Thermal Evaporator SOP v.1.1

1. Important note before starting operation

This system is dedicated for metal evaporation, **no wet, organic or other contaminating sample** allowed inside the chamber. Gloves are required before routine operation to avoid the grease on hand that will damage the vacuum condition of the chamber.

2. Loading sample

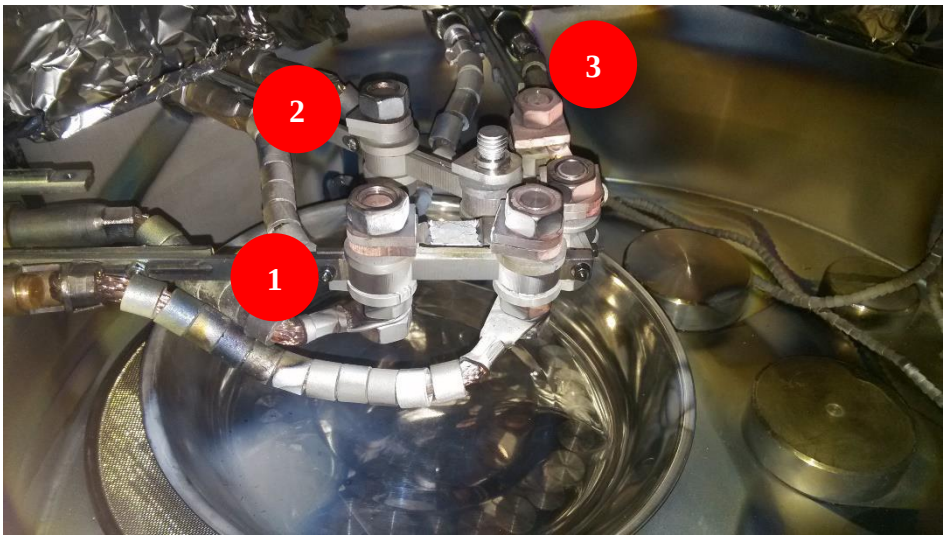
2.1 **Make sure that the vacuum gauge and high vacuum valve are turned off, otherwise it would damage the gauge or turbo pump.**

2.2 Vent the chamber by opening the valve at the corner of the chamber, clamp the samples on the sample holder and screw the holder on the top stage.

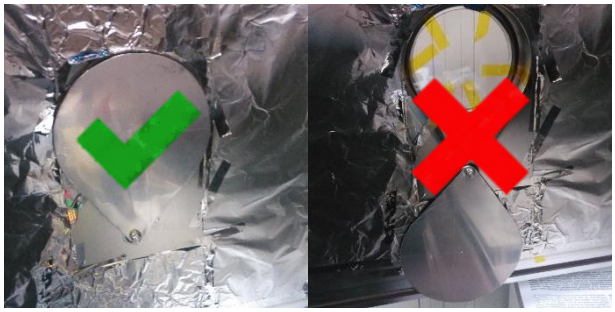
2.3 Switch the shutter to right under the sample to prevent the possible impurity evaporation at the beginning of heating.

2.4 Check the crystal monitor to make sure its life is sufficient and not out of order, otherwise clean the monitor cap or replace the quartz monitor. Input the materials parameters such as density, z-vale.

2.5 Load the crucibles of sample and slightly shake it to guarantee good stability **(Note: the tooling factors of different crucibles are significant different, the final thickness should be corrected).**

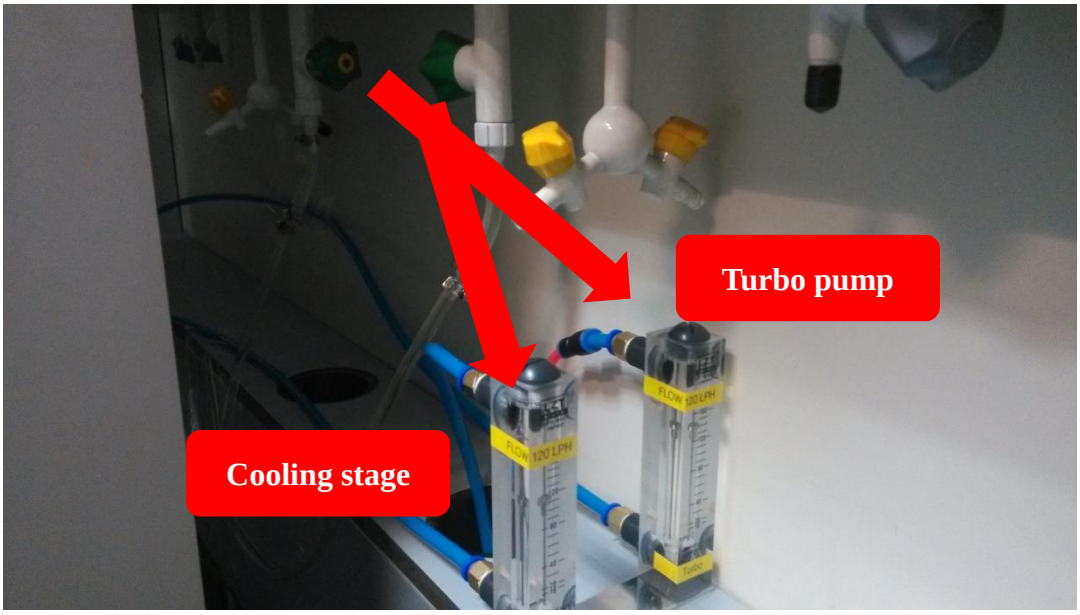


2.6 Close the door and make sure the metal plate is at the correct position, otherwise it will break the vacuum of the door; tighten the screw, make sure door is sealed.



3. Vacuuming the chamber

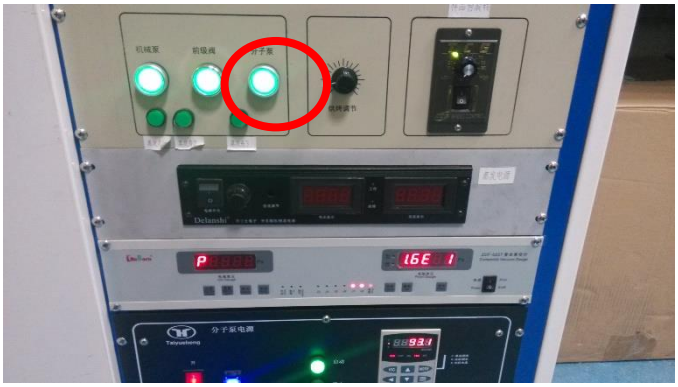
3.1 Open the cooling water of turbo pump and cooling stage, wait a while until the flow is stable, make sure the flow of water is not less than 80 lph.



3.2 Switch on the mechanical pump and the vacuum gauge; open the low vacuum valve to vacuum the chamber. If the gas sound is still loud after 1 min, further tighten the screw of the door until the sound disappears.

3.3 When the pressure of the chamber goes down to 15 Pa, turn off the low vacuum valve and turn on the backing valve.

3.4 After around 1 min, turn on the turbo pump.



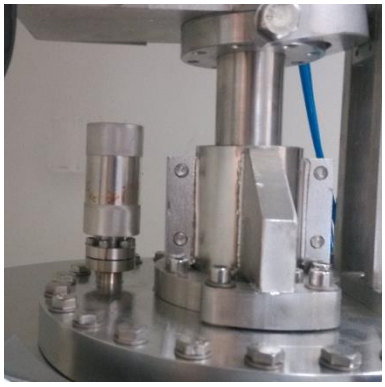
3.5 After around 1 min, open the high vacuum valve and turn on the baking knob of halide lamps (2×300W). Wait for at least 1.5 hrs until the pressure of the chamber goes down to 5×10^{-4} Pa.

4. Evaporating metal

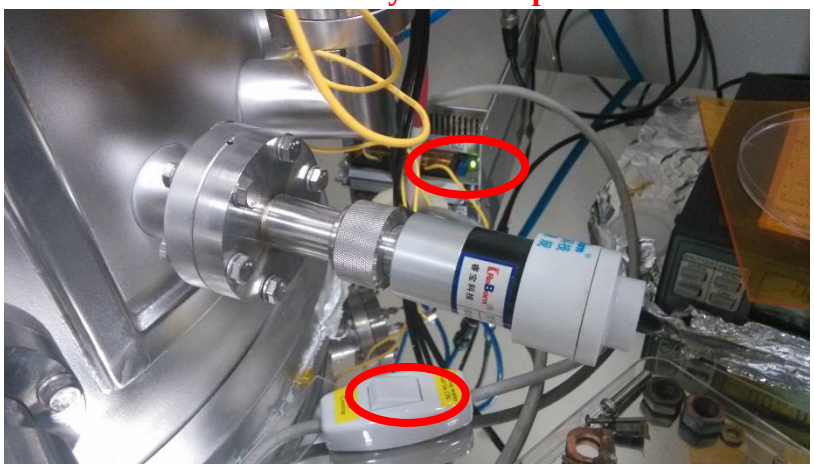
4.1 Turn off the baking knob. Turn on the heating power supply and corresponding button of crucibles. Gradually increase the heating current until there is some variation of the thickness on crystal monitor (the routine evaporation rate is ~0.5 Å/s). **The maximum current of power supply is 200 A**, long time beyond 200A

will trigger the temperature protection of the power supply. Just decrease the current and wait for the auto reboot of power supply after self-cooling.

4.2 After evaporating ~ 5 nm metal, switch on the shutter to start evaporating to get the target thickness.



4.3 There is a Peltier cooling module above the sample holder, which can cool the stage to -5 °C without heating. **The green light on will indicate its running. Remember to turn it off immediately after evaporation.**



5. After evaporation

5.1 ***Turn off vacuum gauge. (Important, otherwise, ion gauge will be damaged!!)***

5.2 Switch off the shutter, and the heating power supply. Wait for around 30 min.

5.3 Close the high vacuum valve and turn off the turbo pump until its speed goes to zero.

5.4 Turn off the backing valve and mechanical pump.

5.5 ***Confirm that sure vacuum gauge is OFF.*** Vent the chamber by opening the valve at the corner of the chamber. Take the sample out of the chamber and close the venting valve.

5.6 Close the chamber and vacuum the chamber to 15 Pa using mechanical pump according to step 3.2. Close the low vacuum valve and the mechanical pump. Close the cooling water.

5.7 Write down the parameters including material used, ultimate vacuum, current, speed, on the log book for future reference.