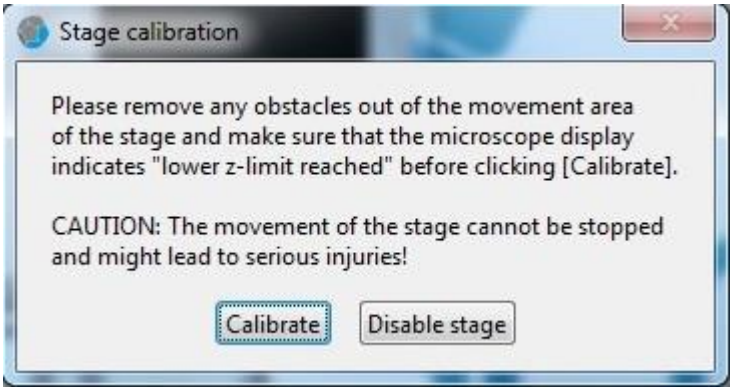
Stanford Nanoscribe System: Operating Procedure

Written June 2018

System calibration and initialization

1. Open the NanoWrite software from the desktop.

2. Click the “Calibrate” button in the “Stage Calibration” window. Wait until the calibration process is done and make sure that NOTHING is touching the Nanoscribe machine during this time

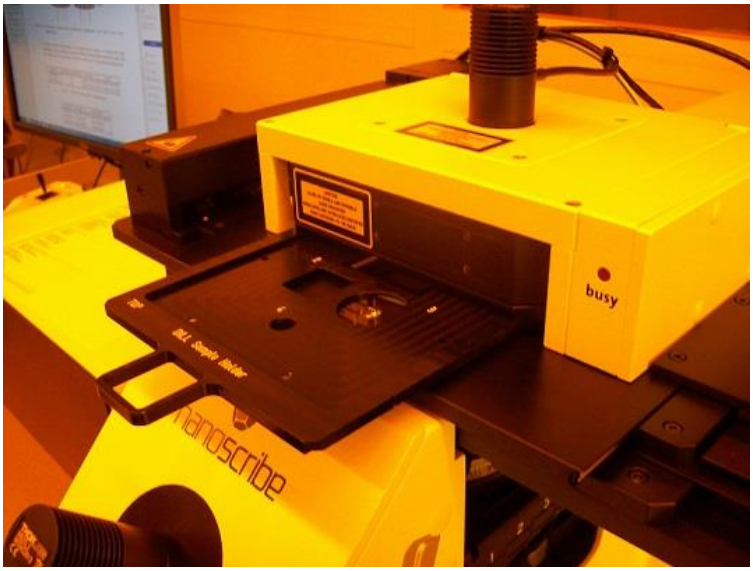


3. After calibration, a “Choose sample holder” window will appear, you can now load your sample, DO NOT click “OK” until you have loaded your sample and scrolled to the appropriate sample holder description.

4. Prior to loading the sample, make sure that there is no objective in the system, and confirm on the microscope controller that the objective turret (Z-stage) is in the lowest position (it should say “Lower Z-limit reached”)

Sample Preparation

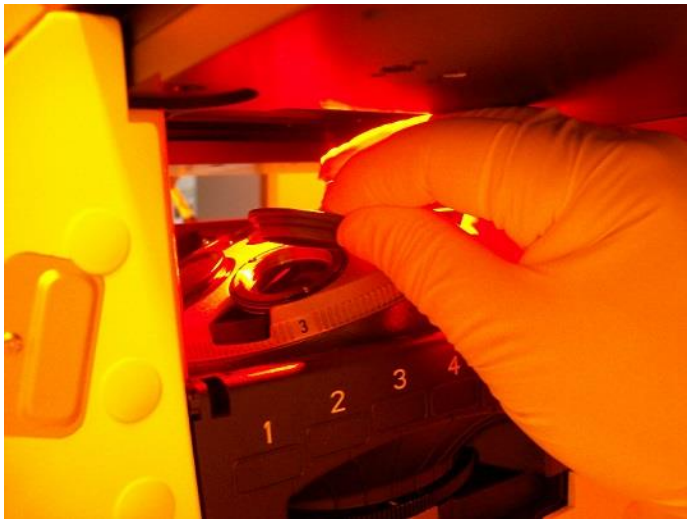
1. Remove the sample holder needed for your experiment from its protective wrapping.
2. Place the appropriate photoresist on the substrate in the fumehood
3. Insert the sample holder into the microscope module



4. Make sure that the sample holder is set at the right position (when the sample holder is inserted, you can hear a “click”)

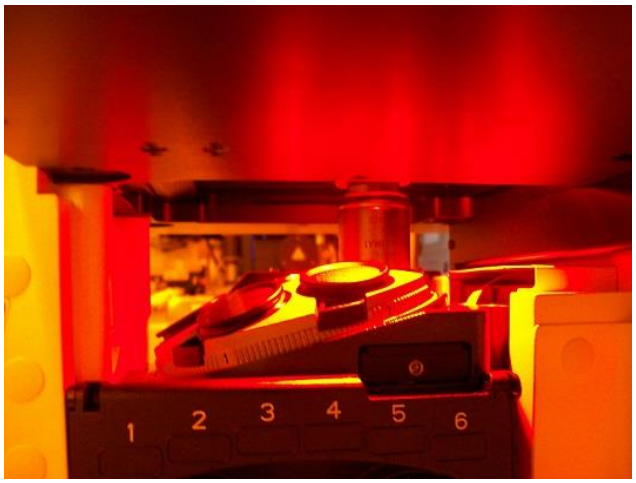
Switching the Microscope Objective

1. Using the buttons on the microscope, switch the turret position until the appropriate slot is in position for the microscope objective to be placed in



2. Remove the cap from the pocket of the turret
3. Remove the objective lens from the case (a white felt ring must be put on the objective lens)

4. Install the objective lens on the objective slot of the microscope module
5. Rotate the objective back to the patterning position using the buttons on the microscope



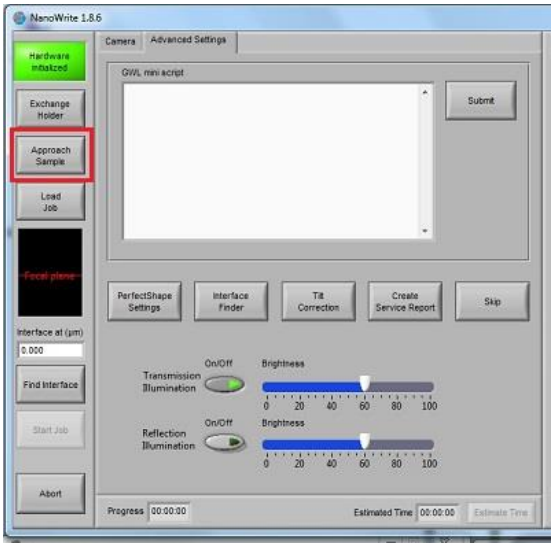
Device Creation with Nanoscribe

1. Navigate to the appropriate configuration on the “Choose sample holder” window (i.e 4 cm with 570 um) and click the “Ok” button
2. Turn on the Camera:
    a. Option 1: NanoWrite camera

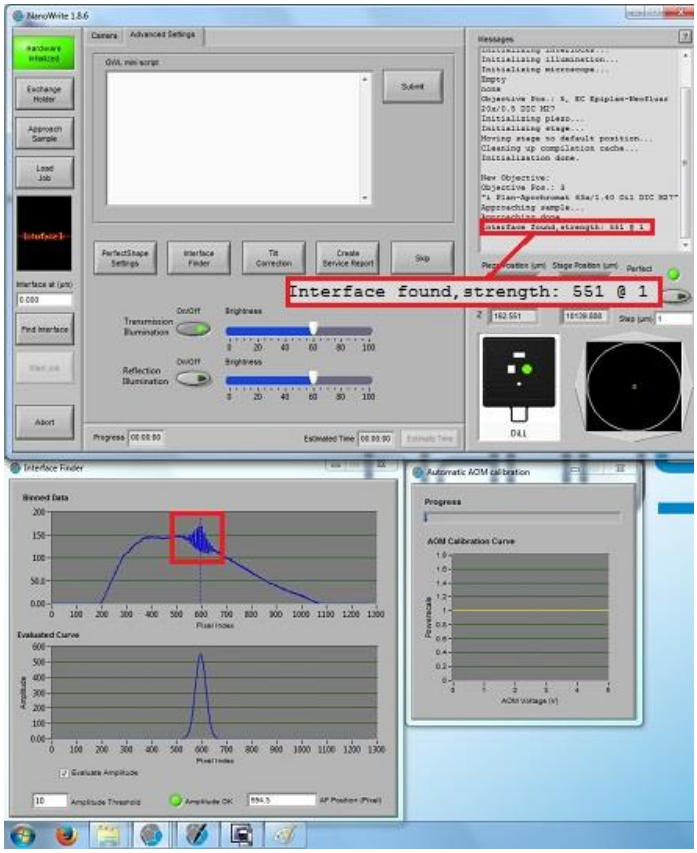
i. Enter the Camera options by clicking on the Camera tab then toggle Cam to "on" and set gain and exposure time to 10
ii. Then enter advanced settings and toggle Reflection Mode to on

b. Option 2: AxioVision camera
i. Click AxioVision Rel 4.8
ii. Ensure Camera Selection is "AxioCam1Cc1"
iii. Click Live
iv. Click A. Best Fit

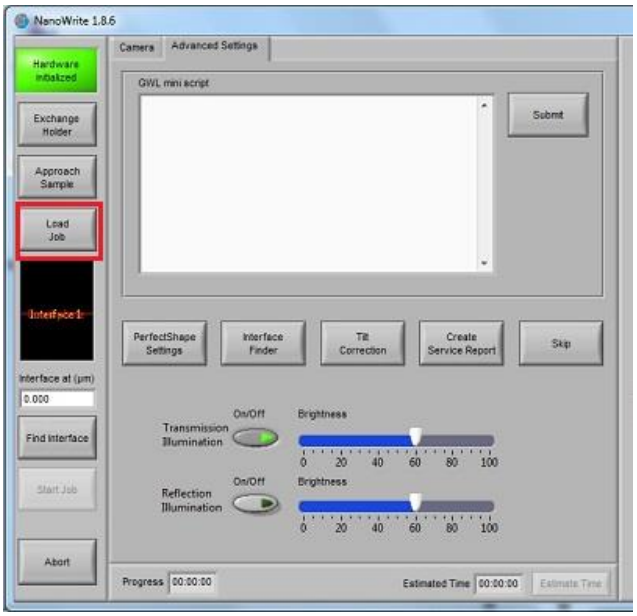
3. Click the "Approach Sample" button



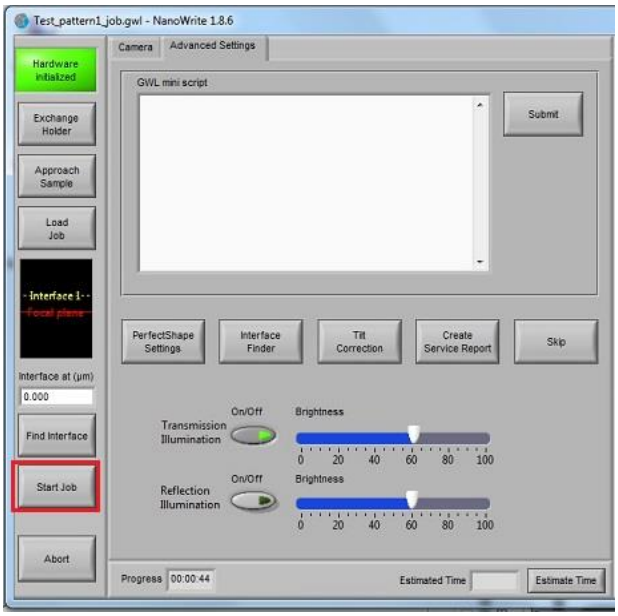
4. When the right working distance is automatically found, the small interference fringes will be observed in the "Interface Finder" window, as shown below. If the small interference fringes are not observed, or located at the wrong pixel, you have to click the "Find interface" button later.



5. Align the laser with the blue cursor on the display
    a. After finding the interface, draw a straight line by pasting the contents of the "alignment.txt" file into the GWL miniscript textbox under the Advanced Setting tab and then hitting "Submit"
    b. Adjust the blue cursors (both x and y) to the center of the laser spot
    c. Repeat steps a-b until the cursors are in the center of the laser spot at 100% zoom
6. Navigate to the location where the structure will be patterned using either the arrows on the keyboard or the navigation pad in the bottom right hand corner of the screen
7. Align sample (follow powerpoint located on NanoBox)
8. Click the "Load Job" button and the "Open File" directory will be opened

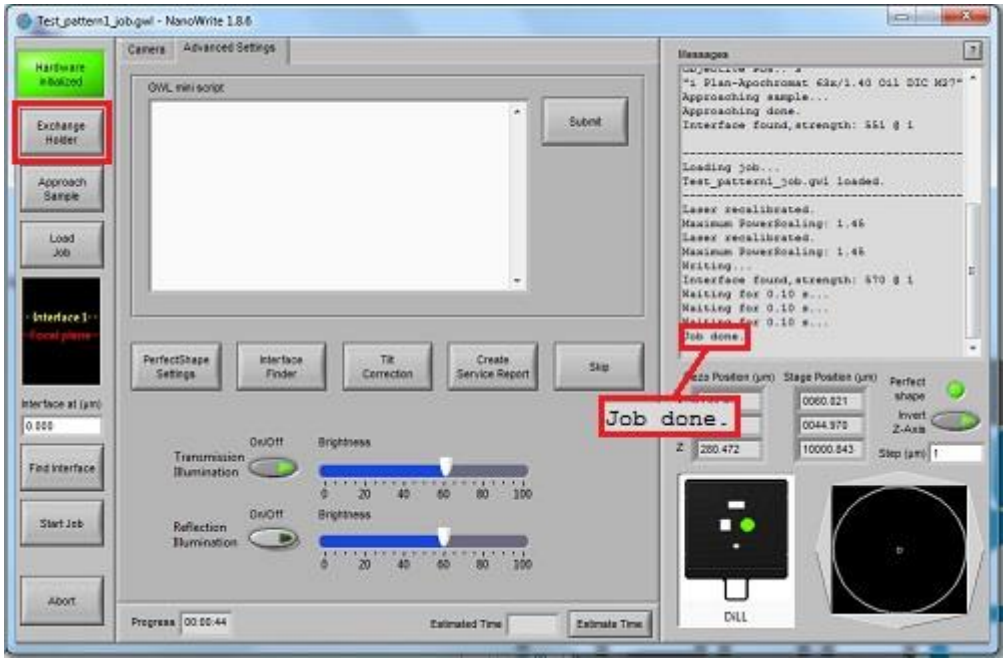


9. *Optional*: If the interface is not found in the process of "Approach Sample," you must click the "Find Interface" button before starting the job. Then, make sure that the small interference fringes are seen in the "Interface Finder window.
    a. Make sure that there is no find interface command in your job file, otherwise the system will attempt to find an interface before beginning the patterning. Additionally, note that the interface is found according to the top left corner.
10. Open your job file, which will be in the form "xxx_job.gwl"
11. Click the "Start Job" button
    a. Make sure no find interface in job file

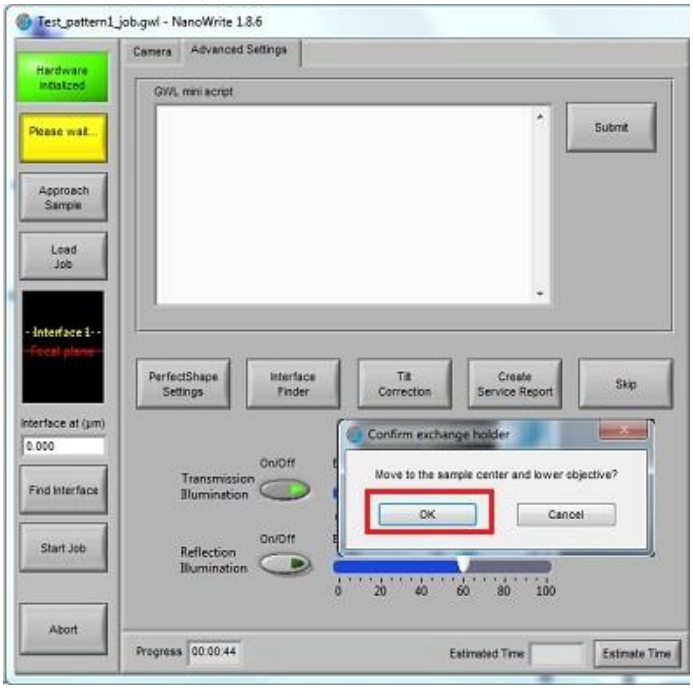


Unloading Sample

1. After the job is finished, click the “Exchange Holder” button



2. Click the “OK” button in the “Confirm exchange holder” window



3. Remove the sample holder from the microscope module
4. Remove the sample from the sample holder
5. Close the software and make sure that the laser is off

Cleaning Objective

1. Make sure on the microscope controller that the objective turret is in the lowest position
2. Navigate the turret such that the microscope objective can be removed
3. Remove the objective lens from the turret carefully
4. Screw the objective lens back into its holder
5. Remove the felt ring
6. Using a clean wipe, gently wipe the photoresist away, brushing with the grain of the wipe, and AVOIDING the glass lens.
7. Put a small amount of IPA on another wipe
8. Wipe around the front lens to remove most of the resist, but AVOID the glass lens itself
9. Now, wrap a wipe around the circumference of the of the objective and gently wash IPA across the objective to remove photoresist from the glass objective
10. Repeat steps 7-8
11. Repeat step 6
12. Store objective in its holder case