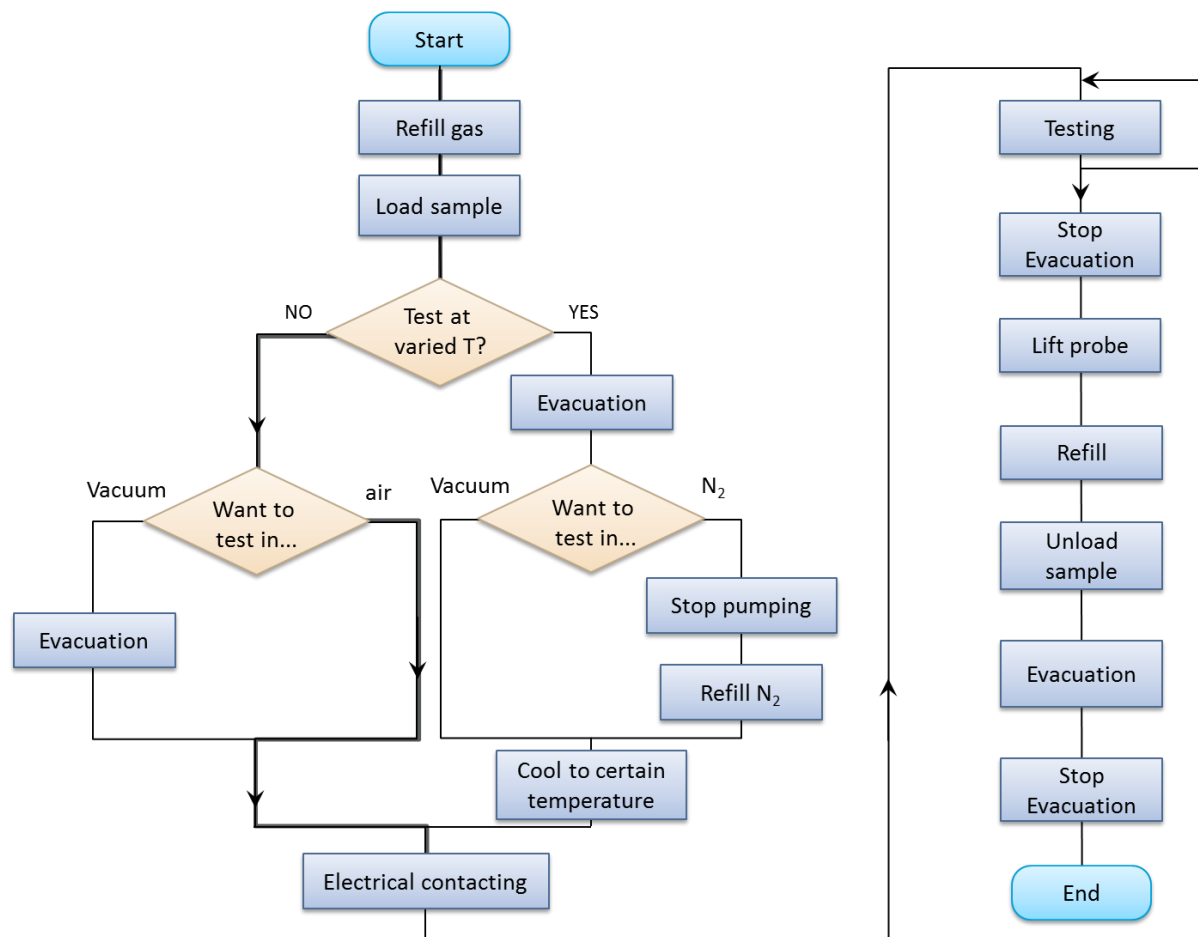
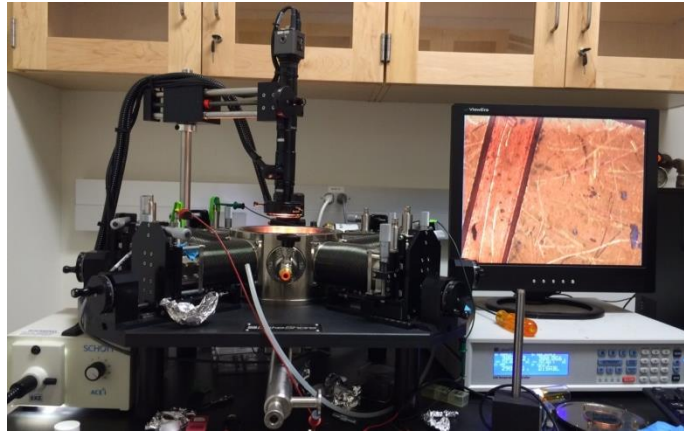


# Standard Operating Procedure of Probe Station (Lake Shore TTP4)

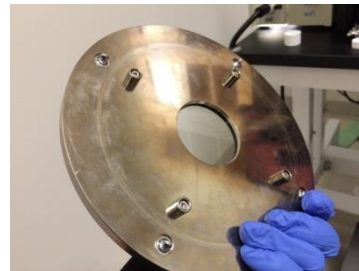
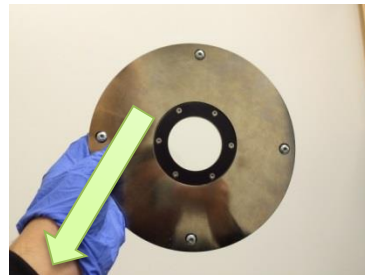
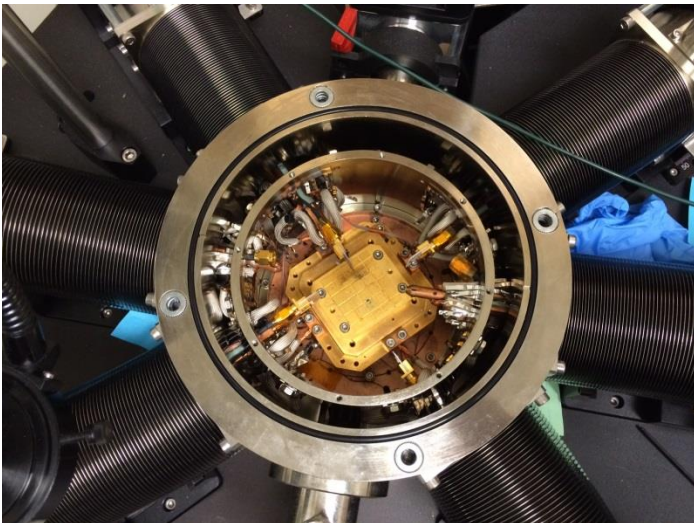


## Probe station includes the following three systems:

- Electrical contacting system
- Vacuum system
- Cooling and temperature control system

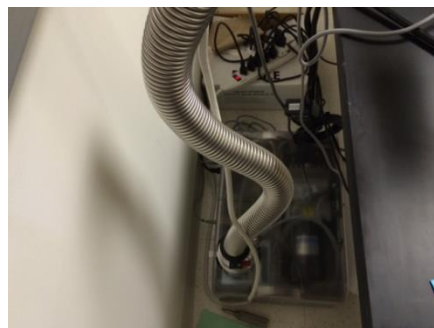
## I Load the sample

- 1 Open the cover with screw driver.
- 2 Put samples inside.
- 3 Cover the two chambers and seal the chamber via fasten the cover with screw driver.

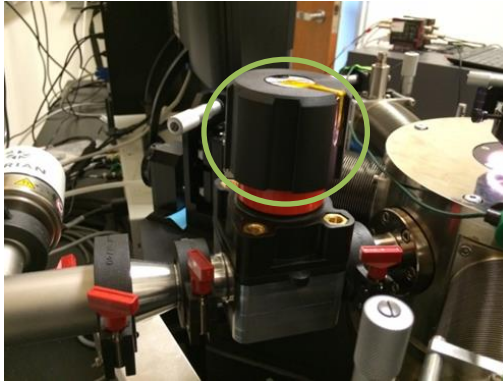


## II Evacuate the Chamber

- 1 Before evacuating the system, check that **all probes are clear of the wafer** (lift all probes nominally 4 mm up from the wafer).
- 2 Press the button (under the table, on the backside) to turn on the mechanical + turbo pump (auto-switch)



3 Turn on the valve by loosen the screw anti-clockwisely;



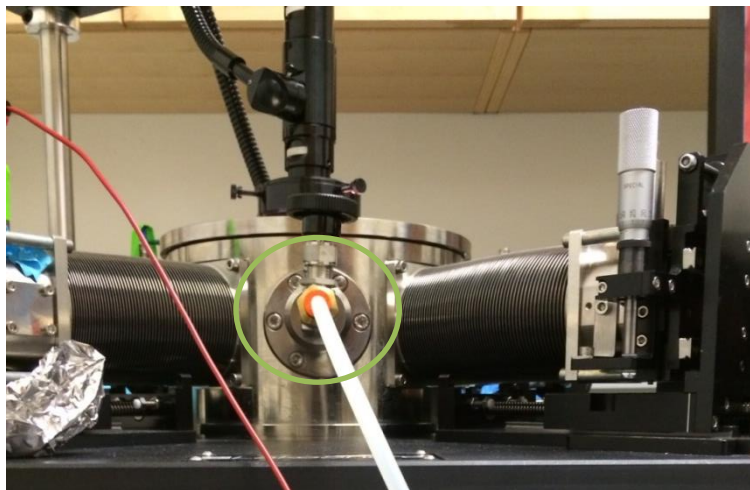
### III Fill the chamber with N<sub>2</sub> or other type of gas

1 Turn off the pump by pressing the button at the back of the pump;

2 Turn off the valve by rotate the screw clockwise;

3 Inject the N<sub>2</sub> (or else) The N<sub>2</sub> pipe is connected to the air inlet port (output pressure: ~5 psi);

**Caution: Don't inject gas when the pump is running and the valve is open, otherwise the turbo pump will be destroyed.**

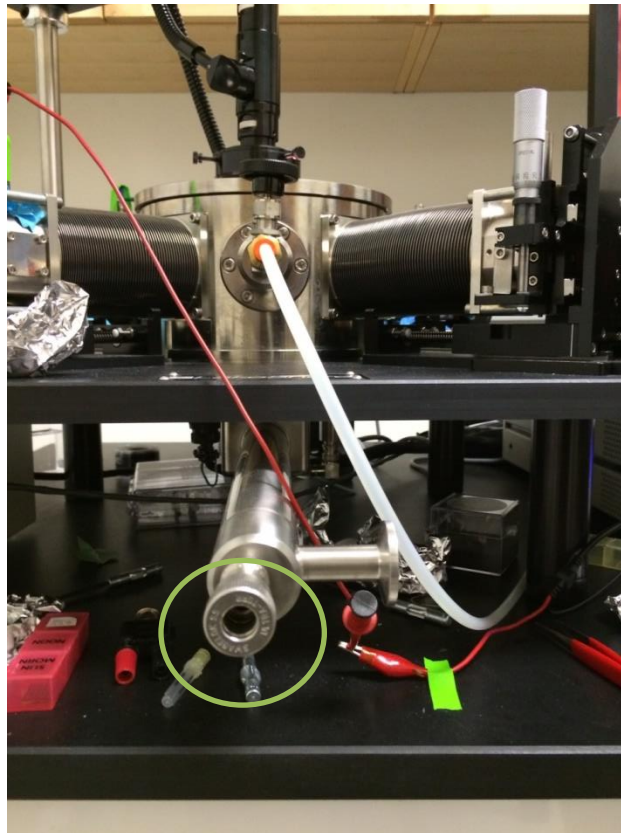


### IV Temperature Control

1 For cooling the station to lower temperature, need the following two parts:



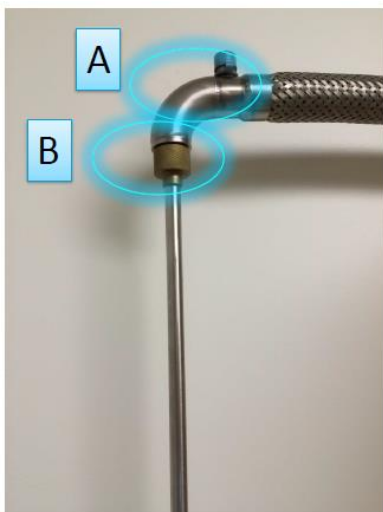
2 Connect the liquid-N<sub>2</sub> tank and probe station with a thermally insulated tube.



3 Insert until it close to the bottom



4 Hold A, rotate B, then liquid N<sub>2</sub> will come out; The flow of the N<sub>2</sub> depend on the number of turns. **Caution: Keep the door open during your experiment, otherwise the concentration of N<sub>2</sub> in the room will increase (Dangerous).**



## V Temperature Setting

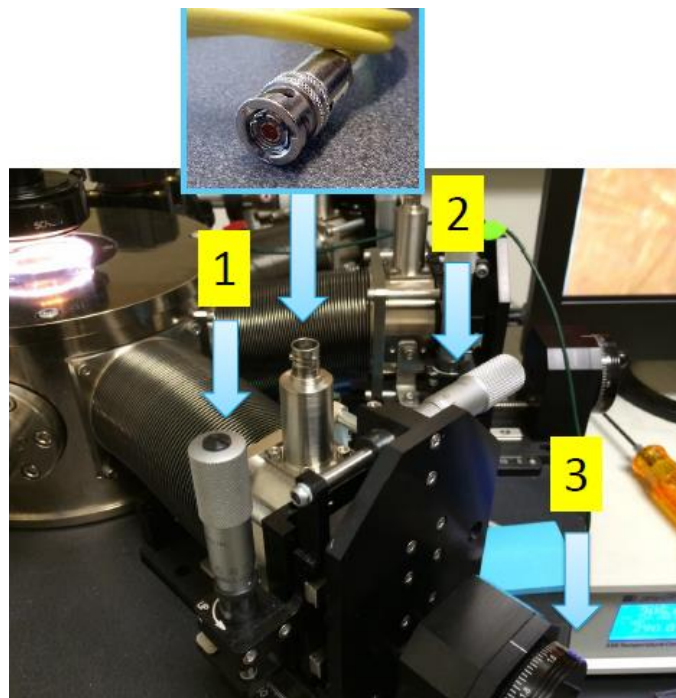
1. Turn on the temperature controller, the "A" in the display panel and control panel stands for the metal plate (where the sample located); The "B" stands for the metal shield in the chamber.
2. Set temperature for metal plate: Press A → press "setpoint" → fill the number you need → "enter"
3. Solely set the temperature is not enough, you need to start heating program: Press A → press "Heater range" → press "up" to increase the heating power (or combining "down" button for adjustment)

4. The maintaining of a certain temperature is realized by the balance between the liquid  $N_2$  flow and the electrical heating, the flow of  $N_2$  is controlled by how much you turn on the brass screw, the electrical heating frequency is controlled by the computer.



## VI Electrical Contacting

1. Turn on the light by rotating the screw.
2. Move the CCD camera to the window, adjust the view location until you see the probe in the screen.
3. Move the tip by using the 3D tip positioner, the screw 1, 2 and 3. The location of the tip can be monitored in the screen.



4. Landing the tip slowly, you can see the tip bend a little when it contact with your sample.
5. Connect the BNC cable (triaxial) from the probe station to you testing system.

## **VII After Testing**

1. Resume the plate to RT, and wait for >20 mins to let other parts increase to RT (to prevent condensation).
2. Turn off the temperature controller.
3. Lift the tips away from your sample surface.
4. Stop the pumping and carry out gas-refilling procedure.
5. Restore the liquid N<sub>2</sub> tube.
6. Take out your sample and pump the chamber again, let the chamber at vacuum state with the pump and valve turned off.