THE nanoFAB
Fabrication | Characterization | Expertise

W1-60 ECERF Building Edmonton, AB, CANADA T6G 2V4
p: 780.492.0167 f: 780.492.1811 **www.nanofab.ualberta.ca**

Trion RIE

September 5, 2012

Location: Plasma Etch Area
Primary Trainer: Scott Munro (2-4826, smunro@ualberta.ca)
Secondary Trainer: Les Schowalter (2-4829, les.schowalter@ualberta.ca)

OVERVIEW

The Trion Phantom RIE is available to users who require silicon oxide, silicon nitride and isotropic silicon etching using standard RIE processes.

SAFETY PRECAUTIONS

There is potential for harmful gases to form during the etch process. The chamber is purged with Nitrogen and vented to minimize this hazard. Ensure that the chamber is fully vented before opening the chamber door, and do not force the door open. If needed, perform a second vent and wait until an audible hissing noise is heard, indicating the seal is broken. Use caution opening and closing the lid and it is heavy.

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Reflected power occurs when power is not fully transferred from the source to the plasma. A set of capacitors automatically adjust to minimize the reflected power. Running the plasma for an extended time with high reflected power may permanently damage the system. If the capacitors fail to minimize the reflected power and remains consistently above 10% the RF power, stop processing immediately by pressing the Abort button, and contact nanoFAB staff. Note that there may be a slight delay during which the capacitors adjust, and reflected power may be higher than the 10%. This is normal, but should decrease within several seconds.

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.

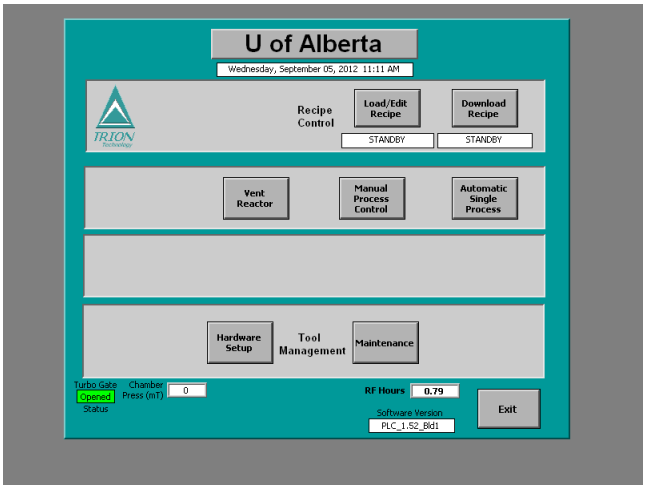
PROCESS COMPONENTS OR FEATURES

Samples entering the chamber must be clean and dry. Samples should be handled with tweezers only, and the graphite chuck should never be touched with gloves as it's easily contaminated.

Ensure that the masking layer is sufficiently thick enough to etch the desired depth in your film. Users should account for non-uniformity in both the film and the etch when calculating etch time.

OPERATING INSTRUCTIONS

1. The system should be in **Standby** mode, and either in the Main Screen or Automatic Process Control window. If in the Automatic Process Control window, press the **Abort** button to return to the Main Screen.



2. The process chamber should be cleaned prior to processing. A minimum cleaning time of 10 minutes using the **Clean** recipe should be ran. The chamber should remain empty for the cleaning process.

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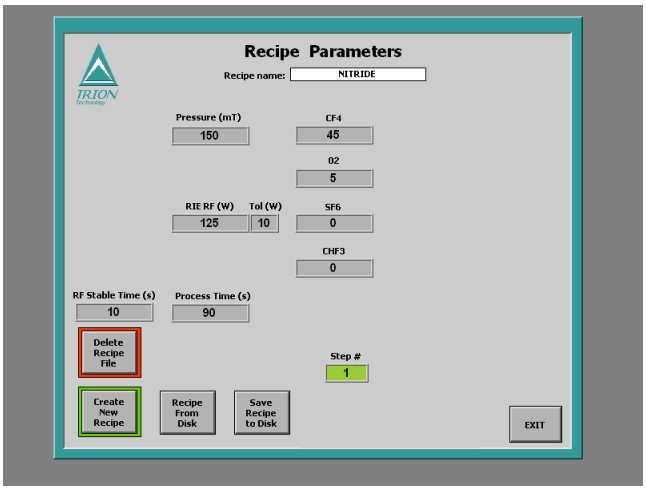
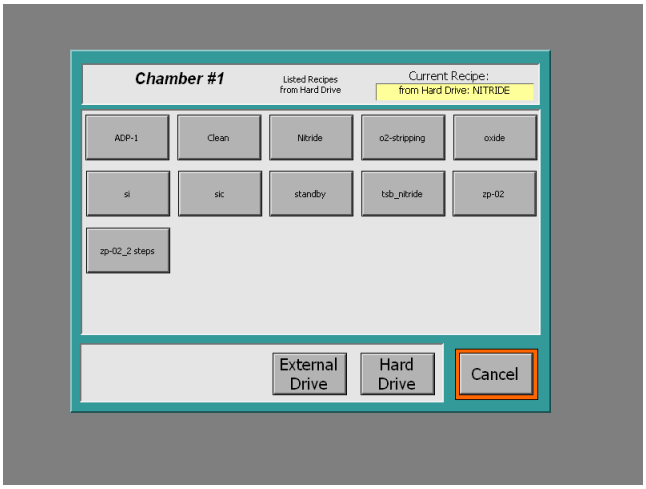
3. To load a sample, the chamber needs to be vented. Press the **Vent Reactor** button and wait for the timer to reach 0 and an audible hiss indicating the seal has been broken. Open the chamber door and load the sample in the centre of the chuck. Again, use tweezers and ***do not*** touch the chuck with your fingers. If running the Clean recipe, leave the chamber empty. Close the lid.

4. To run a process, press the **Load/Edit Recipe** button. The recipe currently loaded will be displayed.



5. Select the **Recipe from Disk** button to display a list of the standard processes.



6. Click on the desired recipe to load into the edit window. Editing may be performed simply by pressing the parameters to be edited. Ensure that the correct step is being edited as some recipes contain multiple steps. It is not necessary to save the changes; any changes made will remain until another recipe is loaded.

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7. Press the **Exit** button to return to the Main Window. The recipe will be downloaded and be displayed in the Main Window.

8. To begin the process, press the **Automatic Control** button. The system will begin by pumping out the process chamber and will begin the process. Record all run data in the logbook, including any errors or processing issues. If the process needs to be stopped during a run, press the **Abort** button.

9. When the process has finished, a window will open indicating as much. Press **OK** to return to the Main Window.

10. If processing is complete, press the **Vent Reactor** button. Open the lid and remove the sample. If more processing is required, load and repeat the above procedure. Note that a chamber clean between samples is typically not required.

11. Once all processing is complete, load and run the **Standby** recipe. This is a 30s pump step that will keep the chamber under vacuum. Leave the system on and the program running.

12. **Manual Process Control** - Use the following procedure as an alternative to automatic processing. While still in the Manual Process Control Window and once recipe parameters have been set, press the **Vacuum Off** button to evacuate the chamber. **Vacuum On** should now be displayed on the button. Once evacuated, press the **Pressure off** button to toggle it to **Pressure On**.

13. Once the system has reached base pressure, the **Gas Off** button will be displayed; press this button to turn begin gas flow. When the pressure has stabilized, press the **RF Off** button the light the plasma and start the process. The timer will start, but any setpoint will be ignored and the process must be stopped manually. Processing parameters may be adjusted during the process, if needed.

14. Record process information in the logbook, including any error messages or processing issues. If the process needs to be stopped during a run, press the **Abort** button.

15. When the desired processing time has been reached, press the **RF On** and the **Gases On** button to stop the process. Press **Exit** to return to the Main Window, and press **Vent Reactor**. Open chamber lid when vented and remove samples. If more processing is required, load and repeat the above procedure. If processing is complete, run the **Standby** recipe as outlined above.

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TROUBLESHOOTING

Extended processing may affect chamber conditions. If there is a noticeable change in processing, such as changes in etch rates, selectivity, DC bias, or discolouration of the process chamber or lid, an extended clean may need to be performed. Running the **Clean** recipe for 30 minutes or more may be required. Contact staff if assistance is required.

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: Scott Munro
Training Coordinator: Stephanie Bozic