

Operation Procedure for SPUT3 Kurt Lesker PVD 75 DC Metal Sputter System

Start Up & Sample Loading

1. Sign-in to the logbook
2. Verify the system is pumped down and the turbo speed is at ~100%
3. Turn OFF the DC power supply if it is powered on
4. On **RECIPE** screen press “Vent” and verify that the vent starts
5. After the vent is complete, Press “DONE” and open the chamber door
6. Verify the “white bar” on top of the sample holder is towards the rear of the chamber, if it is not then turn on the platen rotation until it is towards the back
7. Unscrew the 2 screws at the front of the sample holder and remove the cover. Be use to use caution to not lose the screws or the washers that hold the cover in place
8. Remove the sample holder and mount samples on it as needed
9. Put the sample holder back in place and replace the cover and the screws
10. Check the platen rotation to insure it rotates smoothly and does not rub the cover
11. Check the sputter targets to insure they are in good shape
 - a. Go to the **DEP** screen and press the appropriate shutter button so it turns green. This will open the shutter for the desired target.
 - b. If a target is damaged or needs replacing, contact SMIF
 - c. Close the shutter, verifying that it operates and closes correctly
12. Verify all 3 of the water flow switches are green (just below the shutter controls on the **DEP** screen)
13. Close the chamber door
14. On the **RECIPE** screen press “PUMP DOWN”
15. Watch and listen for the pumpdown to occur properly

Running the system

16. Allow the chamber to pumpdown preferably to 5.0e-6 TORR
17. Turn on the platen rotation, the dial should be set at approximately 4
18. Set the “Source Select” knob to the appropriate sputter target number (1, 2, or 3)
19. Set up the crystal monitor (if used)
 - a. Press “Xtal Life” to check the life of the crystal. It should be above 70%, if it is not then contact SMIF
 - b. Press “Xtal Life” again to return to thickness monitoring
 - c. Press “Program”
 - d. Select the film profile to use by rotating the large knob
 - e. To select the program PRESS IN the large knob
 - f. Verify the density of the material (see the chart posted at the tool)
 - g. PRESS IN the large knob being careful to NOT rotate it
 - h. Verify the tooling factor for the material
 - i. Currently the tooling factors are:
 1. Ti = 180%
 2. Cr or Al= 240%
 3. Au = 141%
 - i. PRESS IN the large knob being careful to NOT rotate it

- j. Verify the Z-Factor of the material (see the chart posted at the tool)
 - k. Press “Program” to exit
 - l. Verify the correct film profile is selected by pressing the “program” button twice and checking the film profile number in the display
 - m. Press the “Zero” button
20. Reduce the turbo speed to approximately 40-50%
- a. On the **VAC** screen press the black % number display and input the desired turbo speed % and press Enter. Be careful not to turn off the turbo (would turn grey if turned off)
21. Turn on the DC power supply via the “Power” button and verify “INTLK” is not flashing
22. On the **GAS** screen open the “GAS INJ” valve by pressing it so it turns green. This will allow the gases to flow into the chamber and allow pressure and flow control. This has to be done **FIRST!**
23. On the **GAS** screen press “CTRL” on the Argon MFC to set it to pressure control mode.
24. Set the chamber pressure to approximately 5-15mT by pressing the white numbers below “SETP (mTorr)” the **GAS** screen and press Enter
25. Allow the turbo pump to reach the reduced speed and verify the chamber pressure is stable at the desired setpoint (the green numbers below “CAPMAN (mTorr)” on the **GAS** screen)
26. Set the sample RF bias (if used)
- a. Set the generator to 50W maximum to start
 - b. Turn the generator on via the RF ON/OFF button
 - c. Verify & adjust the RF tuning as needed to get minimal reflected power using the manual LOAD and TUNE knobs.
 - d. Increase the power if desired to a maximum of 100W
27. Set the sample heating (if used)
- a. Adjust the heater setpoint using the up and down arrows on the larger heat display
 - b. Power on the heater using the rocker “output” switch
28. Set up and start the sputter target DC power
- a. Set the “Regulation” buttons to “Power”
 - b. Set the right display to “Setpoint”
 - c. Adjust the “Level” knob to 100W maximum (unless a lower value is desired)
 - d. Press “Actual” under right display so that “Volts” (the most commonly watched value) is displayed
 - i. During a process if volts are low then there is an oxide on the metal that needs to burn off and if volts rise significantly at a constant power setting then there may be a target problem (such as overheating)
 - e. Press the “ON” button below “Output” to start the sputtering target
 - f. Ramp the power up to the desired power level with the shutter closed at a ramp rate of **50W/minute maximum** via the “Level” knob
 - i. For Ti the **maximum power** that can be used is **480W**
 - ii. For Cr, Al and Au the **maximum power** that can be used is **700W**

29. Once at the desired DC power level, open the shutter (via the **DEP** screen) and press “Zero” on the crystal monitor controller to start a timer and to zero the thickness
30. Watch the crystal monitor display for your desired deposition rate and thickness and adjust the DC power accordingly
31. Once the target deposition is finished, close the shutter (via the **DEP** screen)
32. Ramp the sputter target DC power down at **50W/minute** to at least 100W via the “Level” knob
33. Turn off the DC power via the “OFF” button below “Output”
34. Turn off the sample bias RF (if used) and heater (if used)
35. On the **GAS** screen close the “GAS INJ” valve (turns grey). This will turn off the gas and set the MFC back to flow control mode with zero flow
36. On the **VAC** screen increase the turbo speed setpoint to 100%. (Press the black % number display and input the desired turbo speed % and press Enter). Be careful not to turn off the turbo (would turn grey if turned off)
37. Turn off the DC power supply via the “Power” button
38. Turn off the platen rotation
39. Once the turbo speed reaches ~99% to 100% press go to **RECIPE** screen and press “VENT”

Ending the process

40. After the vent is complete press the green “DONE” button and open the chamber door
41. Verify the “white bar” on top of the sample holder is towards the rear of the chamber, if it is not then turn on the platen rotation until it is towards the back
42. Unscrew the 2 screws at the front of the sample holder and remove the cover. Be use to use caution to not lose the screws or the washers that hold the cover in place
43. Remove the sample holder and remove samples on it as needed
44. Check the window cover and chamber components and clean/vacuum them if needed
45. Put the sample holder back in place and replace the cover and the screws
46. Check the platen rotation to insure it rotates smoothly and does not rub the cover
47. Close the chamber door
48. On the **RECIPE** screen press “PUMP DOWN”
49. Watch and listen for the pumpdown to occur properly
50. Once the pumpdown is running normally, the process is complete
51. Update any necessary information in the logbook