

Major Objectives

1. Photoresist Patterning. Obtain a wafer from the T.A. that has 300 nm of thermal oxide grown on it. Make sure the oxide has been removed from the wafer's back side. Dehydration bake your wafers in the dehydration bake oven for at least 10 minutes at 120°C. Spin on AZ3330 photoresist using the photoresist spinner and soft bake for 60 sec on a hotplate at 90°C. Load wafers into the aligner along with the 1st capacitance switch device mask which is labeled EE550 Mask 1 PR on the bottom. Expose the resist for 10 seconds. Develop the pattern for 40 seconds (or until the exposed resist is gone) in MIF300 developer.
2. Resist Reflow. Heat the patterned photoresist on a hot plate at 120°C for 2 minutes. This will allow the photoresist to liquefy and flow into a rounded shape. This rounded shape will be easier to coat with aluminum. After this reflow, descum the wafers for 15 seconds with oxygen plasma in the PEII parallel plate etcher or Branson barrel etcher.
3. Metal Evaporation. Using the thermal evaporator, evaporate 1000 nm of Aluminum on a 4 inch silicon wafer (or as much aluminum as you can using three boats). It is important to rotate the planetary fixture while the deposition is taking place to ensure that you get an even and conformal aluminum coating.
4. Photoresist Patterning II. Dehydration bake your wafers in the dehydration bake oven for at least 10 minutes at 120°C. Spin on AZ3330 photoresist using the photoresist spinner and soft bake for 60 sec on a hotplate at 90°C. Load wafers into the aligner along with the 2nd capacitance switch device mask which is labeled EE550 Mask 1 AL on the bottom. Align this mask to the original features already on the wafer. Expose the resist for 10 seconds. Develop the pattern for 40 seconds (or until the exposed resist is gone) in MIF300 developer.
5. Etching Aluminum. Aluminum etching will be done using a special mixture of acids that includes phosphoric acid. Essentially etching will take place by immersing a wafer coated with aluminum into an etch solution. Place your wafer in the aluminum etchant at heated to 50°C. It should be obvious when all the aluminum has etched the portions not covered with resist because they will appear black. Rinse your wafer thoroughly in deionized water and examine the pattern under a microscope to make sure all the aluminum was etched away.
6. Sacrificial Photoresist Etching. Cleave your wafer in half. Place ½ of your wafer in a dish containing acetone. This should remove the photoresist over the top of the aluminum pattern as well as that below it. When the resist is gone, move the wafer into a dish of isopropanol, and then dry off carefully. Place this part of your wafer into a wafer holder ready for testing during the next week's lab. Place the other ½ of your wafer in a dish containing concentrated developer. This should also removed the photoresist, but much slower than the acetone. When the resist is gone, rinse the wafer with water and then dry off carefully. Place this part of your wafer into a wafer holder ready for testing during the next week's lab.