

Denton Desk III TSC Sputter Coater

Operating Instructions

Metal Sputtering (Au, Au/Pd, Pt)

1. On the PDA, start the 'Instant HMI' software if it is not running (Login: DVI, Password: desk3) and go to System Operation.
2. Open the chamber by pulling the sputter head assembly directly upward and then rotating to the left and rotating the sputter head counter clock-wise so it faces upward.
3. Make sure the appropriate target is installed (Au/Pd should be installed by default). Other target materials (Au, Pt) are in the drawer below the coater.
4. Load your samples onto the sample stage.
5. Inspect the chamber seal for dust and debris.
6. Close the chamber by rotating the sputter head so it faces downward and rotating the entire assembly to the right and then lower it into contact with the chamber.
7. Select the 'Vacuum' control menu and turn the Rough Pump ON.
8. Wait for the pressure to fall below 200 mTorr and then turn the Turbo Pump ON.
9. The vacuum gauge will base out (a few mTorr) before the turbo pump is completely up to speed. Allow a minimum of 5 minutes before sputtering. For the best/cleanest sputtering, pump for 15-20 min to achieve vacuum in the 10^{-5} Torr range.
10. If you wish to rotate/tilt the stage during deposition, go to the 'Rotation' control menu, set the Rotation Setpoint to the desired speed (20 is good for a 3nm coating) and turn ON the Rotation Power.
11. From the 'Vacuum' control menu, OPEN the Gas Valve and allow the system to settle at a pressure of 5 mTorr above the base pressure. If necessary, you may adjust this pressure slightly with the gas control knob to the left of the chamber.
12. Turn the power on for the thickness monitor.
13. When the system is flashing "P-FAIL" press the STOP button to clear the message.
14. Press the START button to reset the thickness reading.

15. Select the film number for the metal you are depositing according the table below (press the film number button and use the up/down arrows) and verify the material properties:

Film Number	Material	Density	Acoustic Impedance	Tooling Factor*
1	Au/Pd	16.38	23.80	650
2	Pt	21.4	36.04	650
3	Au	19.3	23.17	650
4	W	19.3	54.17	650
5	Ti	4.5	14.06	650
6	Al	2.7	8.17	650
7	Ag	10.5	16.69	650
8	Bi	9.8	11.18	650
9	Zn	7.04	17.17	650
10	Pd	12.0	24.73	650

*Please note that the tooling factor has been calibrated using a samples in the inner ring of holes. There is significant uniformity variation across the stage (~50%). If you need an exact measurement of thickness, you should verify it with an independent measurement.

16. As you sputter, the thickness will be displayed on the right display in kÅ (i.e. 0.030 is 3nm).

17. Select the ‘Sputter Enable’ menu and set the Sputter Setpoint to 40.

18. Turn the Sputter Power ON. The Hi-Voltage should read ~35 mAmp – this is approximately the power you should try to achieve and can be adjusted with either the gas control knob or sputter setpoint. However, this is not critical and as long as the thickness monitor is showing deposition it should be OK.

19. When you the thickness monitor reaches the desired thickness, turn the Sputter Power OFF, CLOSE the Gas Valve, and turn OFF the Rotation Power.

20. Turn OFF the Turbo Pump and wait 10 minutes to allow the pump to spin down – if you don’t do this, you may damage the pump.

21. After 10 minutes, turn OFF the Rough Pump and the chamber will vent.

22. Open the chamber, remove your sample and close the chamber back up – it is not necessary to evacuate the chamber at the end of your session. Leave the system power on at all times, but shut off the power to the thickness monitor.

Carbon Evaporation

1. Open the sputter chamber.
2. Remove the rubber seal on the sputter chamber.
3. Load carbon yarn or rods into the carbon evaporator assembly – if you haven't done this before, please ask for help.
4. Inspect all seals for dust and then place the glass cylinder on top of the sputter chamber and place the carbon evaporator assembly on top. Be very careful not to chip or break the cylinder.
5. Pump the system down as described above.
6. Turn the high-voltage supply for the carbon accessory all the way down and turn on the power.
7. Increase the power until you get to ~10A (this is a good temperature to outgas the yarn) and hold for a minute or two.
8. Increase the power to ~20-30A and allow the carbon to evaporate. With higher power you will get a thinner the film and less sample heating, but never exceed 50A.
9. After evaporation, turn down the power completely and turn off the carbon accessory.
10. Shut down the pumping system and vent the chamber as described above. Replace the sputter head assembly on the top of the chamber.