RCA CLEANING FOR 2″ WAFERS

Allowed Chemicals:

NH4OH(Ammonium Hydroxide),

H2O2(Hydrogen Peroxide)

HCl(Hydrochloric acid)

HF(Hydrofluoric acid)

Recipe:

Preparation of 2% HF:192 ml DI water+8 ml of(49%) HF.

RCA 1:

Take 180 ml of DI water+25 ml NH4OH+50 ml H202

Heat for 5 minutes

Add 50 ml H2O2 and heat for 8 minutes, cool for 12 minutes and give 30 seconds HF Dip.

RCA 2:

Take 180 ml of DI water+25 ml HCl+50 ml H202

Heat for 5 minutes

Add 50 ml H2O2 and heat for 3 to 6 minutes, cool for 12 minutes and give 30 seconds HF Dip.

Training Procedure:

1-Get faculty approval for getting authorization.

2-Read the system operation steps carefully.

3-Get 3 number of training runs with AU/SO.

4-Demonstrate 2 number of independent runs in presence of AU/SO without looking at the operating steps.

5-Wait for authorisation from the system owner.

Violation Policy:

Those who do not follow the steps properly and do without precautions should be suspended from the lab for two days.

Operation Steps:

Introduction:

Contaminants present on the surface of silicon wafers at the start of processing, or accumulated during processing,have to be removed at specific processing steps in order to obtain high performance and high reliability semiconductor devices,and to prevent contamination of process equipment,especially
the high temperature oxidation,diffusion and deposition tubes.
The RCA clean is the industry standard for removing contaminants from wafers.

Werner Kern developed the basic procedure in 1965 while working for RCA (Radio Corporation of America)-hence the name.
The RCA cleaning procedure has the flowing steps:-

1. Organic Clean:Removal of insoluble contaminants [RCA-1 or Standard cleaning process 1]

2.Ionic Clean:Removal of ionic and heavy metal atomic contaminants[RCA-2 or Standard cleaning process 2]

3. Oxide Strip:Removal of a thin silicon dioxide layer which is done after each of the above mentioned processes.[HF Dip]

Safety:

The chemicals used for RCA cleaning are all dangerous if you get in contact with them.HF acid is very dangerous; HF burns are particularly hazardous. An insidious aspect of HF burns is that there may not be any discomfort until long after exposure. These burns are extremely serious and may result in tissue damage.If you contact HF, flush the area with cold water for fifteen minutes and be sure to work under and around your fingernails.A physician must look at all HF burns.

Acid protective gear MUST be worn when working at this station. Lab aprons,acid-proof gloves(atop the normal clean room gloves), and an acid facemask(with the face shield DOWN) worn over safety glasses, are all required.All “RCA CLEAN” acid gear should be labeled and not used at any other wet bench.

Checklist before starting RCA:

[Specific to our fab lab]

1-Check whether the blower is on

2-Verify the availability of DI water

Getting ready:

1. Clean RCA bench, all RCA beakers, quartz boat etc. with DI water.
2. Switch on the heater in the RCA bench
3. Submerge the quartz boat in DI water and take it to the laminar bench for wafer loading

4.Arrange the wafers in the boat in such a way that the polished surfaces are aligned in one direction

5. Fill 3 Teflon beakers with DI water and rinse the wafers 3 times in each of these. 6.Prepare the solution for 'HF Dip'.This is a 2% HF solution. Fill the beaker for HF Dip with 192ml of DI water and pour 8ml of 49% HF in to this.

Chemical Process:

Organic Clean:

RCA-1 Solution:-NH_4OH:H_2O_2:DI Water.

1. Take 180ml of DI water and 25ml of NH_4OH.
2. Heat this solution to 75-80 degree Celsius for about 5 minutes. This is to increase the chemical reaction rate.
3. Remove from hot plate and add 50ml H_2O_2(30%).Solution will bubble vigorously after 1-2 minutes,indicating that it is ready for use.

4.Soak the silicon wafer in the solution and keep it for heating for 6-8 minutes. 5.Remove it and allow it to cool for 8-10 minutes.

6. Rinse the wafers 3 times in 3 DI water beakers. 7.Give a 30Seconds HF Dip.

8.Rinse the wafers 3 times in 3 DI water beakers [Use fresh DI water in each step

9.Wait for the solution in the beaker to cool down for 1 hour.

10.Dispose the RCA-1 solution in the 'Used RCA-1' bottle.

Ionic Clean:

RCA-2 Solution:-HCl:H2O2:DI Water.
1.Take 180 ml of DI water and 25 ml
of HCl.

2.Heat the solution to 75-80 degree Celsius for about 5 minutes. This is to increase the chemical reaction rate.

3.Remove from hot plate and add 50 ml H2O2 (30%). Solution will bubble vigorously after 1-2 minutes indicating that it is to use.

4.Soak the silicon wafer in the solution and keep it for heating for 3-6 minutes. 5.Remove it and allow it to cool for 6-8 minutes.

6. Rinse the wafers 3 times in 3 DI water beakers. 7.Give a 30Seconds HF Dip.

8.Rinse the wafers 3 times in 3 DI water beakers [Use fresh DI water in each step] 9.Wait for the solution in the beaker to cool down for 1 hour.
10.Dispose the RCA-2 solution in the 'Used RCA-2' bottle.

The wafer cleaning process is over. Take the wafers submerged in DI water to the laminar bench and allow it to dry in the drier.