



## **Standard operating procedure for the Denton Thermal Evaporator**

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### General information

- The system can be used to thermally deposit different metals
- Allowed metals: Ag, Al, Ni, Au, Cr, Cu
- Indium is not allowed
- Organics are not allowed

### System operation

1. Login into FBS and start timer.
2. Venting the system:
  - Touch the controller screen in order to activate it.
  - Press Auto Vent (it should take 2-3 minutes).
  - When the pressures gauge shows  $8 \times 10^2$  Torr, you can open the chamber.
  - Do not use force to open the door; just lift the latch with one finger.
3. Replace the glass slides on the door and place the metal coated glass slides in the waste bin on the adjacent table.
4. Make sure there are no particulates on the door O-ring; vacuum the chamber, if needed.
5. The system has 4 sources denoted A, B, C and D
  - Sources A and B are for boats.
  - Sources C and D are more appropriate for rods, like Chromium.
6. If you use the A terminal, you must also install a boat in the B terminal. The extra boat can be empty; it just needs to be there because the two sources are connected to the same transformer. The same goes for terminals C and D.
7. Do not move the terminals around without loosening the Allen bolt holding them.
8. Install the boats and add the desired material. Make sure that the boats are very well attached to ensure a good electrical contact.
9. Install the substrates on the metal plate using Kapton tape or alligator clips. Do not use scotch tape. The screw used to mount the substrates holder in the evaporator should be in the chamber attached to the metal rod.
10. Open and close the substrate shutter by used the lower QCM controller. Make sure that the shutter is covering the substrates.

11. Before closing the chamber door make sure that nothing obstruct it; gently close the door and engage the latch. Make sure not to hit the Hall Effect sensor that sits close to the chamber (it looks like a screw).
12. On the main screen press Auto Pump; It takes approx. 15 minutes to get into high  $10^{-5}$  Torr range and approx. 1.5hours to get into  $10^{-6}$  Torr range.
13. When the pressure gets at least into  $10^{-5}$  Torr, press Screens.
  - Choose either Low voltage A/B or Low voltage C/D. A new screen will open.
  - Select Low Voltage A or Low voltage B depending on where the desired deposition materials was placed.
  - Then press LV 1 power.
  - Starting increasing the power at a rate of 1% per second.
14. Setting-up the top QCM controller:
  - The system has two QCMs. The top controller is for the front QCM and the lower controller is for the back QCM. It is indicated to program both QCMs.
  - To set the controller, press program, then use the up and down arrows to select the Film. Press the desired program number and press enter. The films are preprogramed as follows: 3-Ag, 4-Al, 6-Au, 7-Cr and 8-Cu.
  - Once a program is selected make sure to check the density and the z-ratio.
  - The tooling factor is kept at 100%.
  - Set the Final thickness and SPT thickness to the desired values. When this thickness is reached the shutter will close automatically.
15. Increase the power until the desired deposition rate is reached.
16. Zero the thickness and open the shutter.
17. When the deposition is finished, turn down the power at a rate of 1% per second.
18. Set LV1 power to off.
19. Press Screen and then select Auto. This will bring you to the main screen. Press Auto Vent.
20. After the system vents remove your sample and the boats. Leave the sample holder screw in the chamber attached to the top metal rod.
21. Close the door and on the main screen set the chamber to Auto Pump.
22. Look on the main screen to the pumping progression. It takes 1 minute to see a pressure drop! DO NOT WALK AWAY UNTIL YOU SEE A PRESSURE DROP!!! Failure to do so will cause the pump to break!
23. Stop timer in FBS.