

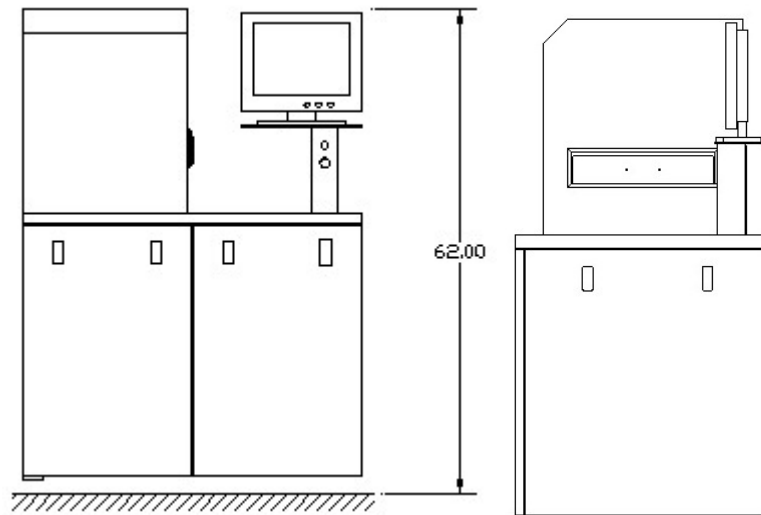
Nanonex NX-2000

Nanoimprinter Users Manual



Coral name: Nanoimprint Lithography
Model: 2000
Location: Nanofab, Building 215
Contact: nanofab_litho@nist.gov
Version: 1.0

OVERVIEW:



Press Unit Pressure: up to 500psi.

Max. Temp.: up to 250°C

Heating Rate: 300°C/min.

Cooling Rate: 150°C/min.

UV: Xenon Lamp

APPLICATIONS:

- Thermal Nanoimprint lithography
- UV room temperature Nanoimprint lithography

SPECIAL NOTES OR RESTRICTIONS:

- Must be trained and qualified to use tool.
- Any new chemical/polymer must be approved by Nanofab staff.

SAFETY PRECAUTIONS:

- Never touch any part inside the chamber or part going into the chamber with bare hands or contaminated gloves.
- Handle samples going into the chamber with gloves and/or tweezers.
- For any abnormal phenomenon during operation, shut down the machine by pressing the **RED Emergency button**.
- Report all emergency stops to the Nanofab staff.

Operation

Turn on the power

- Check four jumpers on the rear panel of the machine. Make sure that all circuit breakers are in the *ON* position.



Four jumpers in the *ON* position on the rear panel of NX-2000 nanoimprinter

- Turn on the High-pressure nitrogen switch. Verify the pressure of nitrogen gas being delivered to the machine is approximately 600 psi.
- Turn on the computer monitor and the computer.
- Turn on the Low-pressure nitrogen switch.
- Wait at least 5 seconds after switching Circuit Break 4 on before switching the control key to “1” position.



Emergency stop and control key of NX-2000 nanoimprinter

Load Sample

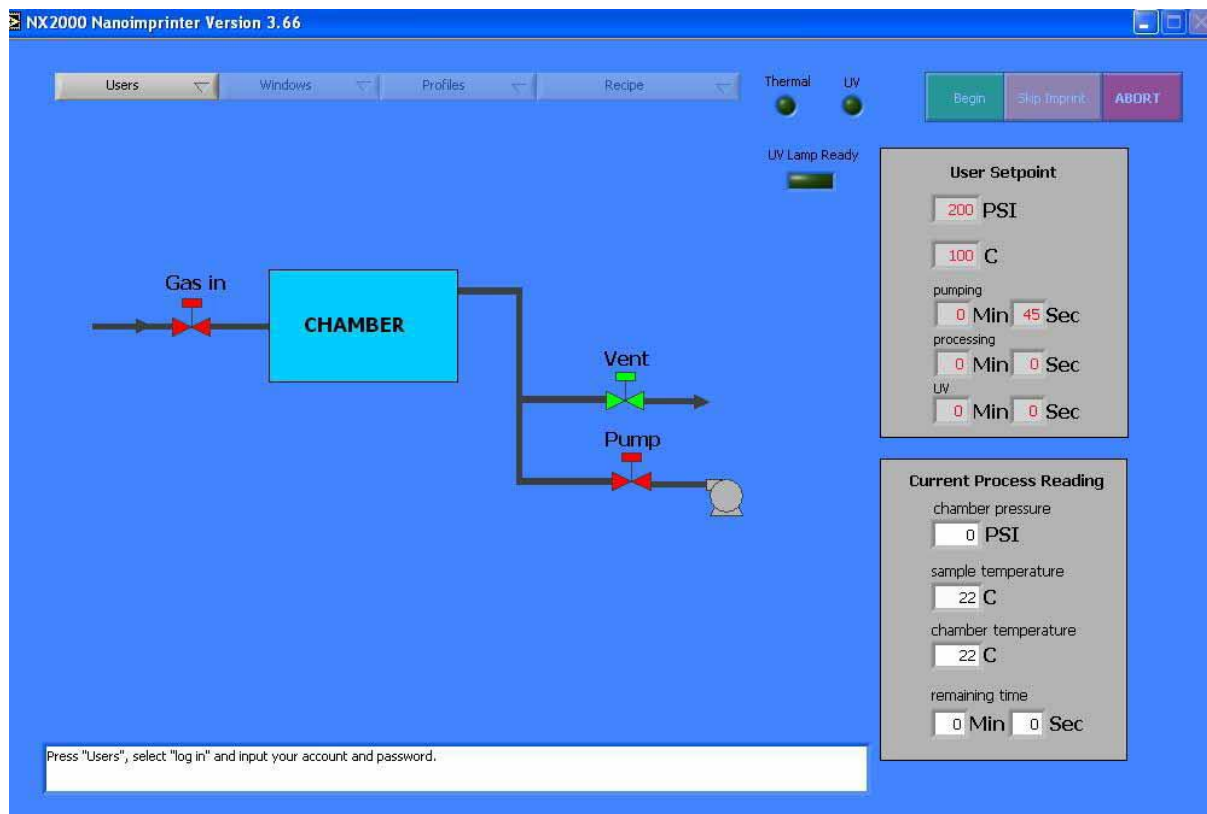
Two plastic thin films are needed to do an imprint.

Loading procedure

- Place the smaller diameter thin film on the wafer holder. Make sure the film covers the large inner hole and extends to the outside edge of the first ring. The film must be flat with no wrinkles.
- Place the mask and wafer in the center of the wafer holder.
- Place the larger diameter thin film on the Top Film Ring Holder. The film is held in place by eight magnets. The magnets must be placed over cone point protrusion. The film needs to be flat with no wrinkles.
- Place the Top Film Ring Holder onto the wafer holder. Align the cut out notches on the holder with the guide pins on the wafer chuck. The magnet side of the holder faces down.
- Gently push the drawer into the chamber until there is an audible “click”.

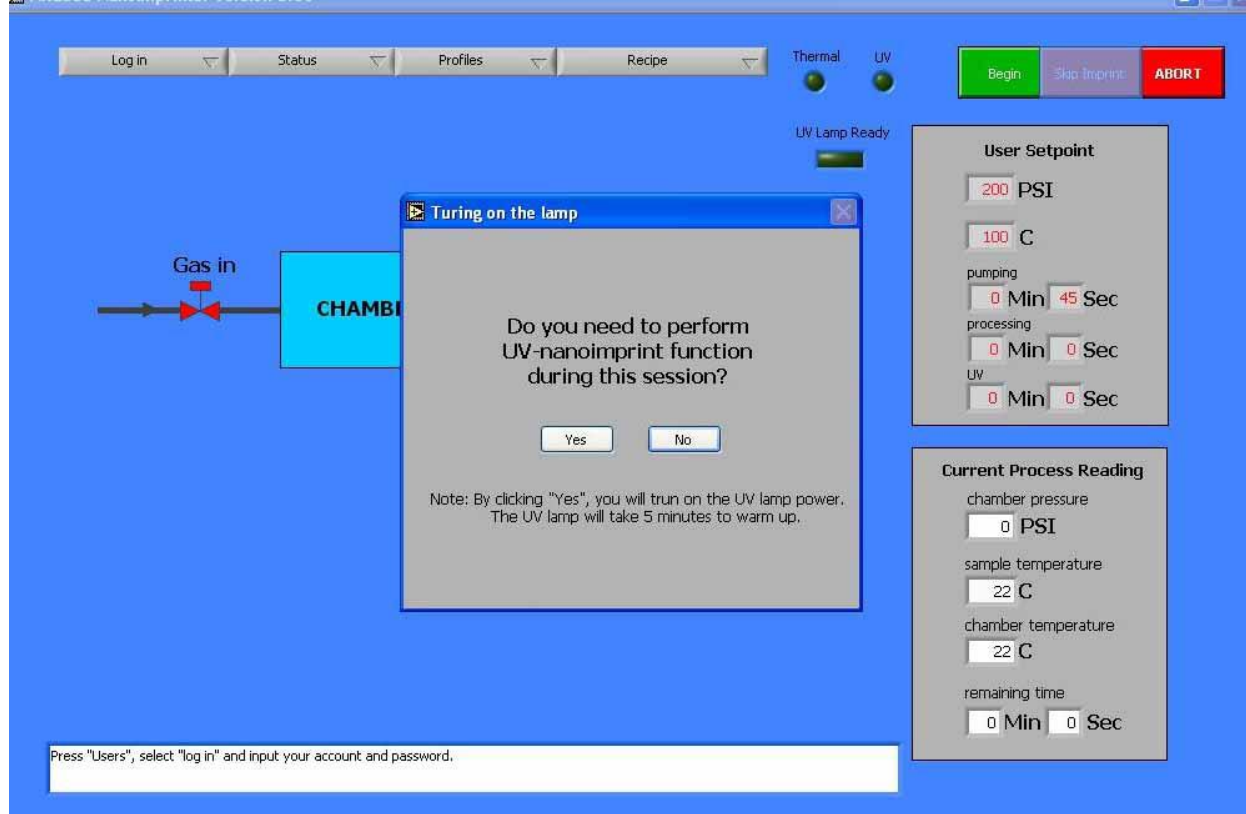
Imprinting

1. Double clicking on the **NX2000 vx.xx** icon on computer desktop.



2. Click “Users” ⇒ “Log in”, enter ID and Password (see staff for the details), and click “OK” to log onto the system. Click “EXIT” in the log in pop up menu.
3. Process edit

- a) Click “Yes” if you want to perform UV nanoimprint processes, which will turn on the UV lamp power. The UV lamp may need up to 5 minutes to warm up. Wait until the indicator “UV Lamp Ready” lights up. Both UV and thermal nanoimprint processes can be performed under this condition.



Caution!

The UV light source is designed for continuous operation. If the power is momentarily lost, shut the unit “off” and let it cool down for 5 to 10 minutes then switch back “on” and wait for warm-up.

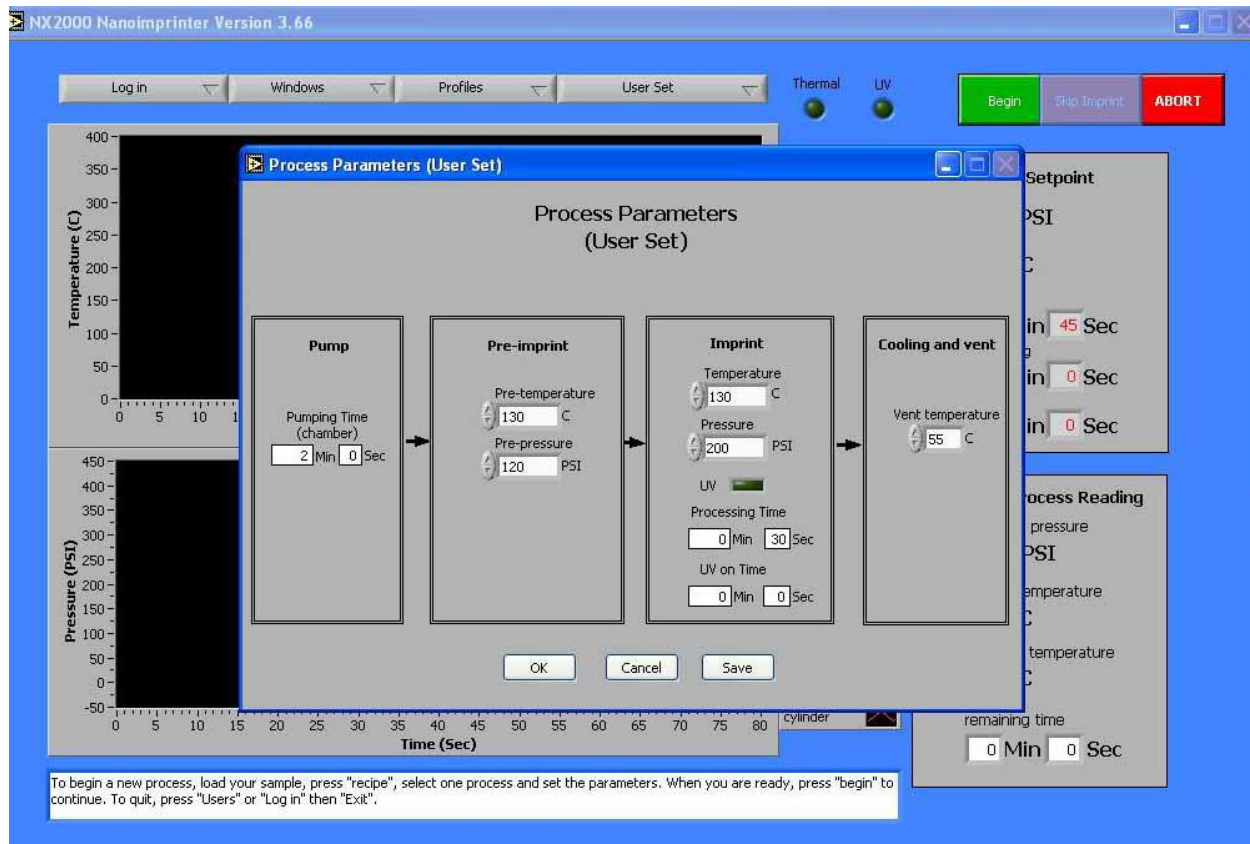
b) Click “No” if you will only perform thermal nanoimprint during the session.

4. Click “Recipe” to load the default imprinting recipes, or use *User Set* to compile a new one. For the *User Set*, input the following in the *Process Parameters* window

- a) *Pumping Time* (chamber) in *Pump* box
- b) *Pre-temperature* and *Pre-pressure* in *Pre-Imprint* box;
- c) *Temperature*,
- d) *Pressure*
- e) *Processing Time* and
- f) *UV on time* (if *UV on/off* is switched to ON).

The process will keep the sample at temperature and pressure for the duration of processing time, and then turn on UV lamp.

Venting temperature in Cooling and Vent box. If both *Pre-temperature* and *Temperature* settings are less than 25°C, the thermal heaters will not be turned on during imprint



process.

To save current recipe, press save button and select a path.

To save current run file, click *Profiles* and *Save* after selecting a file path.

Once the recipe is selected, the indicators will show whether the thermal heater and UV lamp will be on during current process

5. Click green “Begin” button. After clicking the “OK” button in the pop-up menu, the chamber closes automatically and the vacuum pump starts to pump the chamber.

WARNING!!

DO NOT pull out the drawer until the program is finished!

During the process, temperature and pressure inside the chamber are monitored in real-time and displayed on the monitor.

6. When imprinting is finished, the chamber vents and opens automatically. The status indicator at the bottom of the screen shows “To begin a new run”. The operator can open the drawer and remove the sample at this time.
7. To save current process data, click *Profiles*, select a file path, and click *Save*.
8. Repeat *Step 3* through *5* for next imprint run.
9. After finishing all imprint runs, click “Login” ⇒ “Exit” to exit the program
10. During imprint, you can click the “skip imprint” button to skip current imprint and directly go to cooling of sample.

END STEP:

- Switch control key to “**0**” position.
- Turn off High-pressure nitrogen switch.
- Turn off Low-pressure nitrogen switch.
- Sign in and fill out the log book.