<u>Denton Desk III TSC Sputter Coater</u>
Standard Operating Procedures

In case of emergency, contact:
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Metal Sputtering (Au, Au/Pd, Pt, etc.)

1. On the PDA, the 'Instant HMI' software should be running
    a. If it is NOT running, start it
    b. Login: **DVI**, Password: **desk3**
    c. Select: System Operation
2. Open the chamber by lifting the chamber lid straight up, swing it to the left, then rotate the sputter head CCW so it faces upward.
3. Make sure the appropriate target is installed
    a. Au/Pd is usually installed by default
    b. 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 CW so it faces downward, swing the lid to the right and then lower it onto the chamber
7. On the PDA, select the **Vacuum** control menu
8. On the PDA, turn the Rough Pump **ON**.
9. Allow the chamber to pump until the pressure reaches ~200 mTorr
10. On the PDA, turn the Turbo Pump **ON**.
11. Wait 10 minutes for the Turbo Pump to spin up.
12. **OPEN** both valves on the main Argon tank (to the left of the instrument at the end of the counter)
    a. **DO NOT TOUCH** the Gas valve on the Sputter Coater itself
13. On the PDA, **OPEN** the Gas Valve.
    a. The pressure should settle ~5 mTorr above the base pressure
14. To activate the stage rotation <u>(NOT REQUIRED)</u>
    a. Select the **Rotation** control menu
    b. Set the Rotation Setpoint (20 is good for a 3nm coating)
    c. Activate Rotation Power
15. Turn the thickness monitor power **ON**
16. The two screens should flash **P FAIL**
17. Press the **STOP** button to clear the message
18. Press the **START** button to reset the thickness reading
19. On the Thickness Monitor, press the **Film Number** button and use the up/down arrows to select the material of your target.

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.

20. On the PDA, select the **Sputter Enable** menu
21. Ensure the Sputter Setpoint is 40
22. Turn the Sputter Power **ON**
    a. The Hi-Voltage should read ~35 mAmp
    b. If the amperage is very high, there is probably a short around the target
    c. If the amperage is very low, a fuse is probably blown
23. As the system sputters, the thickness will be displayed on the right display of the Thickness Monitor in kÅ (i.e. 0.010 = 1nm, 0.100 = 10nm, etc.)
24. Turn Sputter Power **OFF** when the display reads ~1nm less than the desired thickness
25. Turn **OFF** the Thickness Monitor
26. If you had the Rotation on: On the PDA, select the **Rotation** menu and turn **OFF** the Rotation Power
27. On the PDA, select the **Vacuum** control menu
28. On the PDA, **CLOSE** the Gas Valve
29. On the PDA, turn **OFF** the Turbo Pump
30. Wait 10 minutes for the Turbo Pump to spin down
    WARNING: if you don't do this, you may damage the pump
31. **CLOSE** both valves on the main Argon tank (to the left of the instrument at the end of the counter)
    a. **DO NOT TOUCH** the Gas valve on the Sputter Coater itself.
32. Turn **OFF** the Rough Pump and the chamber will vent
33. Samples may be removed
34. It is not necessary to evacuate the chamber at the end of your session
35. Leave the system power on at all times

Carbon Evaporation

1. Open the chamber by lifting the chamber lid straight up, swing it to the left, then rotate the sputter head CCW so it faces upward.
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.