SILICON DIOXIDE ETCHING SOP

July 2013

Purpose: Remove areas of silicon dioxide unprotected by photoresist to expose the underlying silicon.

Preparation and Precaution:

- You must wear the appropriate PPE of a face shield, gloves and chemical resistant apron before processing.
- Select the Buffered Oxide Etch (BOE) solution from the acids cabinet in the wet etch bay.
- *Always use plastic ware/Nalgene containers for with HF/BOE will etch glass!*
- Determine the oxide thickness from a color chart and the oxidation time for your sample.

Procedure:

1. Pour the BOE solution into the appropriate Nalgene/plastic container.
2. Before beginning etching, calculate the time needed to etch through the oxide of known thickness using the known etch rate of the BOE solution. The etch rate for 22°C is 120 nm/min.
3. Use a stop watch to time the etching process.
4. Etch the wafer for about half of the estimated time.
5. At the end of this initial etching remove the sample from the BOE solution and examine the front or back of the wafer. If the silicon dioxide has not been completely etched away a film of the BOE solution will adhere to the etched surface and will appear wet. If etching of the SiO$_2$ is complete the surface will become hydrophobic and the wafer will appear dry with a mirrored appearance.
6. If not etched completely re-immerses the sample in the BOE solution for 30 seconds. Recheck the sample as mentioned in Step 5.
7. Repeat step 6 until SiO$_2$ is completely etched.
8. In case you are not sure of your ability with the above method or you are processing a critical step and cannot tolerate much over etch, it is safer to proceed with the method below:
   8.1. Remove the holder from the BOE solution and rinse the wafer for two minute in running DI water.
   8.2. Dry the wafer with an N$_2$ gun.
   8.3. Check the color of the oxide under a microscope with vertically incident white light. The oxide thickness can be estimated from an oxide color chart.
   8.4. Etch in the BOE solution for 30 seconds.
9. After etching rinse the wafer in the QDR followed by the spin-rinse-dryer if desired.