

Operation Procedure for EVAP3 *JEOL Vacuum Evaporator*

1. Start a tool reservation on the SMIF web site (CoreResearch@Duke)
2. Enter your usage in the EVAP3 Log Sheet
3. Turn on the main power switch on the lower front panel
4. Press the Start-Up button on the front panel
 - a. The button will blink while starting up. It takes about 20 minutes to heat the diffusion pump oil
 - b. The button will turn solid green when start-up is completed
5. Set the VENT/EVAC button to the VENT position (light turns on)
6. When venting is complete, remove the Bell Jar Cover and set aside
7. Remove the Bell Jar and set aside
8. Wear gloves when handling components that will be placed inside the bell jar
9. Set-up and configure the appropriate vacuum components and source(s) for the type of evaporation desired. Reference the JEOL Vacuum Evaporator manual as follows:
 - a. See diagrams shown on page 8-10 for configuration of components
 - b. See page 28, section 4.7.1 for Metal evaporation method
 - c. See page 30, section 4.7.2 for Carbon evaporation method
10. Place the sample in the appropriate position
 - a. Place the sample on the sample mount
 - b. Set the sample mount of the desired angle and place it in the desired position
11. Place Bell Jar in position and then place the Bell Jar Cover in position
12. Set the VENT/EVAC button to the EVAC position (light turns off) to start the pump down process
13. Wait until the "Fine" light turns green (crossover pressure $\sim 10^{-2}$ Pa); wait for desired vacuum level to be achieved
14. * User may opt to perform Optional Degassing Process if depositing carbon (see below)
15. Make sure the Heater Control knob is turned all the way off (fully counter-clockwise)
16. Select Heater 1 (left side) or Heater 2 (right side) depending on configuration of vacuum components
17. Turn the Heater switch to the ON position
18. Slowly turn the Control knob clockwise to increase the current to the desired level (until material starts to evaporate, and record the Max Amps used in the Log Sheet)
|*** WARNING: The intensity of light can be bright enough to be harmful to the naked eye. Be sure to use shaded safety goggles or welding glasses for viewing the heated material ***
19. Evaporate for the desired length of time
20. When evaporation is completed, turn the Control knob fully counter-clockwise to turn off the current
21. Turn the Heater switch to the off position
22. Set the VENT/EVAC button to the VENT position to vent the vacuum chamber
23. When vented, remove the Bell Jar Cover and remove the Bell Jar
24. Caution: Heated elements (source material(s) and electrodes) may be hot! Allow to cool before handling.
25. Remove sample(s) and evaporation materials from the chamber

26. Place the Bell Jar back into position and place the Bell Jar Cover in position
27. Set the VENT/EVAC button to the EVAC position to start the pump down process
28. Wait until the "Fine" light turns green
29. Press the Shut Down button on the front panel
30. Wait for the Shut Down button to stop blinking (takes about 10 minutes for the rough pump to stop)
31. Turn off the main power switch on the lower front panel
32. Stop your tool reservation on the SMIF web site (CoreResearch@Duke)

*** Optional Degassing Procedure for carbon evaporation (this procedure reduces contaminates trapped within the carbon, thus improving carbon film purity)**

- i. Make sure the Heater Control knob is turned all the way off (fully counter-clockwise)
- ii. Select Heater 1 (left side) or Heater 2 (right side) depending on configuration of vacuum components
- iii. Turn the Heater switch to the on position
- iv. Slowly turn the Control knob clockwise to increase the current until the contact points of the carbon glow red
- v. Allow the carbon contact points to glow for 1 minute (the pressure should rise)
- vi. When evaporation is completed, turn the Control knob fully counter-clockwise to turn off the current
- vii. Turn Heater switch to the OFF position
- viii. Wait for a few minutes until you notice the pressure decreasing close to the previous level (i.e. the pressure prior to heating)
- ix. At this point, the carbon has been *degassed* and you can proceed with normal operation