

TECHNICS SPUTTERING MACHINE SOP

Revised April 2020

Start-up of the system

1. Log into **FOM**.
2. Turn **ON** the chiller and vacuum pump with the switches on the wall over the system.
3. Switch **ON** the MAIN breaker on the bottom front of the machine and make sure the **MAIN ON** light is illuminated. The **ROUGHING VALVE**, **GATE VALVE** and **FORELINE** switches should be in the down position.
4. Press the **POWER ON** button. The AC ON, +15, - 15, and +5 should be illuminated.
5. Move the **VENT** switch upwards to open the chamber. This will allow high purity N₂ to enter the chamber for venting.
6. Move the **VENT** switch downward once the chamber lid opens.

Loading Targets

1. Remove the platen by removing the screws from the center drive shaft.
2. Determine which targets to change; the **RF (right)** source or **DC (left)** source.
3. Remove the deflector ring from the target required to be changed.
4. Remove the shadow ring by removing the two screws.
5. Remove the target clamp by removing the socket head cap screws.
6. Remove the existing target and replace it with the desired target.
7. Replace the target clamp, shadow ring, and deflector ring for the respective source.
8. Replace the Platen and only hand tighten the screws.

Loading Samples

1. Note the sample location number for each of your samples.
2. Place your 4" wafers face down in the platen and load a weighted ring on top of the sample. This will ensure the sample does not come out of its position in the platen during the vent process.
3. Utilize insert rings for 3" and 2" wafers, glass slides or Kapton tape for suspending pieces.

Pump Down

1. After closing the lid, maintain pressure on the lid to keep it closed and move the **ROUGHING VALVE** switch upward. The Baratron Pressure gauge (Capacitive Manometer AKA CAP MAN) will begin to display when pressure is below 2000 mTorr.

2. Once the chamber pressure is below 100mTorr, move the **ROUGHING VALVE** switch downward.
3. Move the **FORELINE VALVE** switch upward.
4. On the turbo pump control panel start the turbo pump by toggling the momentary switch to the **START** position. The yellow LED marked < 27,000 should be illuminated while the turbo pump is spooling up. The green = 27,000 LED will illuminate within 2 minutes after the turbo pump reaches 27,000 rpm.
5. Once the LED is green, move the **GATE VALVE** switch upward.
6. After running the turbo pump for 5 minutes turn on **ION GAUGE** switch. Wait until ion gauge pressure reads 5×10^{-5} mTorr or less; this is your system base pressure. The bottom-right toggle can be in either the 2 mA or the 0.1 mA position. The 0.1 mA is the desired position. The gauge can be degassed by flipping the **DEGAS** switch to the **ON** position and the red LED will be illuminated. The system will degas for approximately 2 minutes.

Deposition

Turn **OFF** the **Ion GAUGE** and move the **GAS #1** switch upward. Adjust the chamber pressure using the adjacent **GAS #1** flow valve.

RF Sputtering

1. Move the **Source Switch** to the **RF** side (right) for RF Sputtering.
2. Set the **RF OUTPUT** switch to **TARGET 1**. Move the **RF POWER** switch upward.
3. Turn **ON** the **R301 Power Supply** and the **MC2** components positioned to the left of sputtering machine. Follow the instructions in bold and emphasized below before proceeding to step #4.

WARNING: Do not run the MC2 in Manual Mode!!!

NOTE: Make sure the MC2 is set to Auto Mode for both Load and Tune. Set both the Load and Tune to 50% before turning on the power.

4. Set the power output to 10 W and press the **RF ON/OFF** button. The LED above the button will switch from blue (no power applied) to RED (power applied).
5. Once the power is stable at 10W and reflected power is low, ramp up to the desired power by using the up and down arrows to the right of the display on the R301 Power supply.
6. After pre-sputtering for 1 to 2 minutes move your sample into the activated plasma cloud by toggling the **ROTATE PLATEN** switch.
7. When you have finished your deposition press the **RF ON/OFF** button on the R301 Power Supply. The blue LED should now be illuminated.
8. Set the Load and Tune on the MC2 back to 50% as a courtesy for the next user.
9. Turn **OFF** the **R301 Power Supply** and **MC2** components.
10. Move the **RF POWER** switch to the downward position.
11. Move the **SOURCE SWITCH** to the center position and proceed to Vent & Sample Removal.

DC Sputtering

1. Move the **SOURCE SWITCH** to the DC side (left).
2. Move the **DC POWER** switch to the up position.
3. Press the **Power** button on the DC controller box to turn on the controller.
4. Press the **SETPT** button and adjust the large knob until the desired set point for power is reached on the display.
5. Rotate your wafer to position it over the DC target. Make sure your sample holder number is on the left side of the number indicator block and monitor your deposition time.
6. When you have finished your deposition turn off the DC controller box.
7. Move the **DC POWER** switch to the down position.
8. Move the **SOURCE SWITCH** to the center position.

Plasma Etch (Optional)

1. Set the **SOURCE SWITCH** to the RF (right) side.
2. Set the **RF OUTPUT** switch to the PLASMA ETCH position.
3. Run PLASMA ETCH for 2 minutes and switch **OFF**.

Vent & Sample Removal

1. Make sure all power supplies are turned off.
2. Move the **Argon GAS #1** switch downward.
3. Toggle the momentary switch on the turbo pump to the **OFF** position.
4. Wait for 1 minute as the turbo pump spools down.
5. Move the **GATE VALVE** switch to downward.
6. Move the **FORELINE VALVE** switch downward.
7. Move the **VENT** switch upward and wait for approximately 2 minutes. You should hear nitrogen entering the chamber.
8. After the chamber opens move the **VENT** switch downward.
9. Remove your samples.

NOTE: Remove all targets from the sputtering machine when finished.

Shut Down

1. After removing your samples and all targets close the lid. Move the **ROUGHING VALVE** switch upward while applying pressure to the lid. The Baratron Pressure gauge (Capacitive Manometer AKA CAP MAN) will begin to read when pressure gets below 2000 mTorr.
2. Allow the chamber rough down to a pressure of 100 mTorr or below.

3. Move the **ROUGHING VALVE** switch downward.
4. Press the red **PUSH BUTTON** and turn off the **MAIN BREAKER**.
5. Turn **OFF** the mechanical pump and chiller switches on the wall.
6. Record your work in the equipment log book.
7. Logout from the tool in your FOM account.

Trouble Shooting and Historical Information:

- Nitrogen tank for venting - set to 10 PSI
- Argon tank for sputter gas - set to 10 PSI
- Nitrogen tank for compressed air - set to 80 PSI
- Check the oil level of the mechanical pump, the level should be between the top and middle markings on the sight glass.
- Chiller temperature should be 22°C, with a pressure of 40-50 PSI and check the water level.
- The chiller must be on to maintain the turbo pump and for RF depositions to function.
- Chiller water must be highly resistive to maintain electrical isolation to sputtering sources.