



IIT Bombay Nanofabrication Facility

Tool Name: Sputter Orion

Standard Operating System (SOP)

INDEX

Contents

Tool's Overview	1
Sample Holders:.....	2
Check the following facilities before using the system:	2
Loading process	4
Sputtering process	6
System Turning ON procedure	8
System Turning OFF procedure	8

Tool's Overview



Fig. Sputter Orion

Sample Holders:

There are 3 different sample holders for substrates.

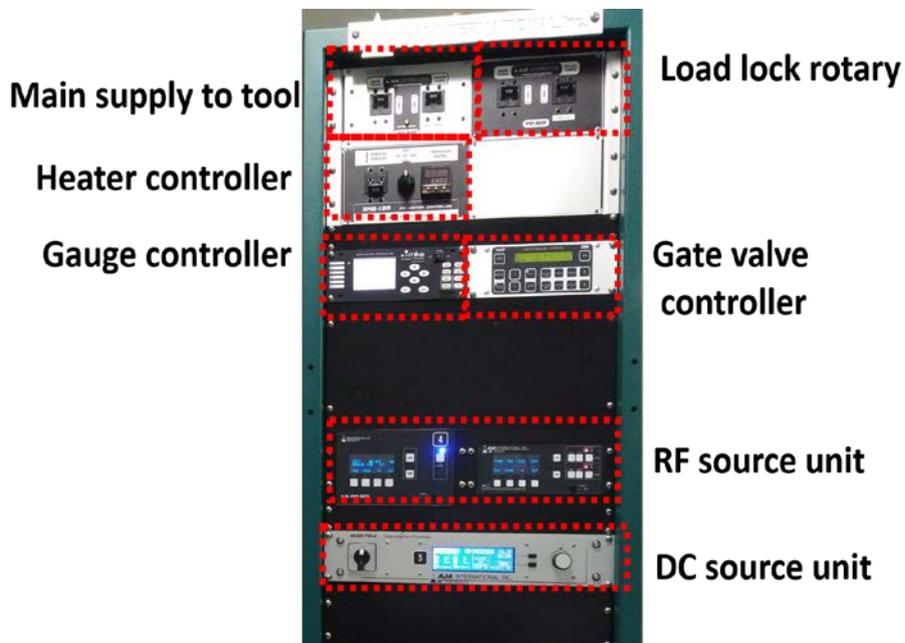
Sample loading chucks



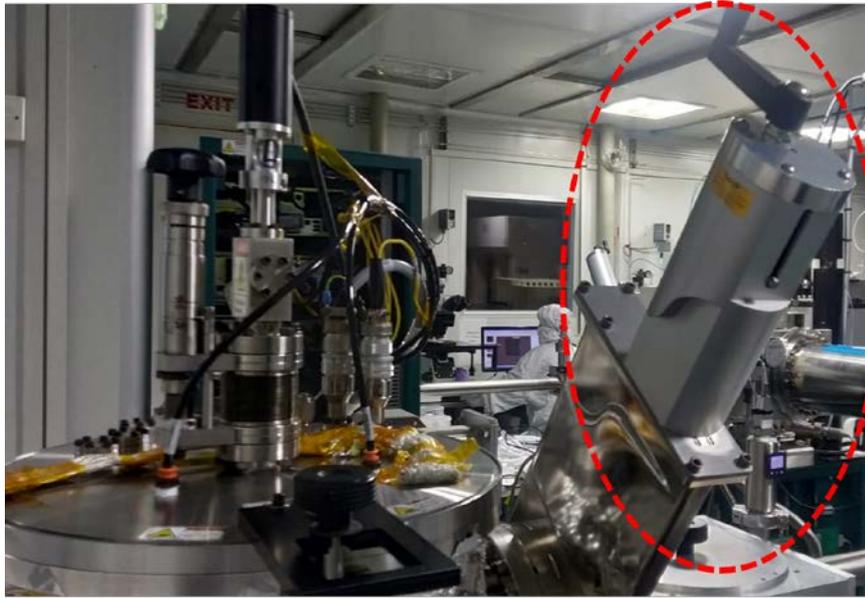
- “W”.
2. One Sample Holder is dedicated for photo resist samples marked at back with letter “R”.
 3. One is used for samples (with and without resist) which are placed on chuck using thermal tape marked at back with letter “T”.

Check the following facilities before using the system:

1. After coming inside the Nano lab–
 - a. Check the “Mains Power supply” on controlling unit

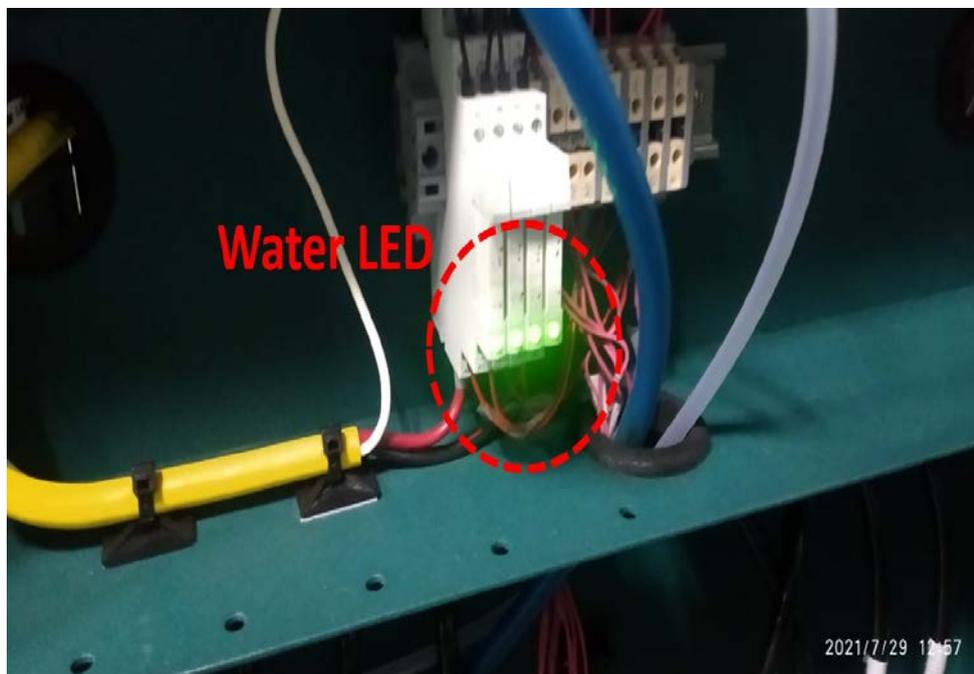


- b. Load lock chamber and slit valve between main chamber and load lock should be closed.

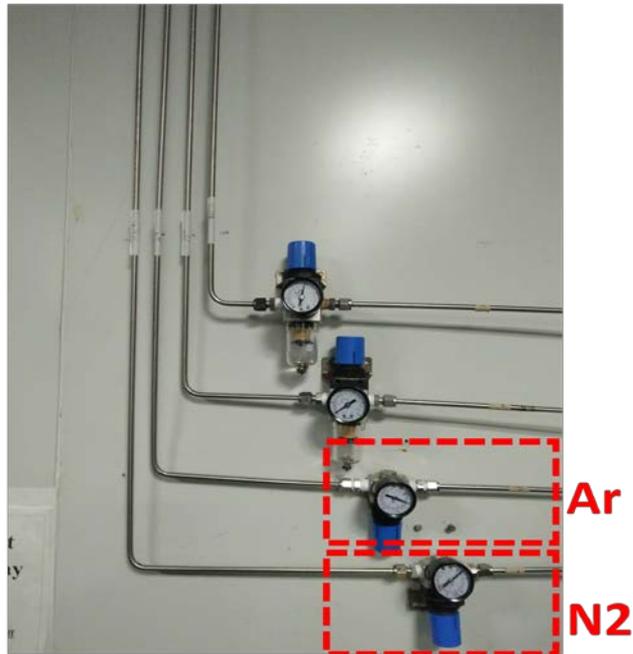


Close position of Slit-valve

- c. Check the 4 green LEDs at the backside of the tool and make sure all LEDs are glowing. If not then please contact SO/EMT/Facility and do not start process unless and until all LEDs turn green.



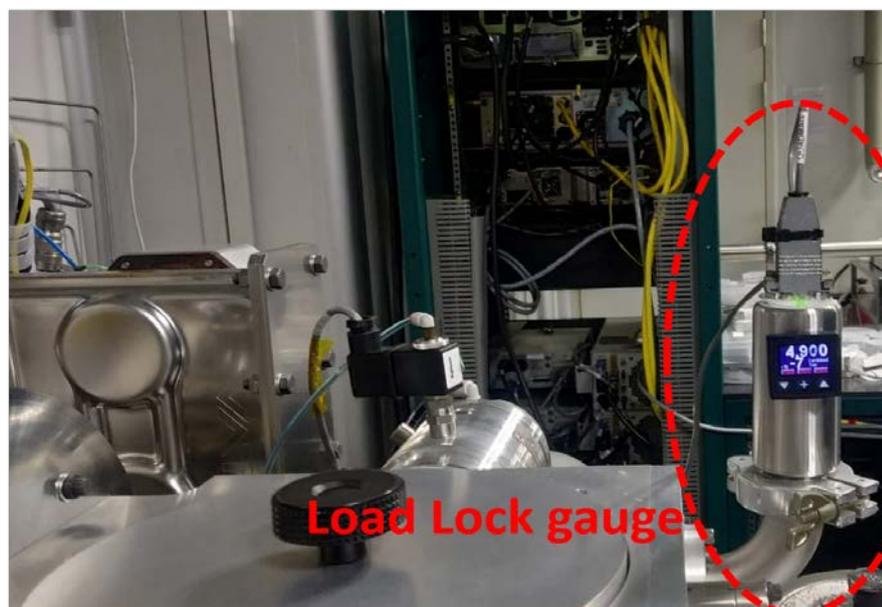
2. Turn ON the required process gases. Set the pressure of gases to 10 psi



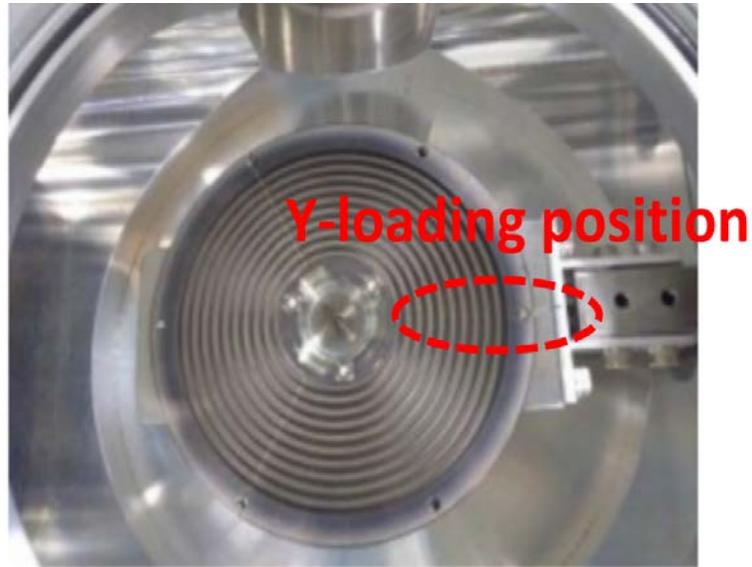
3. Make sure Slit-valve (between the Main chamber and Load lock chamber) should be closed.
4. Turn on the N2 valve for venting.

Loading process

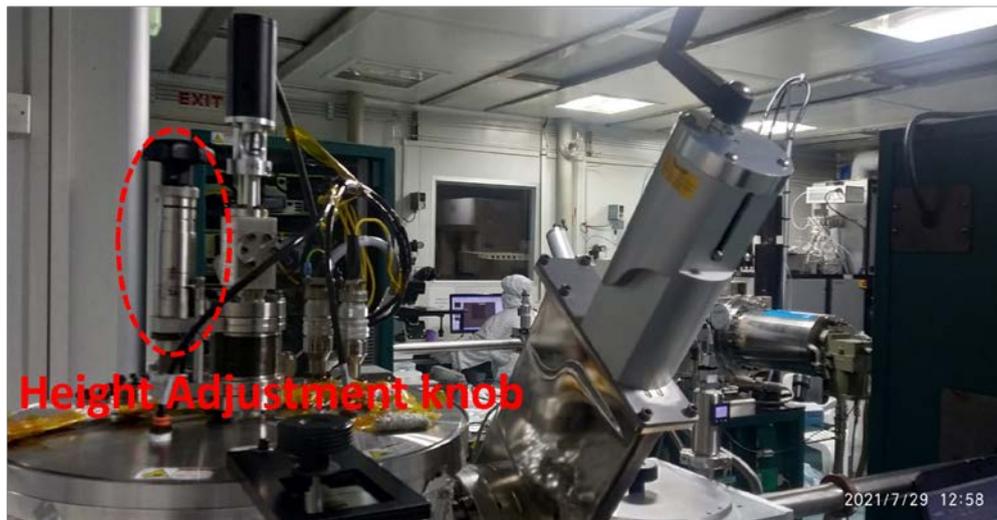
1. Turn OFF the load lock chamber vacuum pump. Wait for the load lock chamber to come to atm. pressure (760 Torr) monitor same from load lock gauge controller.



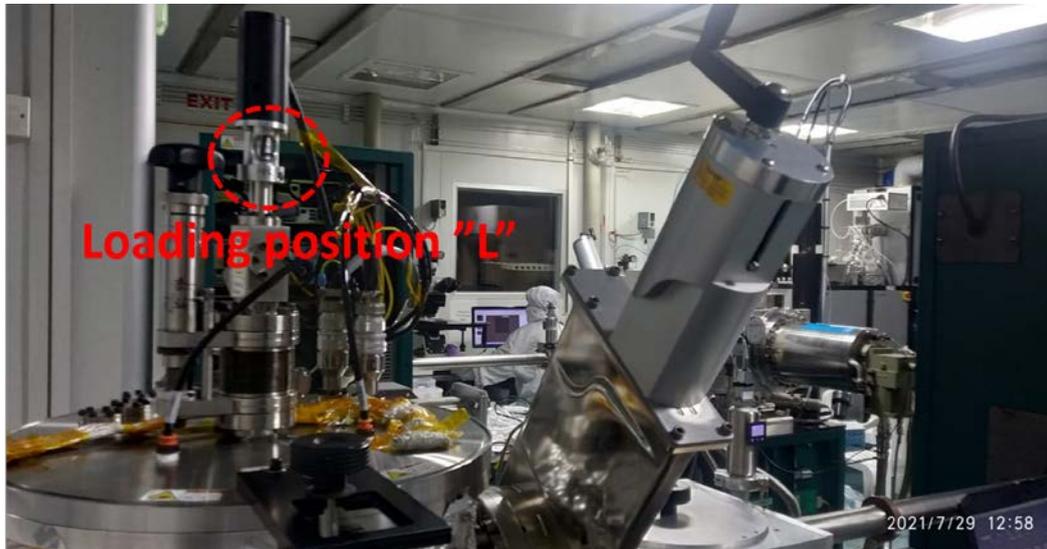
2. Take the lid off and keep it on the 3 rest points.
3. Place the sample on the sample holder.
4. Place the holder in the load lock chamber, taking care of the screws provided on the transfer arm to place the holder correctly (in “Y” position toward main chamber).



5. Place the lid properly and turn on the load lock vacuum pump.
6. Wait for the pressure to reach $5e-6$ Torr.(On load lock gauge)
7. Open the gate valve between main chamber and load lock chamber.
8. Check if the position of the substrate height adjustment knob is below the bottom mark (position "24" on the substrate height adjustment knob). If not, then rotate the knob in anti-clockwise direction until it reaches below the bottom mark.



9. Rotate the rotator to “L” position (on substrate rotator).

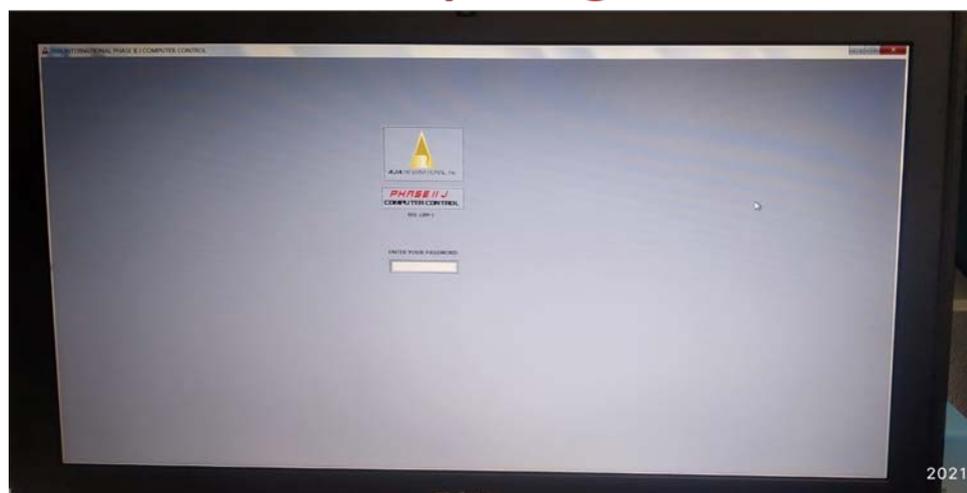


10. Move the transfer arm into the main chamber.
11. Rotate the substrate height adjustment knob in clockwise direction until it reaches below the upper mark ((position “37”).
12. Rotate the rotator to “E” position (on substrate rotator). If it does not rotate then adjust the height adjustment knob a bit and then again rotate the rotator to E position.
13. Rotate height adjustment knob to position ”24”.
14. Move out the transfer arm into the load lock chamber.
15. Close the gate valve between main chamber and load lock chamber.
16. Fix the substrate height adjustment knob to position ”32” position.

Sputtering process

1. Turn on the CEN sputter (Orion) Laptop and press Remote controller on front panel of sputter system.
2. Start the Phase-III software and enter the password. You will see the System configuration page as shown in fig(1).

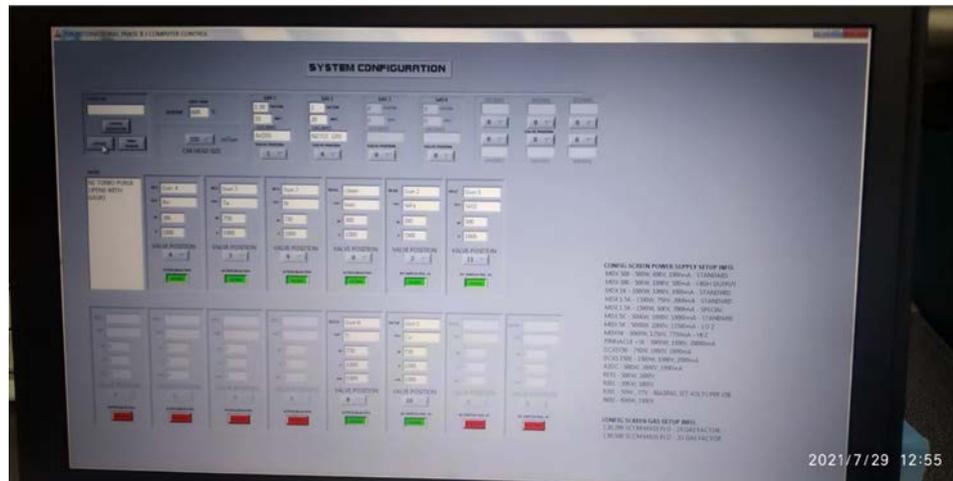
After opening software



Fig(1)

3. Set STPT value to 10 and turn on the Ar gas flow shown by arrow (b) in fig (2).
4. Set the pressure to 30 m Torr using the “pressure” button (a) show in fig(2) for Plasma generation.

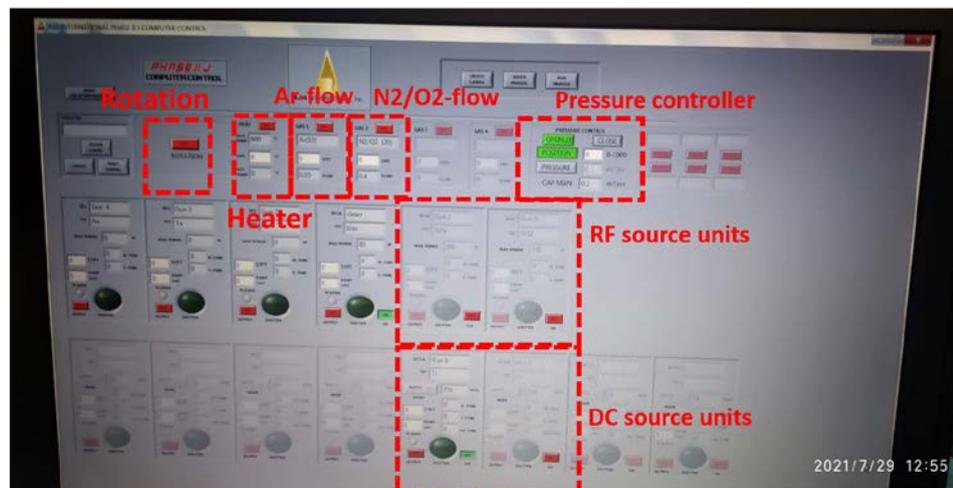
Editing window



Fig(2)

5. Select the gun according to your desired target. (e.g. Ru target shown by arrow (d) in fig(2))
6. Set the forward power in the STPT shown by arrow (c) in fig(3) with the Ramp time=(forward power/10) sec.

Processing window



Fig(3)

7. Turn on the “OUT PUT” button.
8. After the plasma strikes, set the process vacuum to desired value using “pressure” button.
9. Start the deposition by pressing “closed” button.
10. If you want to rotate the substrate during the deposition for uniformity, you can turn on the substrate rotator using the “rotation” button as shown by arrow (r) in fig(2)
11. Do the deposition as per your thickness requirement.
12. After deposition, close the shutter. Set the forward power to 0 with the same ramp time.
13. Turn off the “OUTPUT” button.
14. If you want to deposit another material just after this, repeat the steps 2-10.

The turbo pump of the system is always on and is shut down only during maintenance/ any emergency / servicing. So the steps given below should be followed only when any such situation arises and in consultation with the SO.

System Turning ON procedure

1. Vent the main chamber and load lock chamber using vent valve of the main chamber. (ensure that the PN2 valve is open)
2. After venting the chambers, close the vent valve.
3. Open the gate valve between the load lock chamber and the main chamber and the main chamber and turbo.
4. Turn on the load lock vacuum pump using load lock chamber “main power” and “vacuum pump” switch.
5. Start the turbo using the main chamber “main power” and “vacuum pump” switches when the vacuum reaches $5e-2$ Torr (on load lock gauge)
6. Close the gate valve between the main chamber and the load lock chamber.

System Turning OFF procedure

1. Close the gate valve between the load lock chamber and the main chamber.
2. Close the gate valve between the main chamber and the turbo pump.
3. Turn OFF the load lock chamber vacuum pump and the main power switch of the load lock chamber.
4. Turn OFF the main chamber vacuum pump and the main power switch of the main