

Gomez Evaporator

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Location: 10K PVD area
Primary Trainer: Les Schowalter (587-879-1516, les.schowalter@ualberta.ca)
Secondary Trainer:

OVERVIEW

Gomez is a bell jar, four pocket e-beam evaporator. This system is for general use including oxides.

SAFETY PRECAUTIONS

Please be careful around the power supply very high voltages.

If you are bringing a material in to evaporate that isn't on the official list attached to the e-beam cabinet please see the primary trainer first.

Certain materials can cause issues if put in a vacuum, please see the primary trainer if you are unsure if your substrate is compatible.

If you are bringing any new materials into the NanoFab for use in your process, it is necessary to fill out a chemical import form (available on our website, <http://www.nanofab.ualberta.ca>) and supply an MSDS data sheet to Stephanie Bozic.

OPERATING INSTRUCTIONS

Opening the Chamber and Loading

- 1.0 Turn off the ion gauge by flicking the filament ON/OFF switch. Do a quick visual check of the ion gauge tube to ensure that it is off.
- 2.0 Check the cryo temperature, it must be below 20K.
- 3.0 Close the cryo gate valve by turning the valve clockwise until you hear a loud “click”. **If you don’t hear a loud click the gate valve isn’t closed.**
- 4.0 Open the chamber vent valve, the chamber will be vented when the gauge reads 760 Torr.
- 5.0 When atmosphere is reached, raise the bell jar by pushing the green button on the left side of the tool.
- 6.0 Take out the substrate holder and inspect the inside of the chamber; if you see metal peeling on the side walls get the vacuum and remove the metal flakes.
- 7.0 If the glass in the window needs replacing do this now. Please use IPA to clean all six sides of the glass before putting it in the glass window holder.
- 8.0 Load your substrate onto the holder and put back into the chamber, make sure the shutter will cover your substrate(s).
- 9.0 Test the crystal thickness monitor (CTM) if it is below 85% replace the monitor by pulling down on the round bottom section discard old monitor and replace with a new one, make sure white side is face down. When installing a new monitor push up and twist counterclockwise a bit then press crystal life, if failure is indicated push and twist the holder a bit more.
- 10.0 Make sure the slots where the crucible sits is free of any debris, vacuum if necessary. Load crucible(s). The crucible must make good thermal contact with the pocket.
- 11.0 Check the following: shutter closed; first crucible to use is in place; window can be seen through; crystal monitor works.
- 12.0 Lower the bell jar by pushing the red button on the left side of the tool, note you still must center the bell jar.

Gomez Pumpdown

- 1.0 Make sure the chamber vent valve is closed, and the cryopump temperature is below 20 degrees Kelvin.
- 2.0 Open the chamber roughing valve 1 turn and rough to 350 Torr, then open the valve all the way and rough to 300 mTorr. Close the roughing valve. Roughing takes between six and ten minutes, if after 10 minutes the readout is still above a Torr please find the primary trainer or other nanoFAB staff to look at the problem.
- 3.0 Open the cryo gate valve by turning it counter-clockwise all the way. The pressure should drop quickly on TC1 and after a few seconds should read below 1 mTorr.
- 4.0 Wait until the TC gauge shows less than 1 mTorr then flip the ion gauge filament on/off switch up. Check to see that the filament is actually lit.
- 5.0 Press life on the crystal monitor to make sure it is operational and within the specified range, if it's not in spec or working properly see step 9 in open system.
- 6.0 To program the CTM, press program then enter use the up and down buttons to input gr/cc, press enter then input z-factor, press enter then see if a tooling rate has been inputted. Inputting tooling rate is optional, and varies with material used. Typical tooling rate is 85%, this depends on the material you are evaporating and how the material melts. Press program and then enter to verify your settings; press program to get back to normal mode.
- 7.0 Enter information in the log book and put the system in use sign up.
- 8.0 In about one hour the BP should be in the low -6 range.
- 9.0 You are now ready for evaporation.

Evaporation

- 1.0 Make sure the keylock is off.
- 2.0 Once the desired base pressure is achieved, turn the high voltage controller on. It's the double breaker style switch.
- 3.0 Check to see that all the interlock lights are on except the keylock light. If any are off (except keylock) contact a staff member.
- 4.0 Make sure the emission current is at minimum position; beam position, and dither can be set to the pen marks.
- 5.0 Turn the keylock on; the keylock light should go on.
- 6.0 Make sure the shutter is closed.

7.0 Check that the CMT has been programmed for your material.

READ THE NEXT TWO STEPS BEFORE PROCEEDING!

8.0 Turn the high voltage on (don't touch the high voltage cables, they're at a potential of 7000 Volts) Increase the current until the needle moves up slightly, this will be enough so you can see and adjust the beam position. Adjust the beam position and dither so only the material in the crucible will evaporate. If the beam hits the crucible your film purity will be affected. Do not let the beam go outside the crucible.

9.0 Slowly increase the current to get to the desired level, some materials may only require 10 mA or less, others 90 mA or more. If your film is very thin, try to have a low rate. Typical rates are 1 to 10 Angstroms per second. Au and Pt have a rate of 0.2 Angstroms per second. You will be ready to zero the CTM and open the shutter when your rate and deposition pressure stabilizes.

10.0 Once you have deposited to the desired thickness, close the shutter.

11.0 Turn emission current to the lowest setting. Go to step 13.0 if another material isn't required.

12.0 If you need to evaporate another material wait 5 minutes before moving to the next pocket and follow from step 9.0. Ensure CTM is set to the new material.

13.0 Turn off the high voltage and keylock.

14.0 Leave the double breaker on for 5 minutes to cool the power supply.

15.0 After the 5 Minute cool down, turn off the ion gauge, close the cryo gate valve, and put a few Torr of N₂ into the chamber. Wait 5 minutes before venting the rest of the way.

16.0 Take the crucible(s) out of the chamber then your substrate(s) if the chamber is flaking please vacuum before closing and pumping down.

17.0 Please see section on Gomez pumpdown for instructions.

TROUBLESHOOTING

If you encounter an unexpected error or require assistance please contact the primary or secondary trainer listed above. Should they not be available, please contact any staff member for assistance.

APPROVAL

Qualified Trainer: Les Schowalter

Training Coordinator: Stephanie Bozic