

Oxford Cobra 300 Operating Procedure

1. Log into the system with your Group/Company's login.
 - a. If the mouse and keyboard are unresponsive press the #1 button on the switchbox located under the bottom monitor.
2. Select the "Automatic" screen.
3. Confirm the previous run is completed.
4. Vent the Load-Lock.
5. Reference the appropriate "**Process Traveler**" on page 3 or 4 then continue to step 6.
6. Acknowledge that you have loaded a wafer into the Load-Lock when prompted.
7. Pump Down the Load-Lock.
8. If using the Laser Monitor proceed to page 2 and reference the "**Intellemetrics Laser Monitor Procedure**".
9. Edit your recipe if necessary. **See below for restrictions on recipe writing/editing.**
10. In "Job Actions" (top-right of *Automatic* screen) give your run a "Batch" name with the format: *LastnameFirstInitial_Runname*, eg. *BoschT_etch01*
11. Select the Recipe you'd like to run from the drop-down menu.
12. Select "Run".
13. When the run is completed, and the wafer has unloaded into the Load Lock, select "Vent" from the Automatic Screen.
14. Remove your sample and place a clean Si cleaning wafer onto the load-arm.
15. Acknowledge that you have loaded a wafer into the Load-Lock when prompted.
16. Pump Down the Load-Lock.
17. Run the appropriate cleaning recipe.
 - a. See "**Process Traveler for "X"-based Etching**" on page 3 for cleaning instructions.
18. Fill out the logbook.
19. Log out of the software.

Recipe Editing

1. **When editing a UCSB Standard Etch Recipe you may only edit the Etch Time! There are no exceptions.**
2. If you want to make any other approved changes you must "Duplicate" one of our Standard Etch Processes and use it as a template. Save it to a unique name and change the access from "Public" to "Private".
3. **Never Duplicate the Cleaning Recipes!**
4. Now you may edit the Table Temperature set-point, Gasses and Flows, Process Pressure, Etch Time and Looping. **DO NOT EDIT ANY OTHER FIELDS OR CONDITIONS WITHOUT PRIOR AUTHORIZATION.**

Intellemetrics Laser Monitor Procedure

1. Follow steps 1-8 on page 1.
2. Edit your recipe if necessary. **See “Recipe Editing” on page 1 for restrictions on recipe writing/editing.**
 - a. The first step in your recipe needs to be a 60 minute delay that will give you time to set up the laser.
3. In “Job Actions” (top-right of *Automatic* screen) give your run a “Batch” name with the format: *LastnameFirstInitial_Runname*, eg. *BoschT_etch01*
4. Select the Recipe you'd like to run from the drop-down menu and press “Run”.
5. Press the #2 on the switch box to control the Intellemetrics Computer
6. Insert the Dongle into the laser monitor to turn it on.
7. Launch uEye to position the laser.
 - a. Use only the GREY micrometers to adjust the position of the laser on your sample!! **Never turn the black knobs.**
 - b. The Laser is Infrared (980nm), so it is invisible to the eye.
 - c. Notify staff if there is an issue with the laser monitor, do not attempt repair.
8. Launch “Etch Director”.
9. Simulate your etch or open an image of a LaserMonitor trace to compare against.
10. Go to start logging the Laser reflection intensity.
11. Press the #1 on the switch box to switch back to the Cobra 300 software.
12. From the “Automatic” screen Press the [Skip] button to end the delay.
13. From the “Automatic” screen use the [Skip] button to end the “Etch” step.
 - a. The LaserMonitor trace should be used to indicate this stopping point.
14. Remove the Dongle from the Laser monitor to turn it off.
15. Return to step 13 of the procedure on page 1.

Process Traveler for InP-based Etching

Ridge Etching @ 60°C

1. **Chamber Conditioning:**
 - a. Run the "STD InP Ridge Etch Cl₂/CH₄/H₂-60C" recipe for 5 minutes on a clean bare Si wafer to condition the chamber.
2. **Etch:**
 - a. Run the "STD InP Ridge Etch Cl₂/CH₄/H₂-60C" recipe with your sample placed in the center of the Si carrier wafer. **DO NOT MOUNT WITH ADHESIVES, OIL OR GREASE.**
 - b. Pocketed Carriers may be available for 2" and 3" wafers.
3. **Successive Etches:**
 - a. Run etches sequentially, no clean or season in between.
4. **Cleaning:**
 - a. Run the recipe: "Std Clean – O₂/SF₆ Chamber Clean (Optical Endpoint)" when you have completed your processing. This recipe terminates with optical endpoint monitor, **never edit this recipe.**
5. Return to step 6 on page 1.

Grating Etching – 20°C

1. **Chamber Conditioning:**
 - a. Run "Std Clean-O₂/SF₆ Chamber Pre-clean 2min" on a clean Si carrier wafer
(No seasoning needed)
2. **Etch:**
 - a. Run 1 etch using recipe "STD InP Grating Etch-Cl₂/Ch₄/H₂/Ar 20C" on Silicon carrier. **DO NOT MOUNT WITH ADHESIVES, OIL OR GREASE.**
3. **Successive Etches and Cleaning:**
 - a. Run "Std Clean – O₂/SF₆ Chamber Clean (Optical Endpoint)" after each etch. This recipe terminates with optical endpoint monitor, never edit this recipe.
4. Return to step 6 on page 1.

Process Traveler for GaN or GaAs-based Etching

GaN Etching – 20°C

1. **Chamber Conditioning:**
 - a. Run the “Experimental GaN Etch 20C” recipe for 5 minutes on a clean bare Si wafer to condition the chamber.
2. **Etch:**
 - a. Run the “Experimental GaN Etch 20C” recipe with your sample placed in the center of the Si carrier wafer. **DO NOT COUND WITH ADHESIVES, OIL OR GREASE.**
3. **Successive Etches:**
 - a. 30 minutes of etching maximum between cleanings (including the chamber conditioning).
4. **Cleaning:**
 - a. Run the “Std Clean SF6 then O2 Chamber Clean (edit time)
 - b. Each Etch step should be set to 1 minute per 1 minute of Process Etch time with a minimum time of 5 minutes each.
 - c. With a maximum of 30 minutes of Process Etching before a Cleaning run is mandatory.
5. Return to step 6 on Page 1.

GaAs Etching – 20°C

1. **Chamber Conditioning:**
 - a. Run the “Experimental GaAs Etch 20C” recipe for 5 minutes on a clean bare Si wafer to condition the chamber.
2. **Etch:**
 - a. Run the “Experimental GaAs Etch 20C” recipe with your sample placed in the center of the Si carrier wafer. **DO NOT COUND WITH ADHESIVES, OIL OR GREASE.** 30 minutes of etching maximum between cleanings (including the chamber conditioning).
3. **Successive Etches:**
 - a. 30 minutes of etching maximum between cleanings (including the chamber conditioning).
4. **Cleaning:**
 - a. Run the “Std Clean SF6 then O2 Chamber Clean (edit time)”
 - b. Each Etch step should be set to 1 minute per 1 minute of Process Etch time with a minimum time of 5 minutes each.
 - c. With a maximum of 30 minutes of Process Etching before a Cleaning run is mandatory.
5. Return to step 6 on Page 1.

Process Traveler for ALE-based Etching

ALE Etching - 20C

1. **Set Table Temperature:**
 - a. Edit the "Rapid Cool LN2" Recipe so the setpoint is 20C.
 - b. Run the "Rapid Cool LN2" Recipe on a blank Si wafer to set the Table Temperature to 20C.
2. **Chamber Conditioning:**
 - a. Condition the chamber by running the recipe "Std Cl/O2 clean" for 5 minutes on a clean bare sapphire wafer.
3. **Etch:**
 - a. Mount your sample to a 100mm sapphire carrier using a very very small amount of Santovac oil (at the Panasonic systems). Ensure a minimum of 5mm edge exclusion where no oil or any other contaminant is in the exclusion zone.
 - b. Edit the ALE recipe for the number of cycles you will need.
4. **Successive Etches:**
 - a. Can be completed without any special conditioning.
5. **Cleaning:**
 - a. On a bare clean Si wafer run the "Std Cl2/O2 clean" recipe.
6. Return to step 6 on Page 1.