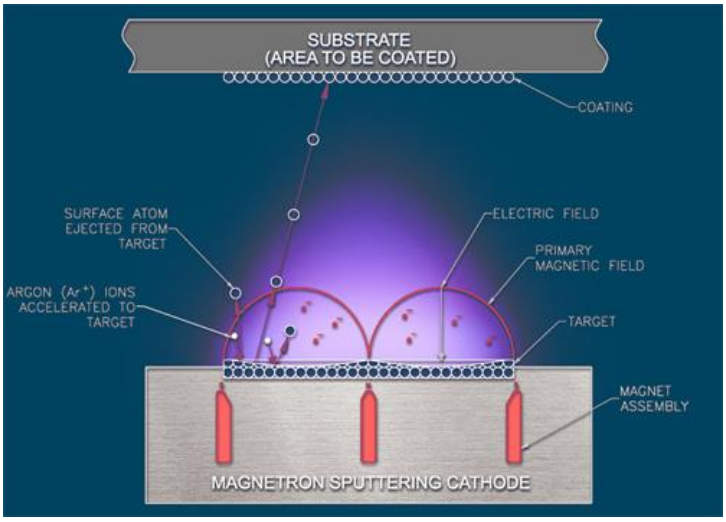
Magnetron Sputtering SOP v.1.1



1.Important note before starting operation

You have to be authorized by Dr. Tang and properly trained by Dr. Tang's group member before operate the system.

This system is dedicated for metal sputtering, insulating material cannot be sputtered.

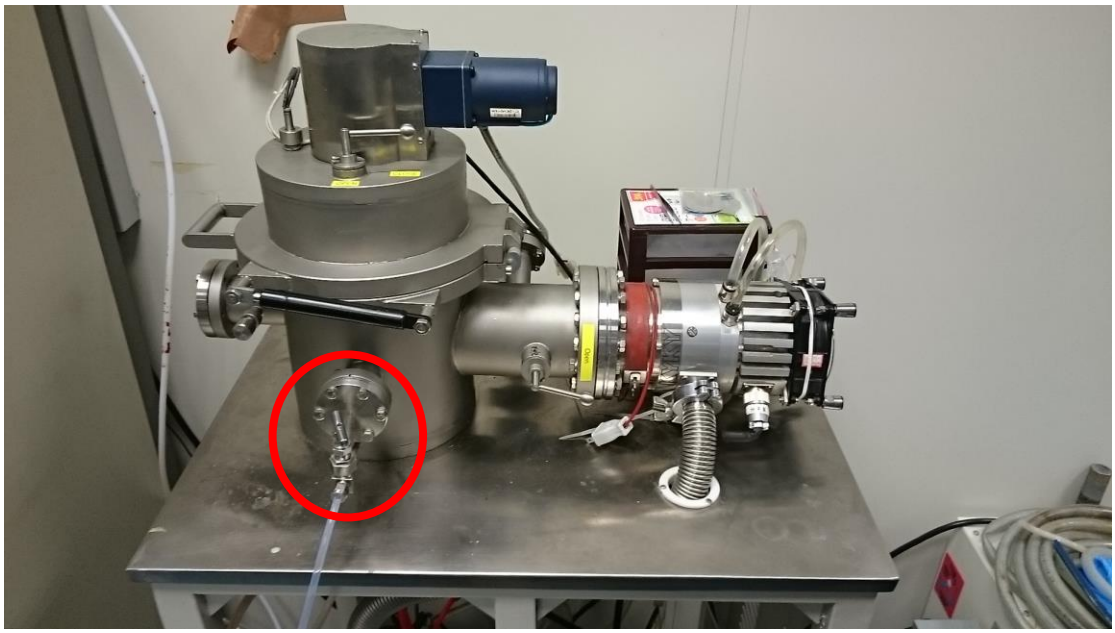
Gloves are required before routine operation to avoid the grease on hand that will damage the vacuum condition of the chamber.

2.Loading sample

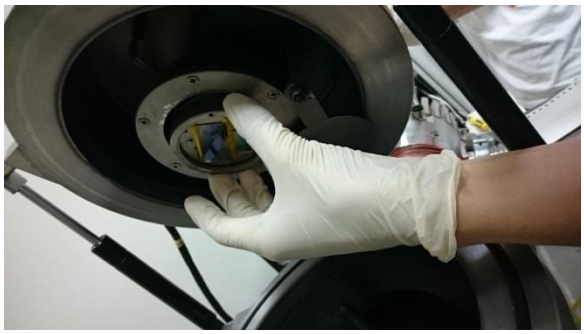
2.1 **Make sure that the system is turned off.**

2.2 Open argon gas valve from cylinder, make sure enough gas is available.

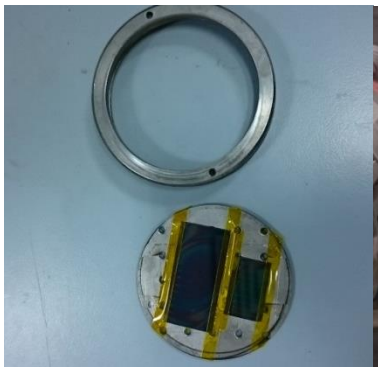
2.3 Vent the chamber by opening the valve as shown following.



2.4 Open the chamber and unscrew the sample holder as following.



2.5 Tape your sample on the sample holder with yellow kapton tape.



2.6 Load sample holder back to stage.

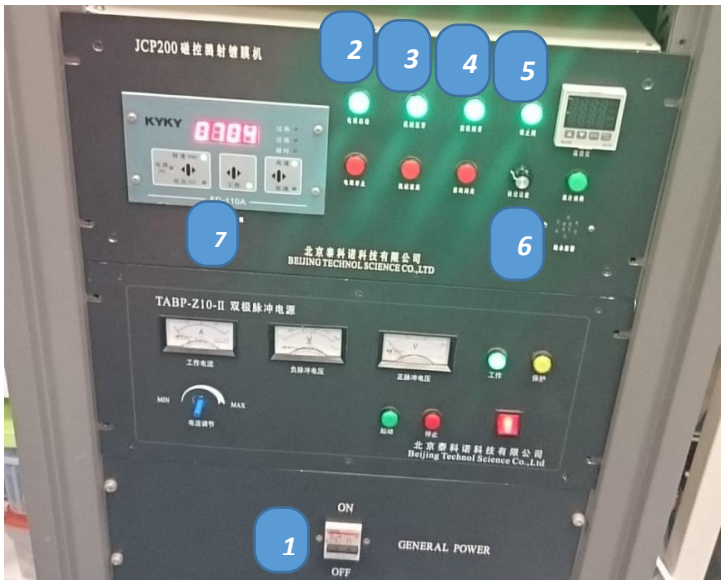
2.7 Load appropriate target. Currently available target: Ni, Al, W, Ti

2.8 Close the venting valve. Close chamber lid; make sure there is no metal dust on the O-ring.

(In case you want to clean the O-ring, use ***Isopropanol***, ***DO NOT USE Acetone!!***)

2.9 Turn on cooling water, and switch on the general power (1).
Switch on main power (2), then roughing pump power (3), then pump valve (4), and working gas valve (5). This will start to pump the system.

2.10 Tune the rotation motor speed controller (6) to full speed, make sure sample holder is rotating.



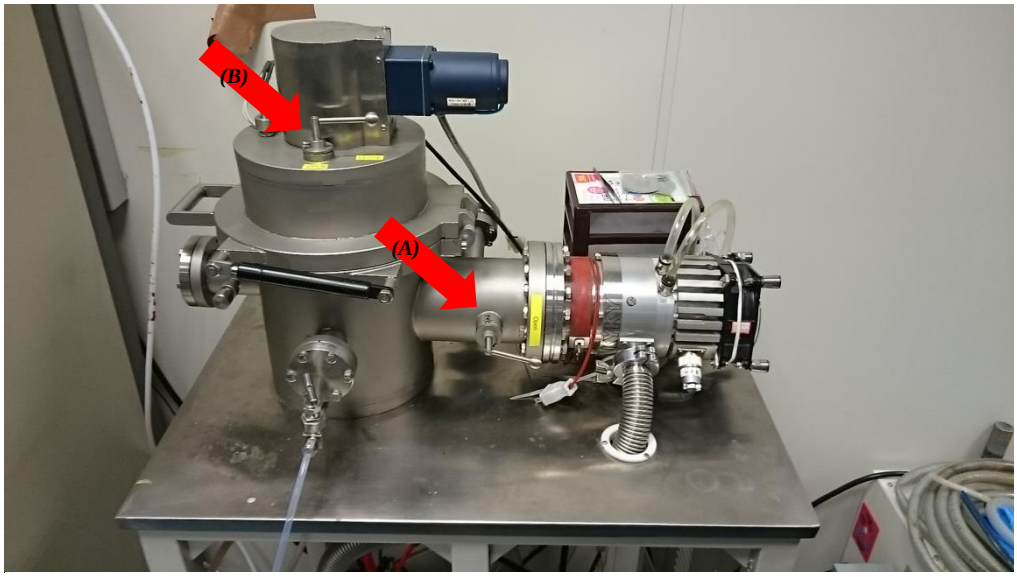
2.11 Turn on mass flow meter and switch the Ar gas to purge. Make sure the Ar gas tank valve is open. This will set the flow rate ~25sccm which will purge the chamber and the tubing.

2.12 Purge the tube for >5min, then switch the Ar gas OFF. Make sure the pressure is lower than 20Pa. Start the turbo pump by pressing (7), the pump will start and eventually running at ~704Hz.

2.13 Pump the system for another 1 hour, the system is ready for deposition.

3.Deposit material

3.1 Close the bufferfly valve **(A)** as following. Make sure the shutter **(B)** is OFF.



3.2 Switch on Ar flow and tune the flow to 10sccm, wait 10min to purge chamber.
3.3 Adjust the bufferfly valve **(A)** to stabilize the pressure to 0.5Pa
3.4 Check the thickness monitor setting (density, tooling)
3.5 Turn on sputtering power supply. And adjust the current to desired value. Plasma is ON.

3.6 Wait until 10nm material is deposited, then open the shutter **(B)** and start deposition. You should zero the reading of thickness monitor at the same time. Typical receipt is listed as following:

Material	*Tooling factor*	*Current*	*Ar Pressure (Pa)*	*Rate (nm/min)*
Ni	1.25	Max power	0.5	2.0
Ti	1.25	0.1A	0.5	6.8
Ti	1.25	Min power	0.5	2.0
Al	1.25	0.1A	0.5	10.0
Al	1.25	0.05A	0.5	2.0
W	1.25	0.05A	0.5	6.8

3.7 When desired thickness is reached, turn off plasma power, and then switch off Ar flow. Wait for 5min to cool down the target, before you start turning off the system and venting the chamber.

4.Turn off and stand by system

4.1 Turn off the turbo pump. Wait the speed slow down to zero.
4.2 Switch off system reversely as starting (5⇒4⇒3⇒2⇒1)
4.3 Vent the chamber and unload your sample.
4.4 Load the sample holder back to stage and pump the system back to <20Pa with roughing pump. (1⇒2⇒3⇒4)
4.5 Switch off system and seal the chamber.
4.6 Turn off cooling water.