

NSC Cleanroom News

Here is the beginning of a site intended for NSC users.

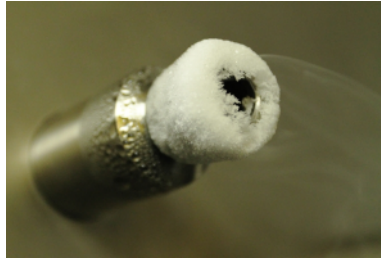
Left nav bar

UHV: A primer (part one)

There are many users of the ultra-high vacuum (UHV) evaporator at NSC and it would be to everyone's benefit if there were standard practices for its use. I will not attempt to provide a comprehensive guide to metal evaporation, but a specific guide for the UHV in the cleanroom of the Nanoscience Center at JYU. This is part one of a multi-part guide on important specifics in the operation of the UHV and focuses on proper starting procedures.

Before entering the cleanroom, one should check the status of the liquid nitrogen (LN). From the service corridor, check to see if there is any LN in the cooling chamber - seen by a flow of nitrogen "steam" coming from the LN filling tube at the top of the evaporation chamber or a cap of frost forming around it. If there is none, and there have been no other users for a

day or more, then you must fill a canister of LN from the storage tank in the measurement lab - 2/3 of a canister is usually plenty.



It appears nearly impossible to apply a caption to images unless you're willing to use a table, in which case the image becomes impossible to wrap within the text, thus taking up the entire width of a text space regardless of the image size.

Here are some more thoughts...

This column should occupy only 30% of the "page". It's unclear if that means 30% of the whole page or the section in which it must be nested. Rather messy documentation in some instances on this Confluence wiki. And apparently, it means neither, because no matter what value I enter for the width, it's always the same. Really great user experience with this thing!

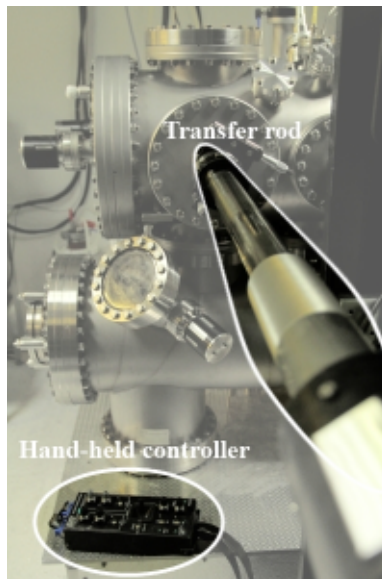
Here's another "column". It should really be named a "potential column", as the properties one expects of a column only appear once at least two have been added. And then they appear columnar, unlike the false column in the section above. Additionally, the widths of these objects don't obey any clear logic. Currently, both of these columns have a designed width of 20% of the page. They don't appear to behave properly assuming either the whole page or the section in which they are nested. Not so great so far.

Some navigation links could go here

- [Like this](#)
- [And another maybe here](#)
- [And still one more](#)

Then, when first approaching the UHV, a few more checks are needed. Check the evaporating chamber pressure. Depending on your quality requirements, the pressure should be lower than a few $\times 10^{-6}$ mbar (10^{-7} for tunnel junctions). If the pressure is too high, DO NOT continue. Contact one of the lab engineers to discuss the situation. If the pressure is okay, check the metal(s) in the crucible to see if there will be enough for your evaporation and that the condition is good (more about this in part two of this guide). If there is not enough metal or the condition is bad, as disappointing as it may feel, it is best to stop here and cancel the UHV booking. Continuing with insufficient or bad quality metal in the crucible will usually give bad results. If the metal situation is good, one should then begin filling the LN (if needed) into the chamber. Make sure to close the pressure release valve on the filling tank (red lever in the down position) and open the rolling clamp on the silicone tube. Insert the end of the transfer tubing into the chamber filling nozzle, making sure that the tubing is not stretched tight. Open the nitrogen gas from the regulator on the wall and wait to see that LN begins to flow through the tube into the chamber. If there is no flow at all after about 10 seconds, there is most likely a blockage in the siphon. This is relatively easy to clear. Turn off the nitrogen gas on the wall and open the pressure release valve on the tank. Open the clamp on the filling tank and pull out the siphon. Either wait patiently for the siphon to warm up, or carefully warm it with your hands until no more frost forms on its surface and the blockage leaks out. Once it is clear, close the pressure release valve and insert the siphon back into the tank. If the blockage is cleared, there should be a brief, but noticeable flow of gas from the chamber filling nozzle. Continue filling the chamber with LN following the procedure above. Monitor the filling to avoid overflow.

While the chamber is filling, position the desired metal in the chamber and select the appropriate data layer on the thickness monitor. The monitor measurement must be off in order to select the layer (NEVER change the parameters for a given layer). Next, turn on the cooling water from the fume hood in the corner of the room (about a quarter turn is enough). Load your sample into the loading chamber. Select the loading chamber pressure monitor, close the turbo pump valve



and open the loading chamber to atmosphere. While inserting the sample stage into the loading chamber, check that the stage holder is secured properly. If it is loose, tighten the screw at its base or ask someone to help. Close the loading chamber lid, close the atmosphere valve and begin pumping the chamber with the rough pump. Holding the lid down with your hand for the first 10 seconds or so helps to ensure the seal is good. At this point, the liquid nitrogen level is likely enough and LN filling can be stopped. Turn off the nitrogen gas from the wall and open the pressure release valve on the tank. The silicone tubing must warm up until flexible before removing from the filling nozzle and closing the rolling clamp. Once the pressure in the loading chamber is below a few 10^{-2} mbar, close the rough pump valve and open the turbo valve. When the pressure in the loading chamber is below the meter's scale, the sample can be transferred to the evaporation chamber. Close the turbo valve and open the evaporation chamber valve and wait to hear the click of the opened door.

Then slowly move the transfer rod to the loading chamber(*) and screw it onto the sample stage, making sure the two alignment pins are securely in place. Bring the transfer rod, slowly, all the way back to the evaporation chamber and close the chamber valve. The door will make a very audible sound as it closes. Open the turbo valve and switch the pressure monitor to the evaporation chamber.

(*) Note: if the transfer rod is touched to the back of the evaporation chamber before moving to the loading chamber, the chamber door will begin to close and the transfer rod may get stuck in it. If you notice the rod has touched back, stop what you're doing and close the chamber valve and wait for the door to close. Then open it again and wait for the opening sound and continue as usual.

And finally, here's some more text.

