UNIVERSITY OF CALIFORNIA
Santa Barbara
Electrical and Computer Engineering Department

Semiconductor Device Processing

Metal Evaporation – Thermal Evaporator

In this lab you will be using the 3176 / 3177 vacuum systems. A schematic of the vacuum system is shown in figure 1.

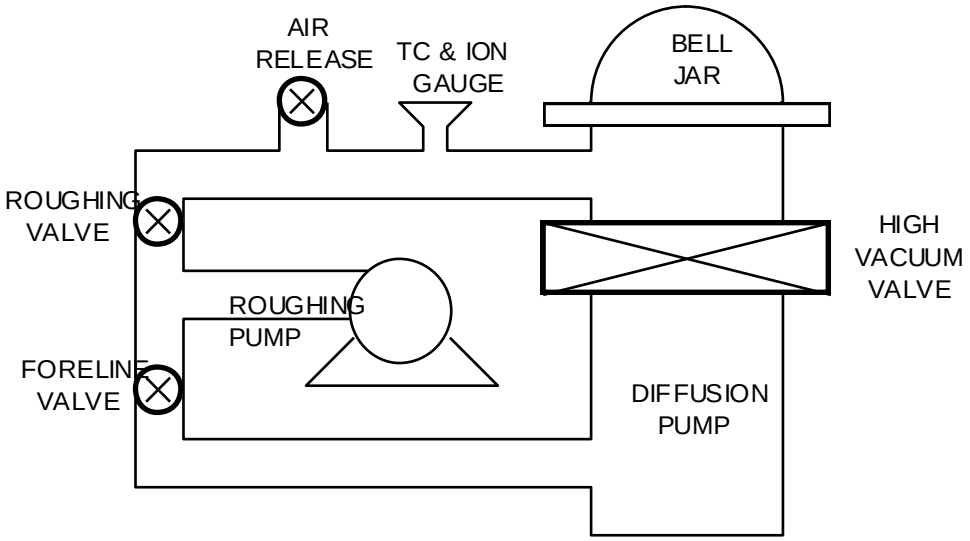

figure 1.

Operating Instructions

1. Ensure that the Mechanical pump and Diffusion pump circuit breakers are ON. Foreline and High Vacuum valves should be open.
2. Turn off the Ion gauge.
3. Switch system to 'Auto' (not center switch position).
4. Switch from 'Evacuate' to 'Vent' to fill the bell with nitrogen.
5. When the 'Hoist Enable' light comes ON, raise the bell jar by switching the 'Hoist' control to the 'Raise' position.
6. Load in the samples and secure them using the spring clips. Make sure the clips do not cover any areas of interest on the samples. Also ensure that the samples are in line-of-sight of the filaments.
7. Load the source material. You will be mainly evaporating Aluminum in this class. Wrap 12 to 14 inches of Aluminum wire around a 4 inch Tungsten filament. Make sure that the

wire is tightly wound and that it does not touch the electrical contacts. Load two or three filaments in the evaporator depending on the thickness desired so that you do not have to pump down again. **In case you are using some metal other than Aluminum, ask Bob or the TA for the correct Boat / filament**.

8. Check the Maxtek thickness monitor and ensure that the crystal is working. Change the settings for the metal you are going to deposit. The density and acoustic impedance for the metal you are using can be obtained from the instruction manual for the Maxtek thickness monitor.
9. Close the shutter over the filaments and then lower the bell jar using the 'Hoist' switch.
10. Switch to 'Evacuate' and put up the 'In Use' sign. The vacuum cycle is automatic. When the pressure reaches about 10^{-3} torr, turn on the Ion gauge.
11. Wait for the pressure to fall to the mid 10^{-6} torr range. (Approx 40 minutes)
12. Ensure that the electrode selector is switched to the desired filament, 1, 2 or 3.
13. Slowly ramp up the current until the metal begins to melt and wet the filament. Now open the shutter and reset the thickness on the Maxtek meter to zero.
14. Monitor the thickness on the Maxtek thickness meter. Use more than one filament if necessary. Remember to ramp up the current slowly each time.
15. When the desired thickness of metal has been deposited, close the shutter. Turn down the current and let the system cool for at least 10 minutes.
16. Turn off the Ion gauge.
17. Change the switch position from 'Evacuate' to 'Vent'.
18. Wait for the 'Hoist' light to come on and then raise the bell jar. Remove your samples from the sample holder.
19. Lower the bell jar again and switch to 'Evacuate'. Remove "In Use" sign.
20. Wait for crossover (when pumping switches from roughing pump to high vacuum pump).
21. Switch system to 'Manual' (not center switch position).

Caution:

* Always use gloves while loading or removing samples or source material from the evaporator.
* Always turn off the Ion Gauge before venting.
* Always leave the evaporator in High Vacuum mode.
* Clean the region around the bell jar seal so that there are no leaks, clean underside of sealing gasket.