Substrate Cleaning Procedures

A. Glass Substrates:

1. Boil in Decon for 15 minutes, followed by the ultrasonic bath for a few minutes to get rid of any grease, dust etc.
2. Rinse in deionised water (DIW) for a few minutes, followed by the ultrasonic bath.
3. Dry in the oven at 95°C for at least one hour.
4. Boil in Acetone, followed by the ultrasonic bath. Care should be taken when boiling solvents. Only a third of the beaker should be filled with solvent. Hot plates must be placed inside the fume cupboard. Never leave solvents on the hot plate without close supervision.
5. Boil in Methanol and finally boil in IPA.
6. Dry with N₂ gun.

Note: Make sure that all beakers and glassware to be used in the cleaning process have also been thoroughly cleaned using the same procedure as above.

B. Silicon wafers:

Standard wafer cleaning:
Any one of the following procedures can be used depending on the degree of cleanliness required, and the state and type of the substrates.

1. Removal of residual organic and metal contaminants:
   a. Piranha clean for 10 minutes. Piranha is an excellent oxidant - it removes most organic residues. To prepare Piranha add 1 part of H₂O₂ to 5 parts of H₂SO₄.

   Note: Always add sulphuric acid to peroxide, NEVER vice versa! This is a self heating process, and will explode if done the other way.

   b. Rinse for 1 minute in running DIW.
   c. Dry with N₂ gun.

2. Thin oxide film removal:
   a. Dip in 10:1 DIW:HF for a few seconds.
   b. Remove the wafer from the water. This should leave an absolutely water free surface with only a drop or two on the lower edge. If this fails, reclean.
3. The RCA clean: (this procedure is widely used in industry).
   a. Removing organic residues:
      Soak in 5 parts DIW, 1 part H$_2$O$_2$, 1 part NH$_3$OH for 5 minutes at 70°C. Rinse in DIW for 5 minutes.
   b. Removing metallic residues:
      Soak in 6 parts DIW, 1 part H$_2$O$_2$, 1 part HCl for 5 minutes at 70°C, followed by DIW rinse.

4. Single Crystal Silicon Wafers:
   a. Immerse in 50% H$_2$O$_2$, 50% H$_2$SO$_4$ for 10-15 minutes at room temperature.
   b. Etch in 6:1 DIW:HF for 5 secs at room temperature, then rinse in DIW and blow dry with N$_2$ gas.
   c. Store in methanol prior to use.

   **Note:** All vessels must be etched with Agua Regia (3 parts HNO$_3$, 1 part HCl).

5. Single Crystal Silicon coated with Silicon Nitride film:
   a. Rinse with hot Acetone followed by the ultrasonic bath.
   b. Rinse with hot Methanol.
   c. Rinse with hot IPA.
   d. Dry with N$_2$ gas.
   e. Keep cleaned samples in a Petrie dish in the oven.

6. Stainless steel substrates / tools etc:
   a. Boil in Decon for 15 minutes, followed by the ultrasonic bath.
   b. Rinse in DIW for a few minutes.
   c. Dry in the oven for an hour.
   d. Rinse in Acetone, Methanol and finally in IPA.
   e. Etch in 25% methanol, 75% HNO$_3$ (only for substrates).

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