



ABM MASK ALIGNERS



LOCATION: Optical Lithography

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1. OVERVIEW

The ABM Mask Aligners use UV (or sometimes DUV) light to transfer a pattern to a substrate. The pattern to be transferred is laid out on an optical mask and the substrate is coated in a UV (or DUV) sensitive photo resist. The mask aligners hold these two pieces in contact so the light can be passed through and expose the photo resist.

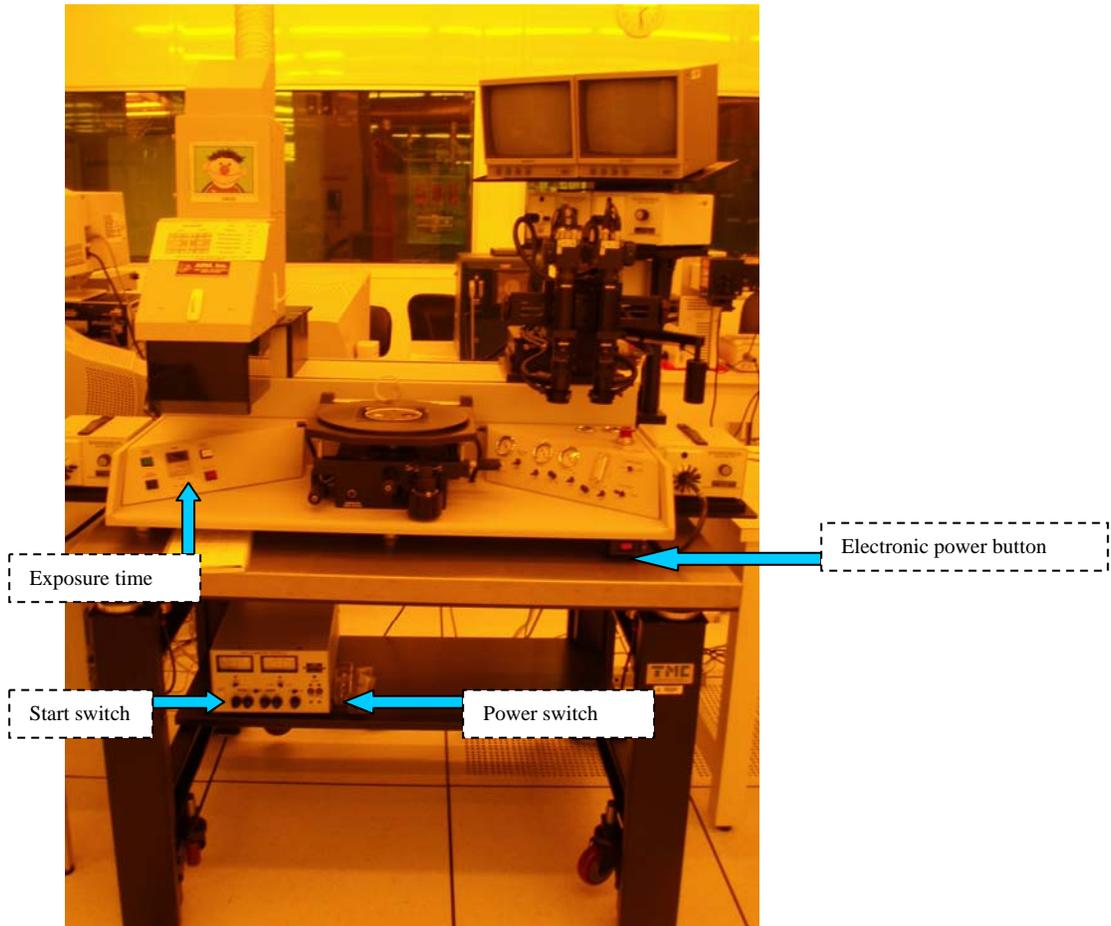
2. SAFETY PRECAUTIONS

When exposing the photo resist UV light is used. UV light may cause damage to the eyes and users should not look directly into the light. The bulbs used to cause the UV light contain mercury and the mask aligners should not be continuously turned on and off so as to prevent the bulb from bursting. Mercury is a highly toxic substance that may irritate the skin, eyes, and respiratory tract. Repeated exposure to vapors and liquids may cause mercury poisoning.

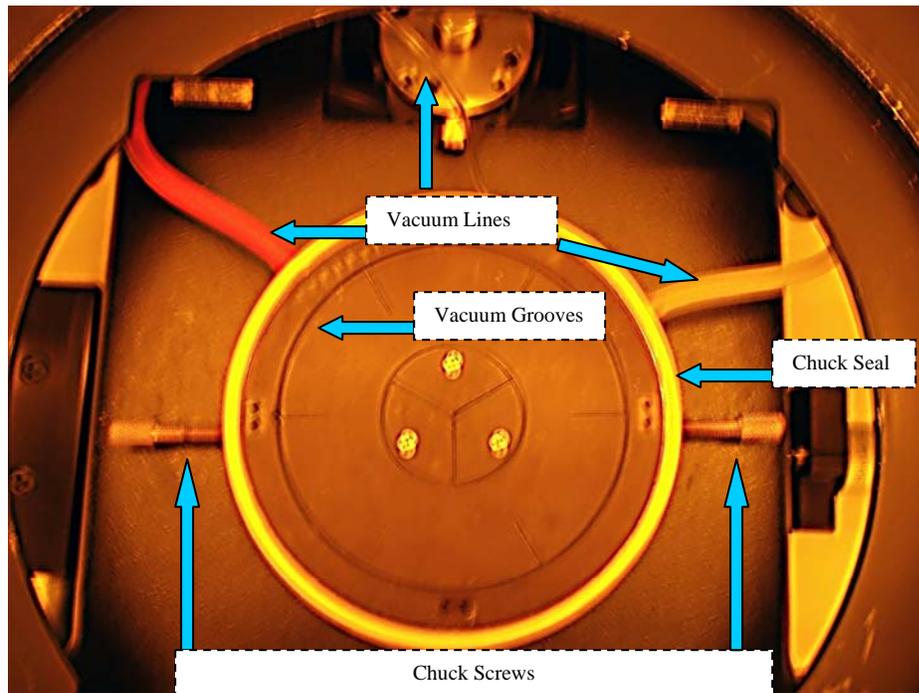
If you are bringing any new materials into the NanoFab for use in your process, it is necessary to fill out a chemical import form (available on our website, <http://www.nanofab.ualberta.ca>) and supply an MSDS data sheet to Stephanie Bozic.



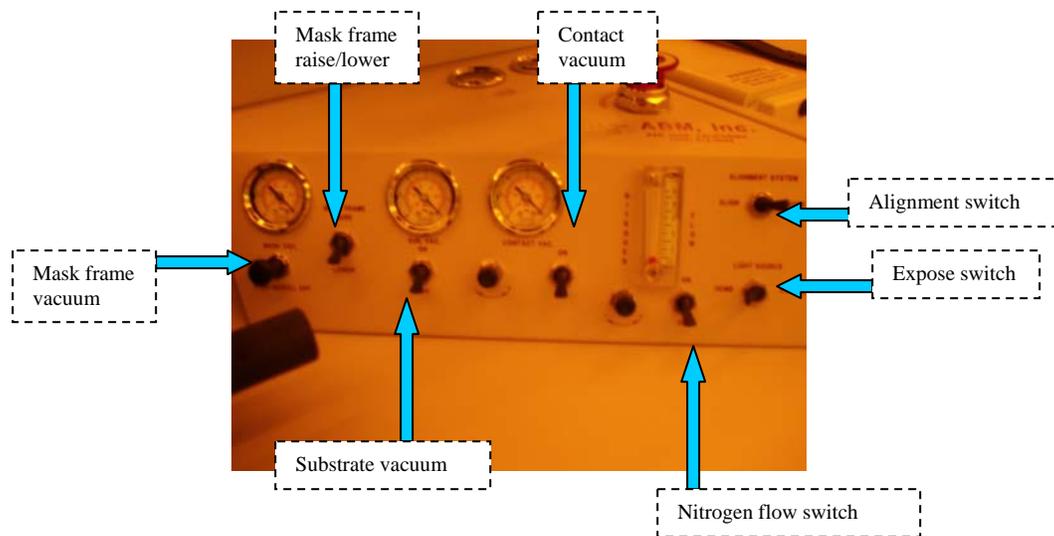
3. OPERATING INSTRUCTIONS



3.1. Turn on the mask aligner in three steps: a) switching the electronic power button until the electronics are lit up, b) turn on the power box by flipping the power switch c) and press and hold the start button until the far right gauge increases to the right. It will take about 20 min for the light source to stabilize.



- 3.2. Ensure the appropriate chuck is chosen for your substrate. The substrate should cover as much of the vacuum grooves as possible to ensure good vacuum. The substrate should not be impeding the seals around the chuck to ensure good contact.
- 3.3. The chuck is changed by loosening the two screws on the sides. These hold the chuck onto the shaft. Ensure the chuck is centered and finger tight on the chuck aligner. There are three vacuum lines that are attached to the chuck and these have to be disconnected as well. The three lines are identical on all of the different sized chucks. Each line is a different color and size so there is little confusion when hooking it back up.
- 3.4. The mask frame may need to be changed because of the chuck selected. It also has two screws that need to be loosened and only one vacuum line.

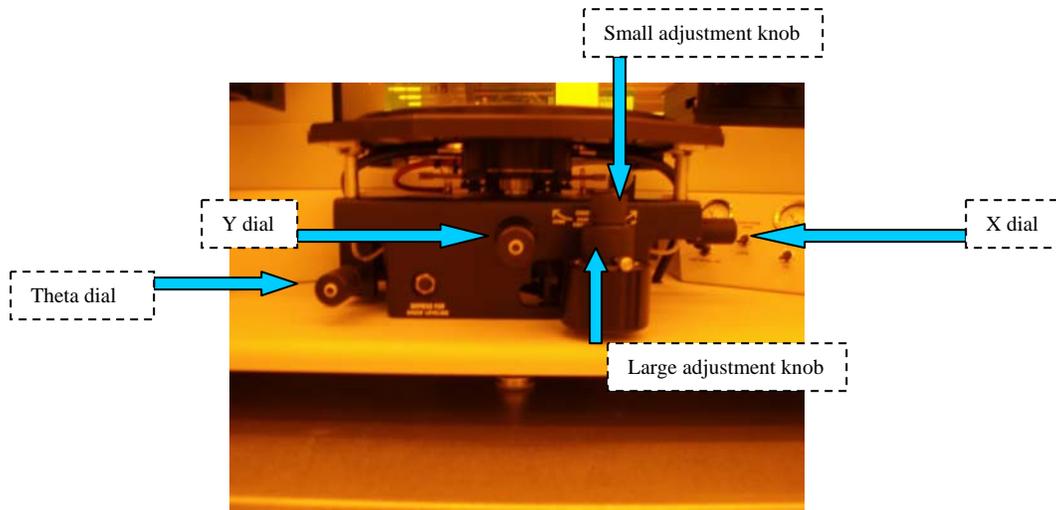


3.5. Lower the mask frame (mask frame switch goes down).

3.6. Clean your mask from particulates by blowing the nitrogen gun on both sides. Place your photo mask brown side down (chrome down) on top of the mask frame. Ensure the mask is pushed against the small metal guides.

3.7. If applicable, put the top of the mask frame on top of the photo mask. Turn the mask frame vacuum on by pulling the switch out. The mask and mask frame should be stationary.

3.8. Lift the mask frame up. Place the substrate on top of the wafer chuck. Turn the substrate vacuum on (flip switch up).



3.9. Lower the mask frame. Align the substrate so the pattern is centered and level onto the wafer using the x and y dials on the bottom and side of the mask frame. If the substrate needs to be rotated use the theta dial located to the left of the y dial on the bottom of the mask frame.

3.10. Turn on the nitrogen flow by flipping the switch to on.

3.11. Lift the substrate until contact with the mask is obtained. To raise the substrate up, press the self leveling button on the mask aligner and hold. Turn the large adjustment knob in a counter clockwise direction until the substrate is close to the mask but not touching

3.12. Using the Y, X and Theta dials aligning can be done. If this is a second layer the alignment viewing system can be moved over by toggling the alignment system switch.

3.13. Raise the substrate into contact using the small adjustment knob until the dial begins to skip. Turn the dial for 2 more turns after skipping begins. Soft contact has now been obtained.

3.14. To obtain hard contact (critical for very small features) turn on the contact vacuum and turn off the substrate vacuum. The nitrogen flow should automatically shut off.

3.15. Set exposure time.

3.16. Switch the light from home to expose. The light source will move overtop the substrate and you will hear the shutter open. Ensure the light is on, but do not look directly into the light as it is UV and may cause damage to your eyes.



- 3.17. When exposure complete, change light from expose to home, turn the contact vacuum off (nitrogen flow should automatically begin again), turn the substrate vacuum on, and lower the chuck by turning the large adjustment knob clockwise until the substrate is separated from the mask.
- 3.18. Lift the mask frame up and turn the substrate vacuum off.
- 3.19. When process is complete, remove the mask and turn off the nitrogen flow. Leave everything else on.

4. TROUBLESHOOTING

If vacuums aren't working make sure that the seals are in good condition and nothing is impinging on them. Check to see that the vacuum lines have been re-connected properly.

If the light doesn't come on, make sure the lamp was turned on. If the shutter doesn't open check that it is set to Auto Expose not Manual Expose.

If you encounter an unexpected error or require assistance please contact the primary or secondary trainer listed above. Should they not be available, please contact any staff member for assistance.

6. APPROVAL

QUALIFIED TRAINER: Jolene Chorzempa

TRAINING COORDINATOR: Stephanie Bozic