

Sputter (ATC 2200)

Contamination policy:

- 1. Targets used in Orion cannot be used in ATC 2200 sputter as Orion is Cu and Au contaminated. Separate (dedicated) targets are to be used for ATC.**
- 2. Resist coated samples are not allowed.**
- 3. Au/ Cu coated samples are not allowed.**

Training Policy for ATC 2200 Sputter

Policy: Students of Prof. U. Ganguly, Prof. S. Lodha and Prof. V. R. Rao will be trained and allowed to use the ATC 2200 Sputter of their own as all of them are associated with the DST project from which we have got the fund for the system. Rest of the users can take the help of the operators.

Once DST project deliverables are met the system will be made open for training all interested users.

Training Procedure:

1. Send a request using the link below:

http://www.cen.iitb.ac.in/equipment_usage/index.php

2. Once approved, go through the system manual to know the system capabilities.
3. Three sessions for observing users handling the system and performing measurements
4. Five supervised hands-on session (sessions to be increased on a case to case basis)
5. Final test taken by the system owner or the operator.

Violation Policy:

1. System mishandling would lead to re-authorization by undergoing through the training procedure again.
2. Standard sample mishandling and using non-allowed materials would lead to debarring from using the system for 7days.

Standard Operating Procedure

After coming inside Nano lab –

1. Check if the front panel is ON.
2. Check if the 5 green LEDs at the backside of tool are ON. This makes sure that the cooling water flow to the tool is proper.
3. Turn ON the process gases (Ar, N₂, O₂(if required)). Set the pressure of gases to ~20 psi.
4. Turn ON the value for venting N₂.
5. The VAT controller should be in LOCAL mode and in OPEN position i.e the chamber must be continuously evacuated.

Loading process:

1. Turn OFF the LL chamber vacuum pump. Wait for the LL chamber to come to atm. pressure.
2. Take the lid off and keep it on the 3 rest points.
3. Place the sample on the sample holder.
4. Place the sample holder correctly on the transfer arm.
5. Place the lid and turn on the LL vacuum pump.
6. Wait for the pressure to reach 5e-5 Torr.
7. Open the gate valve between Main chamber & LL chamber.
8. Check if the position of the substrate height adjustment knob is below the bottom mark. If not, then rotate the knob in anti-clockwise direction until it reaches below the bottom mark.
9. Move the transfer arm into the Main chamber.
10. Rotate the substrate height adjustment knob to upper position.
11. Rotate the rotator to E position. If it does not rotate then adjust the knob a bit and then again rotate the rotator to L position.
12. Rotate the substrate height adjustment knob in anti-clockwise direction until it reaches below the bottom mark.
13. Check if the substrate holder is placed on the arm.
14. Move the transfer arm into the LL chamber.
15. Close the gate valve between Main chamber & LL chamber.

Deposition procedure:

1. Rotate the substrate height adjustment knob to the height that you want to use for deposition. This is usually 32 mm.
2. The software should be ON.
3. Put the VAT controller in REMOTE mode. This closes the gate valve between chamber and cryo pump.
4. OPEN this gate valve from the software.
5. Turn the rotation ON.
6. Plasma striking

1. Set Ar flow to 67 sccm and turn ON the gas. DO NOT turn the Ar flow ON if the gate valve is closed.
2. Set the pressure to 30 mTorr.
3. Set the power to 30W.
4. Turn the power ON.
5. Wait for the plasma to strike.
6. Immediately change the pressure to 3 mTorr (process pressure)
7. Power ramp up
 1. Ramp the power to desired power by 1W/s ramp rate.
 2. Wait for sometime at this power to pre sputter the target. This is needed for the materials that get oxidized easily, e.g Ti, Al etc.
8. Deposition
 1. Open the shutter. Deposition on the substrate begins.
 2. Let the deposition happen for the desired time. Do not sputter continuously for >30 mins.
9. Power ramp down
 1. Ramp the power down to 0W by 1W/s ramp rate.
 2. Turn of the power

Unloading process:

1. Rotate the substrate height adjustment knob anticlockwise to raise the substrate holder above the bottom mark.
2. Check if the rotator is in E position.
3. Open the gate valve between Main chamber & LL chamber.
4. Move the transfer arm into the Main chamber.
5. Lower the substrate holder by rotating the substrate height adjustment knob to upper position.
6. Rotate the rotator to L position. If it does not rotate then adjust the knob a bit and then again rotate the rotator to L position.
7. Raise the substrate holder by rotating the substrate height adjustment knob in anti-clockwise direction until it reaches the bottom mark.
8. Check if the substrate holder is placed on the arm.
9. Move the transfer arm into the LL chamber.
10. Close the gate valve between Main chamber & LL chamber.
11. Turn off the LL chamber vacuum pump. Wait for the Loadlock chamber to come to atm. pressure.
12. Take the lid off and keep it on the 3 rest points.
13. Unload the sample holder & remove the sample
14. Place the lid and turn on the LL vacuum pump.

Turning OFF procedure -

1. Close the gate valve between LL & Main chamber.
2. Turn OFF the LL vacuum pump & main power of LL chamber.
3. Turn OFF the main supply switch.
4. Turn OFF the compressor using the switch on the backside of compressor.

Turning ON procedure of Cryo pump -

- Press the reset switch.
- Turn on the Main power switch of the tool.
- Check the temperature of the cryo.

If cryo temp > 280K

1. The cryo gate valve should be closed. The gate valve between Main chamber and Load Lock chamber should be closed.
2. Vent the cryo by opening the cryo vent valve on the cryo.
3. Close the cryo vent valve completely after venting.
4. Vent the Main chamber by opening the Main chamber vent valve.
5. Close the Main chamber vent valve completely after venting.
6. Switch off the Load Lock vacuum pump.
7. Wait till pressure of Load Lock chamber reaches 760 Torr. .(Check it at vacuum gauge on Load Lock chamber)
8. .Open the gate valve between Main chamber and Load Lock chamber.
9. Switch on the Load Lock chamber Power .
10. Switch on the vacuum pump of Load Lock chamber.
11. Wait till pressure of Load Lock and Main chamber reaches $1e-1$ Torr.(Check it at vacuum gauge on Load Lock chamber).
12. Press the LOCAL button on cryo gate valve controller on the front panel of sputter. Then press the CLOSE button
13. Switch on the compressor .
14. Wait till cryo temperature reaches till 13-14 K.

If cryo temp < 100K

1. The gate valve between the main chamber and cryo should be closed.
2. Switch on the compressor.
3. Wait till Cryo temperature reaches till 13-14 K.

Emergency shut down procedure

1. Press the emergency stop on the top on front panel of the system.

