Plasma-Therm 790 RIE (Reactive Ion Etcher)

Basic Operation Guide

Description:

The Plasma-Therm 790 is configured for RIE (Reactive Ion Etching) processing of Silicon substrates. Substrates up to 8 inches in diameter are manually loaded into the Process Chamber. Process variables are saved in recipe files on the control computer hard drive. All system operation and process recipe steps are completed automatically under Computer Control.

Note: For Silicon Wafer Processing Only
Safety:

1. Before operating this tool, users must be trained and certified by Superuser.
2. Active Alarms are displayed on the operator interface computer screen. Alarms will cause an audible alarm until the silence button has been selected.
3. Alarms during an active process will shutoff process gas and RF power to the chamber.
4. If an alarm occurred during a system idle condition the process will be prevented from starting.
5. System hardware and software interlocks prevent exposure to RF power and process gas.
6. Software interlocks prevent system operation out of recommended parameters.
7. Numerous pump purge cycles can be completed automatically after etching has completed.
8. UV Radiation is created in the plasma.

Note: UV exposure is possible when looking through the Viewports during an etch process.
9. Some Pinch points and Vacuum sealing surfaces are accessible. Keep hands and all materials out of the areas identified below.

10. After closing the chamber a small gap will remain. When using the handle to pull the chamber top down ensure nothing is between the O-ring and the Chamber Sealing Surface.
11. When the chamber is being pumped out the Vacuum will collapse the remaining small gap between the upper and lower Chamber sections. This can become a possible Pinch Point.

Note: The amount of gap shown in the picture above will cause a pump down failure.
Emergency Machine Off (EMO)

Use the EMO Button only if there is a safety hazard or serious system failure. If there is water on the floor between you and the system leave and contact the lab staff.

1. Push Red EMO (Emergency Machine Off) button
2. Contact NCNC staff

Note: Never use the EMO as a On Off power switch.
System Operation

Initial System Checks:

1. If system is giving an audible alarm, select the alarm button to silence the alarm then go to the Prepare for Etching section. If the alarm has been silenced continue on.
2. Check the logbook for process problems or alarms.
3. System On and Standby buttons should be illuminated.
4. Both Turbo and mechanical pump should be on (Green).
5. If either pump is off (Red) and or pump alarm is active contact staff before continuing.
6. Process Chamber should be under Vacuum (less than 5 mTorr) or Atmosphere (vented).
Prepare for Etching

1. Using Trackball and Keyboard Enter your operator code and password then click OK.

2. After Login click in Alarms field Arrow to expand Alarm list if active.
3. Record any alarm not noted in the Logbook.
4. Please notify Dan Haskell (djhaskell@ucdavis.edu) of all alarms.
5. If the Alarm Status Indicator Button is not active (Yellow) go to step 9 otherwise go to step 6.
6. Click Hold Button.
7. Wait one minute if Alarm remains off, system can be used for process.
8. If Alarm returns, Logoff and place a machine down notification on the system. Record the alarm message text in the logbook and E-mail NCNC that the system is down.
9. If no active alarms are present check chamber Vacuum status. If the Chamber pressure is less than 5 mTorr select and click on Vent.

Click on Utilities to open Drop down box
Selecting Vent starts the automatic Vent to Atmosphere
Click on LogOut when leaving the system
Click Hold On then Off to verify If Alarm is still active
10. If the system is at Atmosphere or above 5 mTorr click on Pump Chamber (Turbo) and pump down the system for at least 5 minutes. If the system pressure does not go below 5 mTorr within 5 minutes consider this to be an alarm condition and the system is not useable.

11. If the chamber goes below 5 mTorr go to step 13 otherwise go to the next step.

12. Logoff and place a machine down notification on the system. Record the alarm message text in the logbook and E-mail NCNC that the system is down.
13. If step 10 was successful and there are no active alarms vent the chamber to atmosphere.
14. Place substrate to be etched in the recessed area of the electrode cap.
15. Lower the Upper chamber, if the chamber is not completely down an alarm will be generated after the recipe is started.

Materials to be etched must be placed within the recessed area

An Aluminum Electrode cap is shown here
Select Recipe

1. To Load Recipes the system must be in Standby. Using Trackball Highlight Process click on Load to open Process (files) drop down list.
2. Click on Load to open Process selection window.
3. Scroll to desired recipe then Left click to select.

4. Click OK if the File Name box has the desired recipe.
Starting an Etch Process

1. Left Click Ready button if not displaying yellow. This will enable the Run Button.
2. Left Click the Run button.
3. The screen will change to step 1 (Initial). A Typical Step 1 is shown below.
4. Run starts an Automatic sequence of events defined in the Process Recipe.
5. As the Recipe is running each active Step will be displayed in a Data readout box. The field boxes display Recipe Variables, Real Time Sensor displays or Timer readouts.
6. After the Hold time has counted down the recipe will go to the next step and continue through the steps of the Recipe.

7. After the End step is complete the system will display a Process Complete Window. Use the Trackball and Left Mouse Button to select the OK button.

8. Wait for the Automatic sequencer to finish after OK is selected. If the last step is a Vent the pressure should read Atmosphere when completed. If the last step is a pump with Turbo the pressure should be less than 5 mTorr. If either step fails there should be an Alarm. In case of an Alarm refer to step 4 of Prepare for Etching.

9. If the last Process step is not a Vent then the chamber will need to be vented to remove the substrate(s). See step 9 prepare for etching.
After Etching is Complete

1. Open Chamber and remove substrate(s).
2. If finished with etching go to step 3. If more etching is required select a new recipe if required otherwise place a substrate on the electrode and go to step 1 of starting an Etch process.
3. If this is the last Etch close Chamber then pump down the system for at least 5 minutes. Refer to Reference Manual Appendix Pumping from Atmosphere section if necessary. If the system pressure does not go below 5 mTorr within 5 minutes check the following. Was the chamber completely down? If necessary Vent the chamber and check the following is the O-ring and sealing surface clean and free from foreign objects?
4. If the chamber was down and the sealing surface is clean consider this to be an alarm condition and the system is not useable. Complete steps 4 and 8 of the Prepare for Etching Section.
5. If the chamber pressure is below 5 mTorr left click Standby then left click LogOut from Utilities drop down menu.

6. Update Logbook with your Etch information.