

Materials: AZ 1512 (Positive Photoresist), AZ351 (Developer), 'Dog Bone' Aluminum Sample, Double-sided tape, Disposable Pipette, Aluminum foil, Nitrile Gloves

Equipment: 26-1k Mercury Exposure System, Straight 8-5k Centrifuge, VWR 300 Hot Plate,

Initial Setup:

Prior to starting the lab, please check to make sure that the following items and/or steps have been completed.

- 1) The inside of the centrifuge has been layered with aluminum foil. If not, please do so with the foil provided. It is not necessary to change the saran wrap beneath the aluminum foil. To open the lid, turn on the system with the switch on the back of the centrifuge. Then push the 'OFF' button on the front panel. A click will sound, informing you that the lid can be now opened.
- 2) There is a sufficient amount of photoresist (AZ1512) in the container. If the container is less than 1/8th full, then contact Prof. Wei-Chih Wang. CAUTION: Do not open the container under the fluorescent light. The yellow light must be the only light source on and can be found at the entrance of the room.
- 3) A solution of 4:1 (H₂O:AZ351) volume ratio has been prepared in a crystallize dish. If no solution can be found or the solution is one week old, please contact Prof. Wei-Chih Wang.
- 4) The VWR 300 Hot Plate is set at ~90°C.
NOW YOU ARE READY TO BEGIN!

Lab Procedure:

Remember: All processing must be done under yellow light due to photosensitive materials being used. Therefore, the switch for the yellow light must be turned on and can be found at the entrance of the room.

- 1) Take the Dog Bone sample and place a piece of double-sided tape on one side of the metal.
- 2) Put on a pair of Nitrile (Blue) Gloves. Have these gloves on at all time during handling of the sample. Large and medium gloves are available. If there are no more gloves left, contact Prof. Wei-Chih Wang.
- 3) Open the centrifuge and attach the sample to the center of the chuck. The centrifuge will be spinning the sample at a maximum speed of 3000rpm. So be sure that the metal is attached firmly onto aluminum chuck.
- 4) The centrifuge operates at spin speed increments of 100rpm and time increments of 1min. Set the initial spin speed to 8 (800rpm) and time to 1 (1min) on the front panel of the system.
- 5) Clear the timer by pushing the 'C' button.
- 6) Next open the container of the photoresist bottle (remember: the yellow light must be the only light on for the duration of the lab) and take a pipette full of the resist. Then squeeze the resist onto the center region of the sample. One pipette full should be sufficient for coating the sample.
- 7) Close the lid.
- 8) Begin the coating process by pushing the "ON" button. Start the timer and let the sample spin at 800rpm for 5 sec (this is needed to spread the resist). Then push on the UP arrow of the SPEED section until the display reads 30 (or 3000rpm). Let the sample spin at 3000rpm for 30seconds. After the 30 seconds, stop the coating process by pushing on the "OFF" button. A

click should sound, signaling that the lid can now be opened. The final thickness of the resist is measured to be 1.2 micrometers.

- 9) Detach the sample from the chuck remove the tape from the sample and chuck, if necessary.
- 10) Place the sample on the hot plate and let heat for 3min at 90°C. This step is needed to evaporate any solvent remaining in the resist. It is also known as the Pre-Exposure Bake step.
- 11) After the baking step, place the sample onto a wipe and let cool for 3 min.
- 12) Increase the temperature of the hot plate to 110°C by turning the dial to the second black mark.
- 13) Take the sample to the 26-1k Mercury Exposure System and place the sample onto the platform.
- 14) Next take the chrome mask and center the mask on top of the sample making sure not to scratch the resist. The side that should be in contact with the sample is the darker side of the mask that has the actual chrome film.
- 15) The exposure system takes 40 sec to stabilize its output intensity. Therefore, the cardboard must be covering the sample for 40sec before the sample is exposed to the light. Be careful to not look directly at the light during its operation. The UV light is
- 16) Turn on the system by pushing the "POWER" button.
- 17) The "INTEGRATOR" will start the exposure. Have the timer ready to time the 40sec stabilizing process as well as the exposure. Once the sample and mask is ready. Place the cardboard over the sample and push 6:5:S on the INTERGRATOR to start the lamp. Run the timer for 40sec, then remove the cardboard and let the system expose the sample for 25 sec.
NOTE: AZ1512 has been calibrated for an exposure dose of 42mJ/cm² for a 1.2micron thick film with a 365nm wavelength. The exposure system was measured to be 1.65mW/cm².
- 18) Once the sample has been exposed for 25sec. Turn the light off by pushing 'C' on the panel.
- 19) Remove chrome mask and take the sample to the developer solution.
- 20) Place the sample in the developer for 60sec.
- 21) Remove the sample from the developer (hold with tweezer) and pour deionized water over the sample in the sink to remove any remaining developer. The deionized water is in a bottle by the sink labeled "DI WATER".
- 22) The sample should then be placed on a towel or wipe to be dried. Wipe the backside of the sample with a towel and then place the sample onto the hotplate (110°C) for 3min. Then remove from hot plate to cool.
- 23) You are now FINISHED!

Clean-up Process:

- *Clean chuck (remove resist) by wetting a towel/wipe with acetone and wiping the chuck down.
- *Remove aluminum foil, being careful not to spill any of the remaining resist into the chamber, and disposing the foil in a trash bag.
- *Unplug hot plate and turn power off to the Exposure System and Centrifuge.
- *Disposal of the developer is not needed, please leave developer on table.