# Pete
# Kurt J. Lesker Evaporation System
# Operation Procedures

*Last Updated: January 19, 2005*
*Master: Jim Hyland ext. 2-4304*

The following procedures must be followed **EXACTLY** to avoid damage to the vacuum system and other components. If you have **ANY** questions, call Jim Hyland, or Eric Stern. If you do not follow the instructions, you **WILL HURT/BREAK/DAMAGE THE SYSTEM**. Problems that occur as a result of not following these instructions will result in the **PERMANENT** removal of the user's qualification on this system, no exceptions. If you have questions, ask for help.

Loading Wafers and Materials for E-Beam

1. Fill out the SAMPLE LOADING section of the *PETE log sheet.*
2. Swing the chamber top plate to the left in order to load your samples.
3. Load your wafers into a wafer holder and place the holder into the system.
4. **Place the metal plate on top of the wafer holder. This is REQUIRED or else material will be deposited onto the heating lamps. ~$2000 Mistake!!!**
5. Remove e-beam crucibles and store in the **PROPER MARKED LOCATION**.
6. Carefully load crucibles into the hearth into the **PROPER LOCATIONS**. The locations are clearly marked on the chart pasted to the outside of the chamber and are scribed at the bottom of the individual locations.
7. Load material into the crucibles. You must supply your own crucibles and materials. Be careful not to load material above the top of crucibles. Make sure that any material loaded into a crucible is of greater than or equal purity to existing material. If you wish to use a different material than those listed on the chart please see the master for assistance.

Pumping Down the System

1. Carefully clean the vacuum chamber seal by wiping the top plate and o-ring with a non-abrasive wipe (e.g. Berkshire wipe)
2. **Lower the hoist using the hand controller. Make sure you avoid hitting the e-beam crystal monitor with the sample holder. ~ $2000 Mistake!!!**
3. Make sure that the cooling water is on by checking the gauges behind the system.
4. Turn on the mechanical pump using the "MECHANICAL PUMP ON/OFF" switch
5. Wait for the system to reach 2.0 E-2 T before turning on the Turbopump
6. Turn on the turbomolecular pump by pressing "TURBOPUMP ON"
7. Wait for the turbomolecular pump "normal operation" light to turn on
8. **Only after turning the turbomolecular pump has entered normal operation should you turn on the ion-gauge using the "ION GUAGE ON/OFF" switch. Turning on before the turbo pump has enter normal operation could destroy the ion gage. ~$10,000 Mistake!!!**
9. Check the PETE pumping down box on the *PETE log sheet* to inform other users of the status of PETE.
10. Wait for the system to reach the desired process pressure. Typically < 1.0 E-6 T.

Thermal Evaporation

1. Completely fill out the DEPOSITION section of the *PETE log sheet.*
2. Choose the appropriate boat (1-4) from the rotary selector on the front of the rack. Facing PETE boat one is the right most boat. Boat four is the left most boat.
3. Program the thickness monitor for the desired process program. If you do not understand this see the master.
4. **CLOSE BOTH THE FRONT AND SIDEPORT SHUTTER. ~ $1000 Mistake!!!**
5. Turn on the thermal power supply.
6. Press “RESET”, "START" and "ZERO" on the thickness monitor.

7. Increase the current percentage slowly (no more than 1 % every five seconds) until a satisfactory deposition rate is observed.
8. Record metal, emission current, rate, predep. and desired thickness in logbook
9. Press “ZERO” on the thickness monitor and open the sample shutter.
10. After reaching desired thickness close the sample shutter.
11. Slowly decrease the current percentage to 0 (no more that 1 % every five seconds).
12. If additional metals are to be evaporated, select the next boat using the rotary boat selector for the next evaporation and continue at step 3.
13. When you have completed your process turn the thermal power supply off and vent the system.

Ebeam Evaporation

14. Completely fill out the DEPOSITION section of the *PETE log sheet*.
15. Rotate the hearth to the desired metal.
16. Program the thickness monitor for the desired process program. If you do not understand this see the master.
17. Turn on the ebeam power supply.
18. Turn the high voltage switch on the control handset. After several seconds the beam voltage should reach its operation level between 6 and 7 kV.
19. Looking through the side port slowly increase the emission current until ebeam just becomes visible.
20. Center ebeam in the crucible and set desired sweep characteristics.
21. **CLOSE BOTH THE FRONT AND SIDEPORT SHUTTER. ~ $1000 Mistake!!!**
22. Press “RESET”, "START" and "ZERO" on the thickness monitor.
23. Increase the emission current to desired level.
24. Record metal, emission current, rate, predep. and desired thickness in logbook
25. Press “ZERO” on the thickness monitor and open the sample shutter.
26. After reaching desired thickness close the sample shutter.
27. Slowly decrease the emission current to 0 when evaporation is complete.
28. Turn off high voltage switch on control handset.
29. Wait 5 minutes for crucible to cool.
30. If additional metals are the be evaporated, wait five minutes for the crucible to cool and return to step 3.
31. When you have completed your process turn the ebeam power supply off and vent the system.

Venting the System

1. **Turn off the ion-gauge using the "ION GAUGE ON/OFF" switch. If you were to turn the turbo pump off before doing this you will destroy the ION GAUGE. ~$10,000 Mistake!!!**
2. **Turn off the turbomolecular pump by pressing "TURBOPUMP OFF" If you were to turn the roughing pump off before the turbo pump you could destroy the turbo pump. ~$30,000 Mistake!!!**
3. Turn off the mechanical pump using the "MECHANICAL PUMP ON/OFF" switch
4. Wait for system to reach atmospheric pressure (approximately 30 minutes)
5. The chamber lid can now sefely be opened with the hoist to remove or load samples

Unloading samples and leaving the system when you are done

1. Vent the system as described above.
2. Remove your samples.
3. Remove ebeam crucibles.
4. Lower the chamber lid and leave the system at atmospheric pressure.
5. Finish filling out the *PETE log sheet* and check the PETE FREE box to inform other users of the status of the system.