University of Pennsylvania
ScholarlyCommons

Standard Operating Procedures | Browse by Type

11-2021

Oxford PlasmaLab 80 Plus RIE standard operating procedure

Mohsen Azadi
Singh Center for Nanotechnology, azadi@seas.upenn.edu

Follow this and additional works at: https://repository.upenn.edu/scn_sop

Recommended Citation
Azadi, Mohsen, "Oxford PlasmaLab 80 Plus RIE standard operating procedure" (2021). *Standard Operating Procedures*. Book 7.
https://repository.upenn.edu/scn_sop/7

This paper is posted at ScholarlyCommons. https://repository.upenn.edu/scn_sop/7
For more information, please contact repository@pobox.upenn.edu.

Oxford PlasmaLab 80 Plus RIE standard operating procedure

Keywords
RIE SOP, Oxford 80Plus RIE SOP, Reactive Ion Etching SOP

This working paper is available at ScholarlyCommons: https://repository.upenn.edu/scn_sop/7

Standard Operating Procedure (SOP)

Oxford 80 Plus RIE

(DE-04)

In case of fire or injury please call 911 (511 from campus phones)

If there is an error on the system/tool please report it in IRIS, the staff will take care of it

Please *DO NOT* run diagnosis without a staff member's approval

General safety tips and common mistakes

1) If the system is not running, make sure you are logged into the tool on IRIS.
2) The following materials are not allowed in the chamber:
   - *PZT, ZnO, ITO, Pb, Zn, In*
3) *Consult a staff member if you are using the following materials in the chamber:*
   - *Polyimide, SU-8, Cyclotene*

     Consult the staff if you are using a material that is not listed here and you are not sure if it is allowed in the chamber.
4) Use kapton tape to secure your samples, especially small pieces
5) DO NOT log out of the tool before the clean process is finished!
6) Let the vent complete before you attempt opening the chamber.

Last modified by Sam Azadi, 10/25/2021
Last reviewed by Sam Azadi, 10/25/2021

Oxford 80 Plus RIE

- Primary tool owner: Sam Azadi.
  For questions regarding process development and characterization of etch rates contact Sam Azadi at: azadi@seas.upenn.edu
  Problems with the tool ***MUST*** be reported on IRIS. Do not contact primary tool owner with tool issues directly.

Tool Policy:

- Not completely running the clean recipe is considered tool misuse.
- Logging out of the tool before the clean recipe is done is considered tool misuse.

Procedure Overview

1) Vent the chamber
2) Load sample(s) and pump the chamber
3) Choose/modify recipe and run etch
4) Vent chamber and retrieve samples
5) Pump the chamber and run clean recipe

Tool Overview:

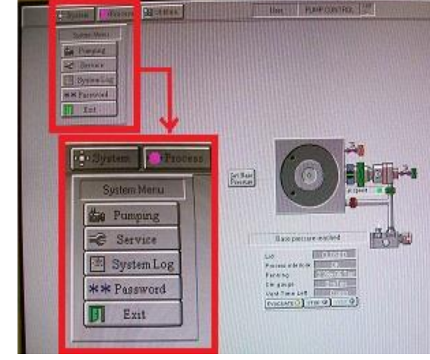
Oxford 80 Plus is an anisotropic dry etch tool. The main use of this tool is to etch SiO_2, and SiN_x to create hard masks for deep Si etch. However, it etches many other materials including a variety of resists. The tool is connected to the following gases: Ar, O_2, CF_4, CHF_3, SF_6.

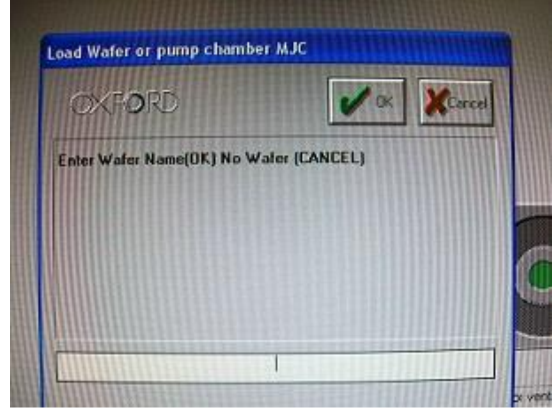
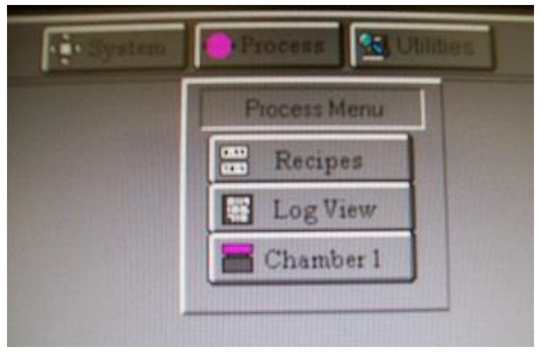
The plasma is ignited by the oscillating electric field created by the RF power at 13.56 MHz. The wafer is cooled down via passive cooling through a graphite chuck.

A list of characterized processes can be found *here*

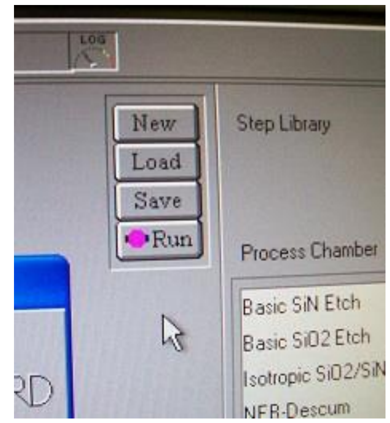
Tool video training can be found *here*

Full procedure:

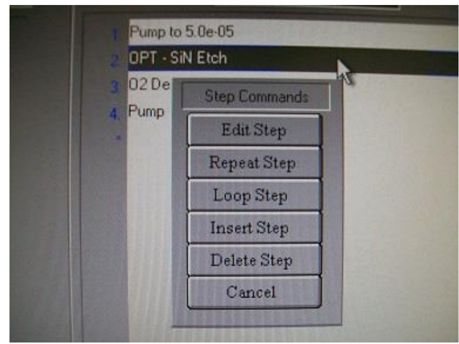
Log into the tool via IRIS	
If the “YELLOW ALERT” is on, click on “**Accept**”. This is just an indicator that the previous process is complete.	
1. Vent the chamber: 1.1. From the top left corner of the screen, click on ”**System**” then choose “**Pumping**”.	
1.2. Once the pumping control screen appears click “**STOP**” then “**VENT**”. The chamber display will read “Venting Started”. ***Caution!*** *DO NOT attempt opening the chamber until the vent process is done. Failure to wait until vent is done causes a RED ALERT and* ***is harmful to the tool****.* If you get a red alert in this step, please report it in IRIS and contact the staff 1.3. Once the chamber status reads “Venting finished” you may proceed to the next step	

2. Load sample(s) and pump the chamber: 2.1. Turn the “chamber up/down” switch located on the front of the tool to “CHAMBER UP”. 2.2. Press and hold BOTH “HOIST” buttons at the same time. The buttons are located at the two sides of the front of the tool. ***Caution!*** *DO NOT block the movement of the chamber* 2.3. Place your sample(s) on the graphite chuck. You may secure your samples with Kapton tape. 2.4. To close the chamber, turn the up/down switch to “CHAMBER DOWN”. Press and hold both “HOIST” buttons until the chamber is completely closed. 2.5. On the pump control screen click “**STOP**” and “**EVACUATE**” 2.6. Enter the name of the process, example: *Sam_SiO2 etch_3min* and click “**OK**” *Note:* *a) the etch rate on the edge is slightly lower than the center.*	 
3. Choose/Modify recipe and run etch: 3.1. From the top left corner of the screen choose “**Process**” and click on “**Recipes**”.	

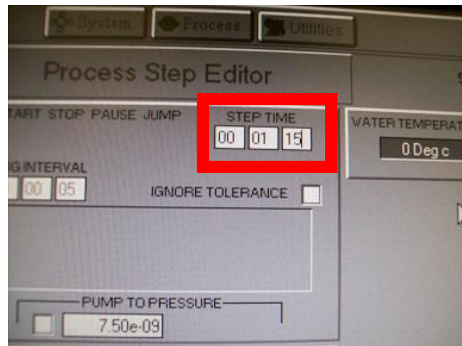
3.2. Click on “**Load**”. The system asks you if you wish to overwrite the currently loaded recipe, choose “**Yes**”, and select your desired recipe.

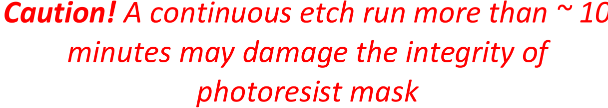


3.3. To modify/check the time on the etch, click on the *ETCH STEP* of the recipe and choose “**Edit Step**”.



3.4. Type in your desired etch time in the “STEP TIME” section and click “**OK**”
- The time is in HH:MM:SS
- *As an example,* the etch time in the screenshot shown here is 1 minute and 15 seconds.





Caution! *A continuous etch run more than ~ 10 minutes may damage the integrity of photoresist mask*

3.5. To run the recipe, click “**Run**”.

Note:

a) If the chamber is not completely evacuated yet, the process is kept on hold until the pressure reaches the acceptable range, and the process automatically starts.

4. Vent the chamber and retrieve samples

4.1. Once the etch is complete, the yellow alert appears. Click “**Accept**”

4.2. From the top left corner of the screen, click on ”**System**” then choose “**Pumping**”.

4.3. Once the pumping control screen appears click “**STOP**” then “**VENT**”. The chamber display will read “Venting Started”.

Caution! *DO NOT attempt opening the chamber until the vent process is done*

4.4. Once the chamber status reads “Venting finished” you may proceed to the next step.

4.5. Turn the “chamber up/down” switch located on the front of the tool to “CHAMBER UP”.

4.6. Press and hold BOTH “HOIST” buttons at the same time. The buttons are located at the two sides of the front of the tool.

5. Pump the chamber and run clean recipe:

5.1. turn the up/down switch to “CHAMBER DOWN”. Press and hold both “HOIST” buttons until the chamber is completely closed.

5.2. On the pump control screen click “**STOP**” and “**EVACUATE**”

5.3. Click “**CANCEL**” on the “Load Wafer or pump Chamber MJC” popup.

Attention! If you enter a name here, the tool assumes there is a wafer inside and will not run clean! **See the Note at the end of this section if you accidentally entered a name.**

Notes:

a) *If you accidentally entered a name for the cleaning process, click on “**STOP**”, then “**VENT**”, allow the tool a few seconds to start the vent, click “**STOP**” and “**EVACUATE**” and then close the*

popup window without typing in a name. Once this is done, proceed with step 5.4. 5.4. From the top left corner of the screen choose "**Process**" and click on "**Recipes**". 5.5. Click on "**Load**". The system asks you if you wish to overwrite the currently 5.6. loaded recipe, choose "**Yes**", and select "Chamber Clean O" recipe. 5.7. To modify/check the time on the etch, click on the *ETCH STEP* of the recipe and choose "**Edit Step**". Type in 10 minutes and click "**OK**" 5.8. Click "**Run**" to run the clean recipe Attention! DO NOT log out of the tool before the clean process is complete! Logging out on IRIS shuts off all gas supply to the tool and throws the tool into a halt with an error 5.9. Once the clean recipe is done and the "YELLOW ALERT" appears, you may log out of the tool.	
Log out of the tool via IRIS once the pumping is done	

Feel free to contact the staff members with any questions about your process and the tool.