



Usage Policies Notebook for Mark 50 Evaporation

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Emergency Plan for CHA Mark 50 Evaporation

Standard Operating Procedures for Emergencies

Contact information

Person	Phone number
Lab Manager	Jake Hes: 949-824-8239 (day), 562-522-8328 (alternate)
Director	G.P. Li: 949-824-4194 (day), 949-824-2047 (alternate)
Staff	Mo Kebaili: 949-824-8239 (day), 949-494-5892 (alternate)
Super User	Phi Pham: 720-939-4500

Hazardous chemicals, gases, and conditions

Hazard name	Description of hazard
Vacuum	Implosion
High temperature	Burn or ignition source
High voltage	Electrical shock, ignition source
N2 (nitrogen) gas	Asphyxiant

Alarms or indications of danger

Alarm type	Condition and response
Alarm on the console (pressure, high voltage, etc...)	Problem with the process state. Halt the process. Correct the problem or notify the staff or the lab manager before continuing.
Pungent or foul smell	Shutdown the machine at once. Contact the staff and the lab manager.

Emergency shutdown plan #1

In the event of an emergency, when there is very little time, press the "EMO" button, this will turn off the machine in case of emergency. Leave the facility at once, and then contact the lab manager or the staff.

Emergency shutdown plan #2

In the event of an emergency, when there are a few minutes available, shut down the DC high voltage power supply and place the tool in the stand-by mode. Leave the facility at once, and then contact the staff and the lab manager.

Standard policies for usage

The CHA-Mark 50 is a six-pocket e-beam evaporator used for depositing Au, Ti, Ni, Pd, Cr, Cu, Yt, Fe, and Pt. Other materials need to be cleared with the staff. The wafers are loaded on a planetary substrate holder. The system will pump down to the base pressure of $5e-7$ Torr using a cryo pump. The pumping speed is typically one hour. The metal deposition thickness is measured in real-time by a crystal monitor. To verify the deposited metal thicknesses, use the Dektak or the Alphastep surface profilometers.

Contact information

The INRF staff or the lab manager may be reached at 824-8239 or 824-9831.

Authorized users

Only INRF registered users who have completed the training and passed the certification may use this equipment. Users may only use the portion of the system for which they have been trained.

Training

Users must have received direct training from the staff in order to use this equipment. Users are expected to understand the nature of the system, as well as the proper control and use of the crystal monitor. Training varies slightly, depending on the material to be deposited on the substrates. Contact the staff for details and to arrange for a training session.

Usage logs

Users are required to log all activities in the provided log sheets. All users must log when they used the Evaporator (date and time), which materials they deposited, and when they completed their process in the user log sheets. If users notice anything unusual, they should record it on the user log sheets, and add details in the maintenance log sheets. Any maintenance to the tool must be logged in the maintenance log sheets (maintenance staff only).

Safety equipment

There is no specific safety equipment for use on this tool, however, cleanroom gloves and tweezers should be used when handling pieces in the chambers. Care should be taken to avoid hitting their head on the chamber or pinching their fingers upon lowering the chamber.

Standard equipment and materials

The lab will provide standard metals including gold. Gold will be billed in addition to tool time for each deposition.

User maintenance

Users are requested to clean the chambers after usage, by first vacuuming the base of the chamber then wiping the rim down with the Isopropanol. Dispose of the wipe in a waste container marked for flammable solid waste.

Waste disposal

Dispose of the broken glass and the broken wafers in the appropriate waste container. Dispose of the alcohol soaked wipes in the waste container marked for flammable solid waste.

Scheduling

Reservations can be done on-line, also the system can be used on a first-come, first served usage if no reservation was made.

Other issues

Users should remain physically present at the tool during the evaporation run to monitor the deposition rate and the current set point. Users should monitor the chamber pressure during the evaporation run.

On completion of the evaporation run, the system should be left in the stand-by mode, with the high vacuum valve open.

Any new materials introduced into the system need to be cleared with the lab manager or the staff.

At no time should a user adjust the tool's pressure regulator.

Non-standard use

Users should not modify any hardware on this equipment. For use of non-standard processes, gases or materials, contact the staff or the lab manager.

Usage Notes for CHA Mark 50 Evaporation

Guide for using the Metal Evaporator correctly

Follow these steps for evaporation of metals on a silicon or glass substrates.

1. Initial System Check:

- a. The system is not in use by other users and is in stand-by mode.
- b. Check the log-book and verify that the system is working properly from the last user's run.
- c. Verify that the E-beam evaporator power supply is off.
- d. Verify that the water chiller, and cryo temperatures are to spec.
- e. Verify that the high vacuum valve is open to the chamber.
- f. Verify that the chamber ion gauge pressure reads $< 5 \times 10^{-7}$ Torr, unless the system was recently used.
- g. Make sure that your samples are already taped (kapton tape) onto spare wafers, or ready to be quickly loaded into the chamber.

2. Chamber Venting:

- a. Log on to the tool PC/computer with your user name and password.
- b. Fill out the log sheets
- c. Log into the tool using the GUI interface.
- d. User name: ed Password: rag
- e. Select "Vent"
- f. Ensure that the Hi-Vac valve closes and that the chamber pressure starts to rise (GUI will show venting animation)

3. Open Chamber:

- a. After chamber has vented (pressure will read $\sim 7.3 \times 10^{-2}$), gently open the chamber and slide door open.
- b. Select "stand-by" on the GUI, and verify that chamber is no longer venting.

4. Substrate Loading and Measuring Gold:

- a. Load your samples/wafers into the chamber. Remember to pre-tape your samples before the chamber is venting to ensure minimal time open to air.
- b. Select "password", and type in "m"
- c. Select "Manual"
- d. If you are using gold, you will need to measure the gold before and after.
- e. Select "Pocket 3" to rotate turret to gold. Even if you aren't planning on using gold, it is good practice to rotate the turret to ensure it is not stuck during deposition.
- f. Select "Toggle Shutter" to open the shutter.
- g. Using tweezers, gently remove gold crucible from turret pocket, and measure on scale (make sure that the carbon spacer is not stuck to the bottom of the crucible).
- h. Replace gold crucible. Check to see that the crucible is flat in the pocket.
- i. Select "close shutter".

- j. Wipe the full circumference of the base plate and the bell jar seal using clean wipes and ensure that the o-ring is properly seated up against the bell jar.
 - k. Gently slide and close the door.
- 5. Pump down chamber:**
- a. With one hand pressing the door closed, select "pump down".
 - b. Check to see that the roughing pump turns on and that the GUI shows a decrease in pressure. If this fails, you must go into standby and adjust the door to make sure that the seal is good.
 - c. The chamber will pump to its first set point, 1×10^{-1} . Then the high vac will open to pump down to 5×10^{-6} Torr.
- 6. Program Deposition Recipe:**
- a. On the Recipe Panel, select "F6 Program", "F2 Process Directory". Use "Page Forward", and "Page Back" to select your recipe. Once you find your recipe, select "F4 Select Active Process".
 - b. Check to see that the program has selected your recipe "Active Process is _"
 - c. Turn on the Hi-Voltage switch on the Hi-voltage source.
- 7. Pump Down and Load Recipe:**
- a. Once the chamber reaches 5×10^{-6} Torr, select "F1 Automatic Run"
 - b. Select IC5 to Process _, and input your process recipe number
 - c. Chamber will pump to 5×10^{-7} Torr
- 8. Metal Deposition:**
- a. Once the chamber reaches 5×10^{-7} Torr, deposition will automatically begin.
 - b. Ensure that the computer has selected the correct pocket. Once the shutter opens for deposition to begin, record the current and voltage values in the log book.
- 9. Venting and Unloading:**
- a. After the deposition is complete, there is a 30 minute cool down period.
 - b. After cooling, you can vent the chamber by selecting "F3 Vent".
 - c. Check to see that the hi-vac is closed and that the chamber starts to vent.
 - d. When the chamber reaches atmospheric pressure, open the door, select "stand by", and unload your samples.
 - e. Enter password "m", go back into manual mode, open the shutter, and weigh gold. Record INRF gold consumption in log book.
- 10. Chamber Pump down:**
- a. Close the chamber door, and select "vent". Once again, press down on the chamber door to ensure that the vacuum seal is maintained.
 - b. Wait for the chamber to pump down, and wait for the hi-vac valve to open. **Once the hi-vac is open, you can put the system in stand-by.**
 - c. Log out of the log-in computer.
 - d. Clean up the area.