

STANDARD OPERATING PROCEDURE

OxfordCobraICP-SOP-01

Rev#: 1.0

Date: 2025-06-18

Oxford COBRA ICP Etcher



Location	Brim446-white room	Equipment Group	Plasma/Dry Etching
Building	Brimacombe	Equipment Name	Oxford COBRA ICP
Website Link	https://www.nanofab.ubc.ca/equipment/as-one-rtp-system/	Bumblebee Name	CR: ICP - Oxford ICP COBRA etcher
Primary Contact/Trainer	Mario Beaudoin beaudoin@physics.ubc.ca	Secondary Contact/Trainer	
Additional Superusers			

Revisions

Revision	Revision Date:	Revised By:	Change:
R0.01	June 2025	Mario Beaudoin	Initial SOP

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1. Purpose

This document summarizes how to use the Oxford COBRA ICP etcher. This etcher is dedicated to shallow etching of silicon and no metals are allowed in the etching chamber. The etcher uses SF₆, C₄F₈, CF₄, O₂ chemistries in addition to Ar and N₂ gases.

2. Access and Training

The following are the standard requirements for all users seeking to operate UBC ANF equipment.

Lab Access	Booking Access	Required Training
ANF Nanofab Orientation • Self Declaration ○ Intended Usage • Full Name ○ First and Last • Status ○ Std/staff/pdf/etc ○ Grad or end date • Email ○ UBC email address • UBC ID ○ UBC provided ID # • Supervisor Declaration ○ Name of supervisor ○ confirmation of approval to incur usage costs • Chemical Safety Certificate ○ https://srs.ubc.ca/health-safety/research-safety/chemical-safety/chemical-safety-training/	• ANF Nanofab Orientation • Training on equipment by qualified user (preferably ANF staff) • Final equipment sign off from ANF staff	• ANF cleanroom orientation and tour • Independent usage requires Bumblebee account and final sign-off from ANF staff

All UBC Nanofab equipment requires a minimum training requirement prior to users being cleared for operation. Operation of equipment or procedures without training clearance may result in revoked access and/or additional penalties

3. Health, Safety and Environment

The following safety requirements are to be strictly adhered to during operation of this equipment. Failure to comply to these guidelines may result in damage to persons and/or equipment. Please refer to the equipment hazard assessment for full details of risk categories included in Appendix



Dangerous Electricity,



Cryogenic/liquid nitrogen,



Compressed gases.

4. Personal Protective Equipment

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The following is the MINIMUM MANDATORY PPE for entering and using equipment and processes within any CLEANROOM facility (BRIM 446 and 449).

The following Additional PPE is MANDATORY for operation of the equipment and processes described in this SOP

						
Cleanroom PPE	Eye protection					

5. Materials and Tools

The following materials and tools are required during general operation of this equipment. Additional materials may be required beyond this list if performing procedures outside the scope of this SOP

Procedure	Consumable Materials	Equipment	Tools
Section 7 below	Vacuum grease		Sample handling tweezers

6. Before you begin

- 6.1. Tool Safety
 - 6.1.1. **ENSURE TOOL IS SAFE TO USE**
 - 6.1.2. Inspect the equipment and surrounding work spaces:
 - 6.1.3. Overall Tidiness, Loose Objects, Collision Points, Pinch Points
- 6.2. Ensure that LN2 is available for the process to run (inquire with ANF staff)
- 6.3. Tool Configuration
 - 6.3.1. Contact the Primary Tool Contact if the tool requires a tooling change from the default.
 - 6.3.2. THE **DEFAULT** TOOLING SETUP FOR THIS EQUIPMENT IS: **Equipment is turned OFF**
 - 6.3.3. **FAMILIARIZE LOCATION OF EMERGENCY OFF**
- 6.4. Critical design considerations (eg sample needs to fit inside chamber/
- 6.5. Always run a cleaning recipe before your process(es)
- 6.6. Always run a cleaning recipe before signing off from the equipment

7. Standard Operating Procedure

7.1. Starting up

7.1.1. Open PC4500

- 7.1.1.1. User: OPT, Pass: OPT
- 7.1.1.2. If machine was off, push reset button in back of etcher

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7.1.1.3. Click verify, click OK

7.1.2. Open N2 valve (labelled "LN2 ON/OFF") on the cabinet behind the computer

7.1.3. In the Chamber 1 menu:

7.1.3.1. Set table temp to 15 C

7.1.3.2. Click run, then stop

7.1.3.3. Temp will start cooling to 15 C

7.2. Sample mounting

7.2.1. In Pumping menu:

7.2.1.1. In loadlock module, click stop, then click vent (assuming cleaning recipe was run before). Loadlock will begin to vent

7.2.2. Once done venting, Open the load lock

7.2.3. Take the backing wafer out and place on big wipe

7.2.4. Clean the mounting wafer with vacuum grease remover-wetted wipe, then dry with dry wipe

7.2.5. Take a bit of vacuum grease on a foam-pointed swab, dab it onto backing wafer, then place and press sample onto the grease so it lies flat.

7.2.6. Put backing wafer with sample mounted back in loadlock. Make sure the wafer is snug against the two alignment pins in the loadlock

7.2.7. Check the lid gasket and clean off dust, if any

7.2.8. Close load lock

7.2.9. In Pumping menu:

7.2.9.1. In loadlock module, click stop, then click evacuate. Loadlock will begin to pump down.

7.3. Etching

7.3.1. In Recipes menu:

7.3.1.1. Select "automatic"

7.3.1.2. Click load and select your desired recipe

7.3.1.3. Click Run now

7.3.1.4. Enter your sample name and click OK.

7.3.2. Wait for recipe will run. Sample will automatically be loaded and unloaded from the chamber.

7.4. Sample unloading

7.4.1. In Pumping menu:

7.4.1.1. In loadlock module, click stop, then click vent. Loadlock will begin to vent

7.4.2. Take out backing wafer and place on a wipe

7.4.3. Remove sample from backing wafer (vacuum grease will need to be cleaned off the backside of your sample)

7.4.4. Clean the mounting wafer with vacuum grease remover-wetted wipe, then dry with dry wipe

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7.4.5. Put backing wafer into loadlock. Make sure the wafer is snug against the two alignment pins in the loadlock

7.4.6. check the lid gasket and clean off dust, if any

7.4.7. Close load lock

7.4.8. In Pumping menu:

7.4.8.1. In loadlock module, click stop, then click evacuate. Loadlock will begin to pump down.

7.5. Cleaning and wrap-up

7.5.1. In Recipes menu:

7.5.1.1. Run "Clean 15C" recipe with wafer name "susceptor"

7.5.2. Wait for recipe to finish

7.5.3. In the Chamber 1 menu:

7.5.3.1. Set table temp to 40 C

7.5.3.2. Click run, then stop

7.5.3.3. Temp will start rising to 40 C

7.5.4. !!Close N2 valve

8. Cleanup

All users are expected to provide sufficient time in their bookings to adequately clean up the work space after they have finished operating equipment. Equipment is always to be returned to a ready-to-use state for the next user, this includes:

8.1 Returning all standard tools and consumables to allocated locations

8.2 Waste disposal

9. Equipment Information

9.1. System Features

Substrate/Stage Related	Operating Modes	Materials (Allowed or Not)
LN2 cooled/resistive heating		NO METALS ALLOWED
Software Features	Available Tooling Options	Additional Accessories
	Cryogenic etching	

9.2. Equipment Details

Manufacturer	Model	Add-Ons
Oxford Instruments	PlasmaPro 100ICP 300	

9.3. Standard Parts and Consumables

Manufacturer Part #	Description of Part	Unit Price (currency)	Intended Use

10. Basic Troubleshooting

10.1. If you require assistance or experience an unexpected error, contact the primary tool contact

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10.2. ...

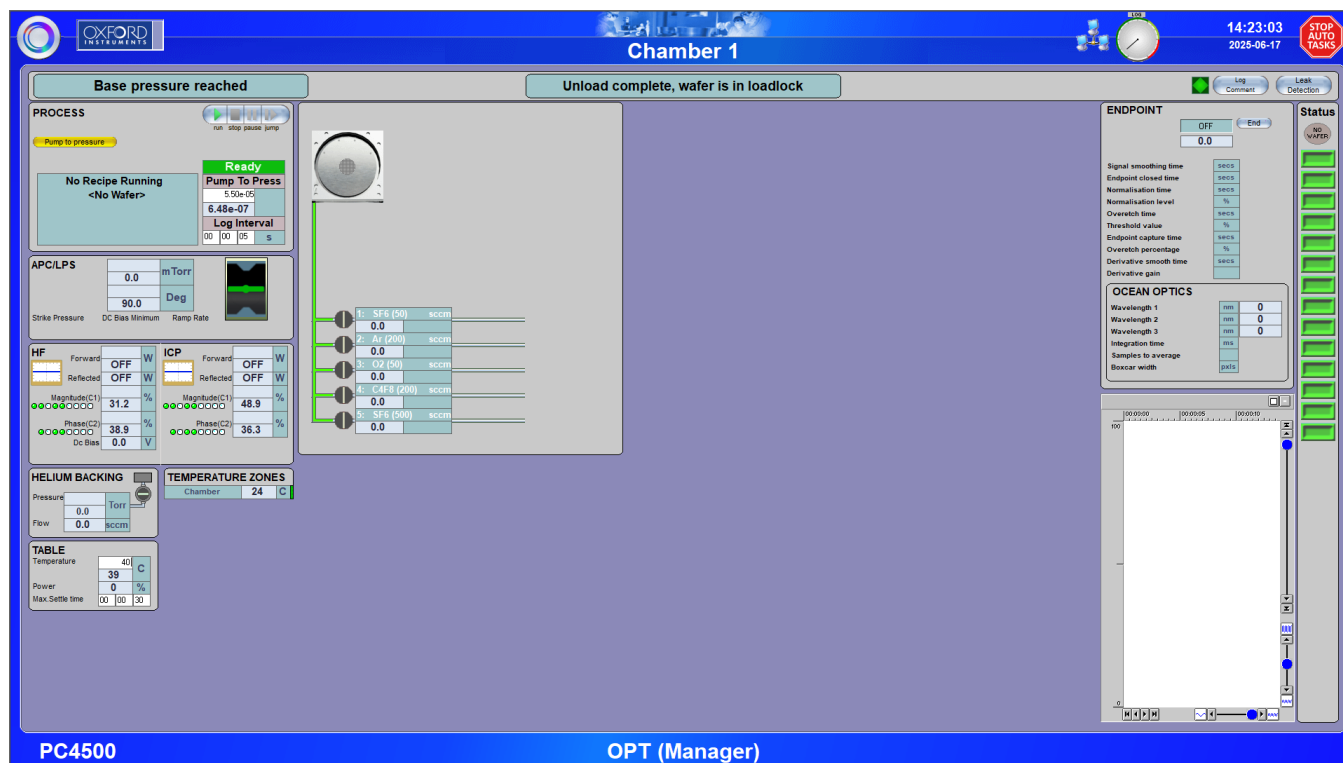
11. Maintenance

11.1. Maintenance to be performed by or under the supervision of ANF staff

Appendix A – Principles of Operation

Appendix B – Design Consideration and Process Restrictions

Appendix C – Quick-Reference images and miscellaneous information

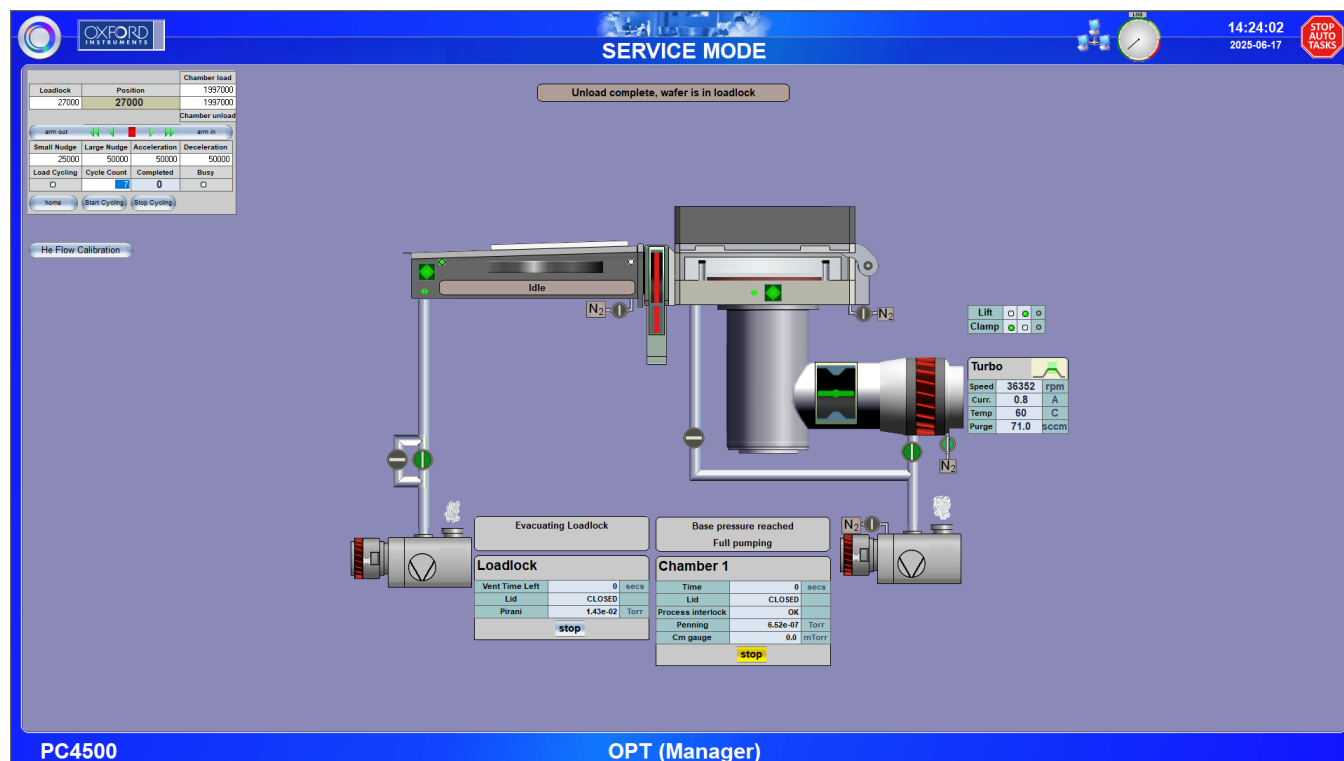
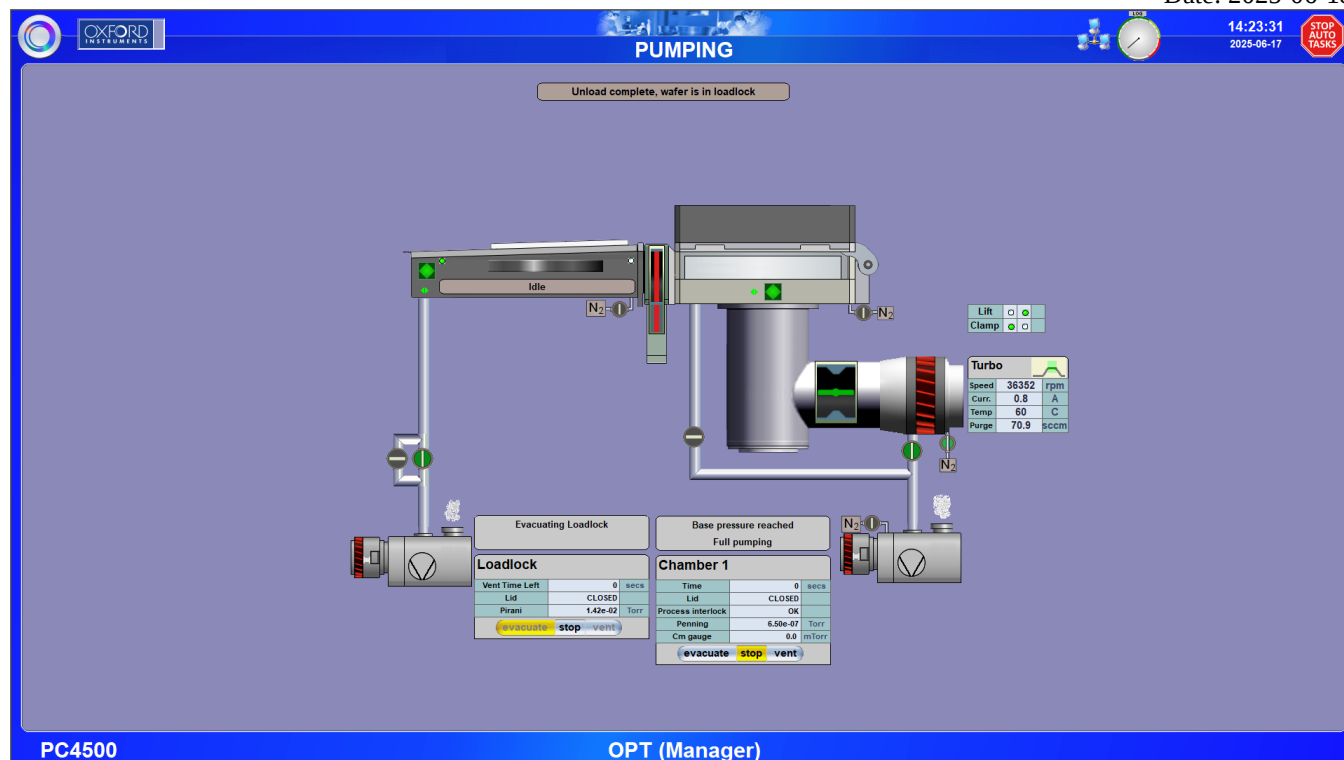


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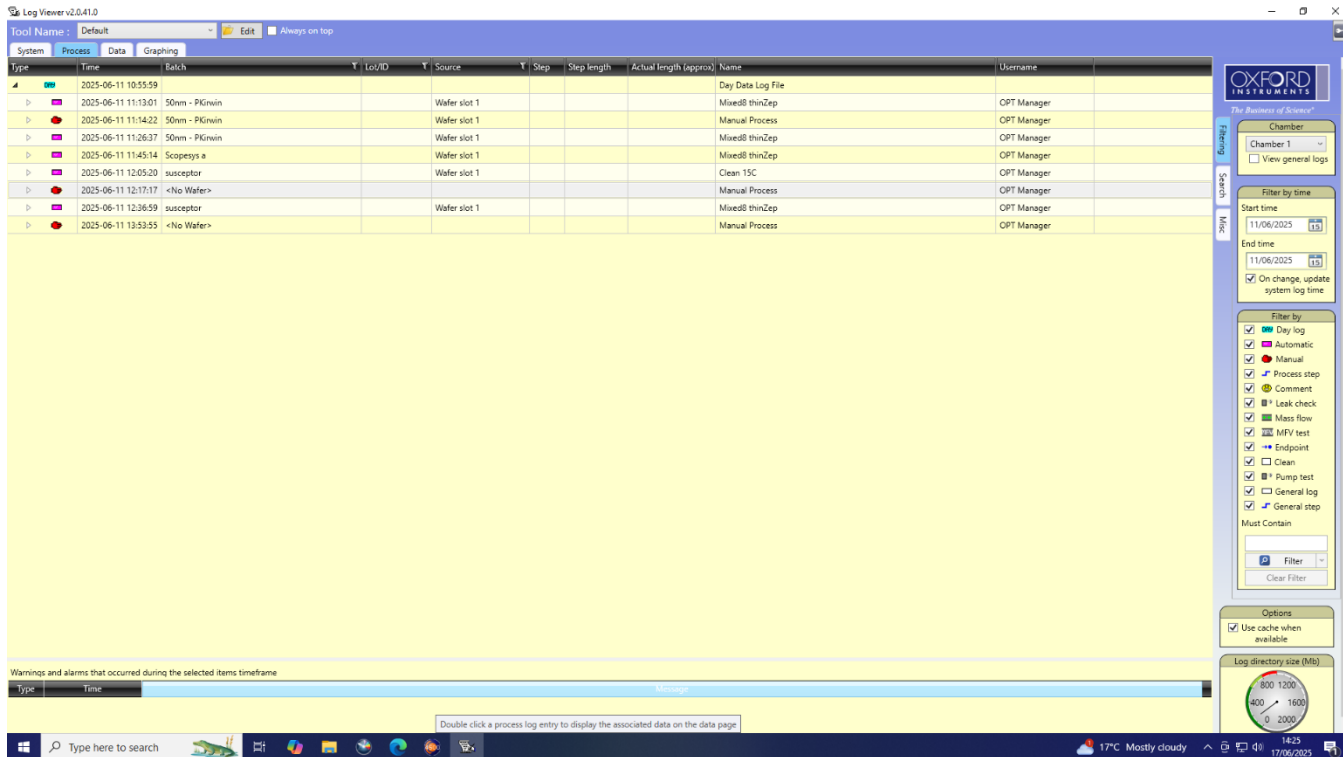
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Log Viewer v2.0.41.0

Tool Name: Default

System Process Data Graphing

Type	Time	Etch	Lot/ID	Source	Step	Step length	Actual length (approx)	Name	Username
	2025-06-11 10:55:59							Day Data Log File	
	2025-06-11 11:13:01	50nm - PKirwin		Wafer slot 1				Mixed8 thinZep	OPT Manager
	2025-06-11 11:14:22	50nm - PKirwin		Wafer slot 1				Manual Process	OPT Manager
	2025-06-11 11:26:37	50nm - PKirwin		Wafer slot 1				Mixed8 thinZep	OPT Manager
	2025-06-11 11:45:14	Scopesys a		Wafer slot 1				Mixed8 thinZep	OPT Manager
	2025-06-11 12:05:20	susceptor		Wafer slot 1				Clean 15C	OPT Manager
	2025-06-11 12:17:17	<No Wafer>						Manual Process	OPT Manager
	2025-06-11 12:36:59	susceptor		Wafer slot 1				Mixed8 thinZep	OPT Manager
	2025-06-11 13:53:55	<No Wafer>						Manual Process	OPT Manager

Warnings and alarms that occurred during the selected items timeframe

Type Time Message

Double click a process log entry to display the associated data on the data page

17°C Mostly cloudy 14:25 17/06/2025