

**Microfluidic/Microfabrication Facility, Harvard Medical School**

**SHARON THERMAL EVAPORATOR OPERATING PROTOCOL**

1. **UNLOCKING THE CONTROLLER/LOGGING ON:**
   1. Access to the computer with your ecommon user name and password.
   2. Open the controller software “TIC PC Monitor” on the PC. Click option Auto-detect system and then “utilities” on the menu bar. Click on the **“front panel”** Unlock button located on the lower right side of the window and use password “824” to unlock only the **“front panel”.**
2. **EQUIPMENT PREPARATION:**
   1. Make sure the regulator for bell jar venting is 1-2psi (**NOTE: no more than 2 PSI or will cause serious damage to the bell jar**).
   2. Open the Nitrogen Tank Valve and the regulator valve for the shutter (NOTE: the pressure should be between 60-80PSI)
   3. Make sure the black manual valve connected to the tubing for the shutter is open too.
   4. Slightly loose the two screws located on each boat holders (source) with the Allen key and place the boat(s), DO NOT REMOVE the screws.
   5. SOURCE 1: FRONT SOURCE 2: REAR
   6. MAKE SURE THERE IS ONLY ONE BOAT IN EACH SOURCE. Use both sources only if you are planning sequential deposition.
   7. Tighten the two pair of screws.
   8. Add the proper amount of material using tweezers
   9. Place your substrate(s) on the substrate holder plate (make sure at least one, preferable 2 clamps are holding each substrate.
   10. Place the cylindrical bell jar shield.
   11. Move the shutter to open position (test if the shutter hits the shield when in open position, if it does, move the shield until the shutter stops touching the shield.
   12. Place the Bell Jar and close the shutter again.
3. **PUMP DOWN**
   1. On the turbo controller use the up/down arrows to highlight the turbo status line at the top of the screen. Once this is highlighted press the cycle button which resembles a circle, at the bottom right of the turbo controller. This will bring you to the system control screen. Highlight "System" using the up/down arrows then press the cycle button. This action will start the backing pump, open roughing line valve, and start the turbo pump. Press the menu button (located to the left of the cycle button) to return to the main screen and check the “WRG pressure”
4. **THERMAL DEPOSTION**
   1. Select the right program based on the material and a preset list located next to the equipment. If the material is not on the list you need to program the thickness monitor for the material you are depositing by using the program button (XTAL life button) and the rotating knob on the controller. You will need density and z-ratio of the material. **(CHECK THE LIST).**
   2. Once the turbo pump is at normal operating speed (display shows vacuum values 10-5) the thermal sources are operable. Using the thermal source select switch, select the source that you wish to be operable. The front source is source 1 and the rear is source 2. Turn thermal source power on by pressing the thermal source power button. Once the thermal source power is on, the thermal source select is not operable.
   3. Strat increasing the current to the selected source when the WRG pressure reaches 1x10-5Torr by using the thermal source power knob. You want to increase the current no more than 20Amps at a time. The current needed for evaporation depends on the material and the boat used. Some guidance can be obtained from staff.
   4. Open the substrate shutter and check if there is any deposition rate on the thickness monitor, and stop increasing the current.
   5. Push Zero on the thickness monitor panel and fine tune the current to get stable evaporation rate of 0.5-2A/sec. for some materials the rate will fluctuate which is normal.
   6. Close the shutter as it reaches the desired thickness.
   7. Slowly reduce the current using the thermal power knob.
   8. Turn off the thermal source power button.
   9. OPTIONAL, if performing sequential metal deposition:
      * Use thermal select switch to select the next source that wants to be operated
      * Repeat (13) THERMAL DEPOSITION.
5. **VENT/ SHUT DOWN**
   1. On the turbo controller use the up/down arrows to highlight the turbo status line at the top of the screen. Once this is highlighted press the cycle button which resembles a circle, at the bottom right of the turbo controller. This will bring you to the system control screen. Highlight "System" using the up/down arrows then press the cycle button. This action will shut off the turbo pump, close the roughing line valve, and shut off the backing pump. Once the speed of the turbo pump slows to 50%, the turbo vent valve will open and the BELL JAR VENT BUTTON becomes operable.
   2. Press the BELL JAR VENT BUTTON to vent the system to atmosphere.
   3. Once the bell jar is vented and the bell jar is able to be removed PRESS THE BELL JAR VENT BUTTON TO CLOSE THE VALVE.
   4. Wait 10-15mins until the bell jar has cooled off and lift it carefully as well as the shield.
6. **LOCKING THE CONTROLLER/LOGGING OFF:**
   1. Open the controller software “TIC PC Monitor” on the PC. Click “utilities” on the menu bar and then on the **“front panel”** Lock button located on the lower right side of the window and use password “509” to lock only the **“front panel”.**
   2. Close the window and log off from the computer.



**Calixto Saenz, Microfabrication Core Manager HMS updated on 07/01/2015**