for five minutes so that the boat becomes attached to furnace temperature. After that, push the boat into the center part of furnace by using the push rod.

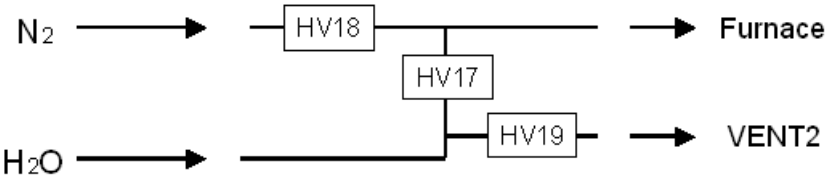
7.Start wet oxidation

Start the oxidation process by switching the gas from N_2 to H_2O. Procedures are as follows

(1) Open "HV17", then close "HV19".

(2) Close "HV18".

※The oxidation process starts when you open "HV17".



8.End of wet oxidation

Finish the oxidation process by switching the gas from H_2O to N_2. Procedures are as follows.

(1) Open "HV18".

(2) Open "HV19", and close "HV17".

※The oxidation process ends when you close "HV17".

9.Taking out Si wafers

Take out Si wafers by the reverse order of "6. Introduction of Si wafers".

※ Take out the boat after putting it on the edge of the oxidation furnace for five minutes.

※ If the furnace temperature is higher than 1000℃, you should wait longer before removing the wafers from the boat.

・When you do oxidation, return to "6.Introduction of Si wafers".

・When you do oxidation by different temperature, press ADV key after confirm that the FNC bar at the display of "TEMP.SET" is lit. Restart oxidation process when the furnace temperature reaches desired temperature.

・When you end the whole process, advance to "10. End of the oxidation furnace temperature sequence" after returning the boat into the oxidation furnace.

10.End of oxidation furnace temperature sequence

(1) After confirm that the FNC bar at the display of “TEMP.SET” is lighting (if not, press the FNC key), press the RESET key. Confirm that “RESET” is displayed on left side of display, and the ammeter on the panel shows 0.

11. Shut down H_2O generator

(1) Set the N_2 flow rate of "wet 酸化(Oxidation)" on the H_2O generator panel to 0.05SLM.

(2) Stop H_2 flow by the following step.

(2.1) Turn off the H_2 switch of the switch-box.

(2.2) Close the valve just before the regulator of H_2 line. Don’t touch the regulator.

(2.3) Close the valve of the H_2 gas cylinder.

(3) Stop O_2 flow by the following step.

(2.1) Turn off the O_2 switch of the switch-box.

(2.2) Close the valve just before the regulator of O_2 line. Don’t touch the regulator.

(2.3) Close the valve of the O_2 gas cylinder.

At this point, only N_2 flows into H_2O generator.

(4) Set both the O_2 flow rate and H_2 flow rate on the H_2O generator panel to 0.02SLM, so that N_2 gas is flowing inside of the H_2Ogenerator (wait 15 minutes).

(5) Record waste fluid log notebooks.

(6) After you wait 15 minutes, turn off “メインスイッチ” of H_2O generator.

(7) Wait for 3 hours (to dry H_2O line completely).

(8) Close H_2 and O_2 line of H_2O generator by the following process.

(8.1) Close "HV11".

(8.2) Close"HV10".

(8.3) Close "HV12", "HV13", "HV15", and "HV19".

(8.4) Close "HV9".

(8.5) Set the both O_2 flow rate and H_2 flow rate on the H_2O generator panel to 0.00SLM.

12.Shut down of oxidation furnace

(1) Turn off the switch (green button) in wet oxidation furnace panel.

(2) Turn the left 3 CURRADJ dials fully

(3) After the temperature of the oxidation furnace decreases to 400℃ or less, stop N_2 gas by following procedures.

(3.1) Close the window in the introduction room of the oxidation furnace.

(3.2) Turn off the N_2 switch on the switch-box.

(3.3) Close the valve just before the regulator. Don’t touch the regulator.

(3.4) Close the valve of N_2 gas cylinder.

(3.5) Close “HV18”.

(3.6) Set the N_2 flow rate on the H_2O generator panel to 0.00SLM.

(3.7) Close “HV2”, and “HV4”

(4) Confirm that all flow rates on the H2O generator are set to 0.00SLM.

(5) Fill in the log notebooks.