

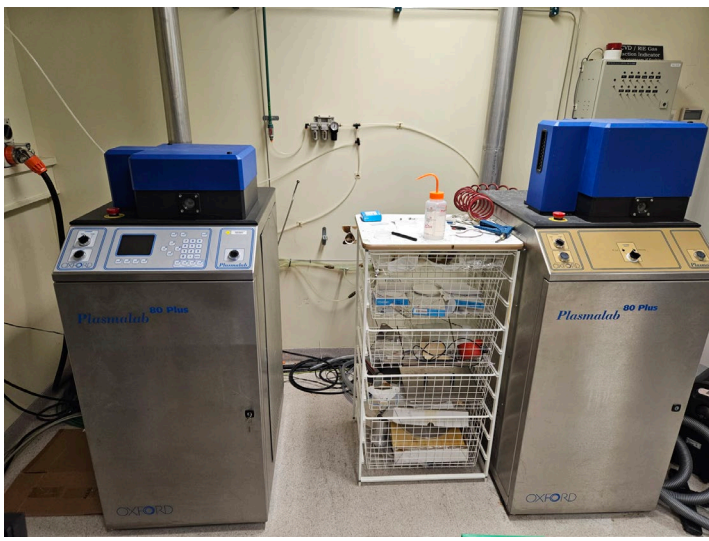
Title <i>(Of equipment, plant, experiment, activity, etc.)</i>	Operating Procedure of the Reactive Ion Etching (RIE) Oxford Plasmalab 80 (also known as RIE (Old) Oxford)		Date	05.08.2024
			Version	1.0
Activity Details <i>(of equipment, plant, experiment, activity, etc.)</i>	Description	Step wise procedure to operate the RIE for plasma etching.		
	Location	#56_L4_H4.30		
	After-Hours Work	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO	
Photo/s <i>(of equipment, plant, experiment, activity, etc. used as part of this procedure)</i>				
Operational requirements	Equipment / Process / Plant / etc.		Instruction Manual (IM)	
	Laboratory Dress Code (lab coat, safety gloves)		N/A	
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Describe, in detail and in sequence, the steps involved in this activity

PRE-OPERATIONAL CHECK

N/A

OPERATION – LIST STEPS TO COMPLETE THE ACTIVITY FROM START TO FINISH**Starting the system**

- Start the chiller (in room next to the RIE lab) and confirm that the wall fan is on.
- Open lower door and press 'System On', then 'Pump On'.
- Start Turbopump (press soft 'start' key) and make sure the turbo load lights go all on then off again.
- Open the software (Password for the PC is 'eme'). When it's loaded, click on 'log-on' button. Select user CSES, click OK and then enter password 'solar'.

Manually venting the chamber

Prior to opening the chamber, it should be properly vented to ensure the removal of any remaining gases and to equalise the pressure with the atmosphere. Venting can be accomplished either manually or automatically as the final step of a recipe. The steps for manually venting the chamber are as follow:

- Put system in Manual mode (via the Manual/Recipe selector switch)
- Set 'Process Time' to 2 minutes (00:02:00)
- Set 'Base Press' to 1×10^{-3} Torr
- Select the 'Vent' check box
- Press Run Process button 'Start'

The chamber will now pump down to the base pressure, maintain that pressure for the specified time and will then be vented with N₂ gas.

Cleaning the chamber

Before etching samples, the chamber may need to be cleaned using oxygen plasma for a short duration (typically 15-30 minutes) or a longer duration (typically 60 minutes), depending on its previous usage.

Edit the cleaning recipe:

- Put system in Recipe mode (via the *Manual/Recipe* selector switch)
- Click on 'EDIT'
- Click on 'Load,' then find and open the recipe for oxygen plasma cleaning (the recipe name is 'Clean RIE' or whatever the users have renamed it).
- Set the cleaning duration in step 2 of the recipe. In this step, also set the process pressure, RF power, and oxygen flow. The typical setpoints are 0.1 Torr, 200W, and 100 sccm. Ensure the O₂ checkbox between the Gas and Flow columns is selected to introduce oxygen into the chamber.
- Click on 'Save Step' and then 'Save File As' to save the modified recipe. Note that the file only can be saved in the 'CSES' folder, which matches the username used for logging in. Click on 'OK' and then 'Quit' (Close the window directly if it is still open after pressing 'Quit').

Carry out cleaning run:

- Ensure the system is in Recipe mode (via the Manual/Recipe selector switch)
- Click on 'Load' to select the oxygen cleaning recipe edited above
- Press 'Start' button under 'Run Process' to run the recipe.
- Monitor the process to ensure it proceeds correctly according to the recipe.

Once the recipe finishes, the chamber will vent automatically as the recipe should include the Vent step mentioned above. The chamber is then ready to be opened.

OPERATION – LIST STEPS TO COMPLETE THE ACTIVITY FROM START TO FINISH**Etching samples****Loading/unloading samples:**

The chamber is ready to be opened after performing the manual venting step (see above) or running a recipe that includes a venting step.

- To open the chamber, turn the knob next to the chamber to the 'Open' position on the chamber housing. Press and hold both black hoist buttons simultaneously until chamber lid fully opens. Place samples in the centre of the quartz plate.
- To close the chamber, turn the knob to the 'Close' position, then simultaneously press and hold the two buttons until the lid fully closes.

Edit etching recipe:

- To edit a recipe, change the system to 'Recipe' mode
- Click on 'EDIT'
- Click on 'Load,' then find and open your recipe
- Modify parameters if needed.
- Click on 'Save Step' and then 'Save File As' to save the modified recipe. Note that the file only can be saved in the 'CSES' folder, which matches the username used for logging in. Click on 'OK' and then 'Quit' (Close the window directly if it is still open after pressing 'Quit').

Perform sample etching:

- Ensure the system is in 'Recipe' mode
- Click on 'Load' to select your recipe
- Press 'Start' button under 'Run Process' to run the recipe.
- Monitor the process to ensure it proceeds correctly according to the recipe.

Shutting down the system

Once all processes are complete, the chamber needs to be pumped down while the lid is closed.

- Change the system to 'Manual' mode
- Set 'Process Time' to 30 seconds (00:00:30)
- Set 'Base Press' to 1×10^{-4} Torr
- Press 'Start' button to pump down the chamber.

Once the chamber has pumped down to below base pressure, the program can be closed.

- Press 'Logoff' and then 'End'. Leave the PC on.

To shut down the system:

- Stop the Turbopump.
- Press 'Pump Off' button to turn off the pump and then press 'System Off' button to turn off the system.
- Switch off the Chiller.

TRANSPORT METHOD for hazardous substances, biological, animal, or radioactive materials or plant equipment

N/A

WASTE DISPOSAL

- All waste (non-sharps) generated by the user must be disposed of in the waste bin located outside the lab.
- A yellow bin for sharps is available in the area for the disposal of sharp materials.

COMPLETION OF WORK – List steps to make area safe (include clean up, any waste disposal & service/maintenance requirements)

- Dispose of waste according to the instruction listed in the section of WASTE DISPOSAL.
- Keep the lab tidy.

Workers must read and completely understand the relevant equipment risk assessment and this instruction manual before they are allowed to work on the activity without direct supervision.