

# Operation Procedure for SPUT2

## Kurt Lesker PVD 75 RF Dielectric 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. On **RECIPE** screen press “VENT” and verify that the vent starts
4. After the vent is complete, Press “DONE” and open the chamber door
5. 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
6. 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
7. Remove the sample holder and mount samples on it as needed, be sure to place a sample or a monitor in the very middle of the sample holder if the optical monitor is to be used.
8. Put the sample holder back in place and replace the cover and the screws
9. Check the platen rotation to insure it rotates smoothly and does not rub the cover
10. 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
11. Verify all 3 of the water flow switches are green (just below the shutter controls on the **DEP** screen)
12. Close the chamber door
13. On the **RECIPE** screen press “PUMP DOWN”
14. Watch and listen for the pumpdown to occur properly

### Running the system

15. Allow the chamber to pumpdown preferably to 5.0e-6 TORR
16. Turn on the platen rotation, the dial should be set at approximately 4
17. Set the “Source Select” knob to the appropriate sputter target number (1, 2, or 3)
18. Set up the optical monitor (if used)
  - a. Load appropriate filter into the detector housing under the chamber setting the filter to be used into the slot first
  - b. Power on the optical monitor and the chart recorder
  - c. Set the measurement wavelength range using the knob on the bottom of the detector housing
  - d. Set the gains on the monitor so the needle in near the center on the scale with no overload
  - e. Set the chart recorder speed and voltage
  - f. Remove the cap from the chart recorder pen (please don't lose it)
  - g. Start the chart recorder
  - h. Further explanation of the optical monitor system and its use can be seen in its manual that is located near SPUT2

19. 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)
20. 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!**
21. On the **GAS** screen press "CTRL" on the Argon MFC to set it to pressure control mode.
22. If a percentage of Oxygen is needed press "SLV" on the Oxygen MFC and set the ratio of Oxygen to Argon via the white numbers under the word "RATIO"
23. Set the chamber pressure to approximately 5-15mT by pressing the white numbers below "SETP (mTorr)" the **GAS** screen and press Enter
24. 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)
25. 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
26. 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
27. Set up and start the sputter target RF
  - a. Set the setpoint to 50W maximum to start
  - b. Turn on the generator via the RF ON/OFF button
  - c. Watch for a plasma above the target in the chamber
  - d. If the plasma does not start, try the following (in order)
    - i. Quickly open and close the shutter
    - ii. Increase the process pressure slightly (possibly followed by opening and closing the shutter quickly)
    - iii. Decrease the turbo speed (possibly followed by opening and closing the shutter quickly)
    - iv. Increase the initial starting power to 80-100W
    - v. If none of the above work, then contact SMIF
  - e. Once the plasma has started, verify that it has automatically tuned properly (minimal reflected power). If it has not it may need to be manually tuned. Contact SMIF if assistance is needed for this.
  - f. Ramp the power up to the desired power level with the shutter closed at a ramp rate of **10W/minute maximum**.
    - i. For ITO and Si<sub>3</sub>N<sub>4</sub> the **maximum power** that can be used is **175W**
    - ii. For SiO<sub>2</sub> the **maximum power** that can be used is **350W**

28. Once at the desired RF power level, open the shutter (via the **DEP** screen) and start the timer if a timed deposition is desired
29. Watch the chart recorder (if used) for waveforms. They will draw very slowly
30. Once the target deposition is finished, close the shutter (via the **DEP** screen)
31. Stop the chart recorder (if used)
32. Ramp the sputter target RF down at **10W/minute** to at least 50W
33. Turn off the sputter target RF, sample bias RF (if used) and heater (if used)
34. On the **GAS** screen close the "GAS INJ" valve (turns grey). This will turn off the gas and set the MFCs back to flow control mode with zero flow
35. 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)
36. Turn off the optical monitor, if used, and the chart recorder and replace the cap on the chart recorder pen
37. Turn off the platen rotation
38. Once the turbo speed reaches 100% press go to **RECIPE** screen and press "VENT"

#### Ending the process

39. After the vent is complete press the green "DONE" button and open the chamber door
40. 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
41. 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
42. Remove the sample holder and remove samples on it as needed
43. Check the window cover and chamber components and clean/vacuum them if needed
44. Put the sample holder back in place and replace the cover and the screws
45. Check the platen rotation to insure it rotates smoothly and does not rub the cover
46. Close the chamber door
47. On the **RECIPE** screen press "PUMP DOWN"
48. Watch and listen for the pumpdown to occur properly
49. Once the pumpdown is running normally, the process is complete
50. Update any necessary information in the logbook