

MOS CLEANING PROCESS (RCA Clean)

IMPORTANT

No metal allowed in the MOS cleaning hood! This includes metal tweezers!

LAB EQUIPMENT AND MATERIALS:

All personnel will wear the blue labcoats, latex gloves, and eye protection while in the cleanroom. In addition, while at the cleaning bench **“Full Battle Gear” is required: Apron, face-shield, and nitrile gauntlet gloves (green).**

Safety Notes:

Always clean your work area when you leave it. If you don't, you are leaving a hazard for the next group of students using the area.

Chemicals Required:

De-ionized Water (H₂O) (Resistivity > 12 MΩ)

Ammonia hydroxide (NH₄OH)

Hydrogen peroxide (H₂O₂)

Hydrochloric Acid (HCl)

Hydrofluoric acid:DI 1:50 (Don't worry, you don't have to mix this)

Lab Equipment Required:

Timer (watch)

Wafer cassette (A dedicated cassette is kept in the MOS clean hood)

Controlled temperature baths

Dump rinser

Spin rinse dryer

SIMPLIFIED PROCEDURE:

1. Clean the wafers in a base solution (RCA 1) 40-50 : 1 : 1 DI : NH₄OH : H₂O₂.
2. Clean the wafers in an acid solution (RCA 2) 40-50 : 1 : 1 DI : HCl : H₂O₂.
3. HF dip.
4. Dry the wafers.

DETAILED PROCEDURE:

1. Remember that cleanliness is right next to Godliness in IC processing!
2. If you need the inspection lamp, turn the switch in the upper left corner of the MOS cleaning bench to the on position to start the lamp.
3. RCA baths. Turn on power to the baths by turning on the breaker on the far left side of the hood, and the switch labeled “Power”. Next, press the green button beneath each of the temperature controllers. This gives you 90 minutes of power to the bath heaters. If you need more time, press the green button again at any time and you get another 90 minutes of power. Check the temperature setting of the baths. Set the temperature to 70° C. It takes about 10-20 minutes for the baths to come to temperature.
4. Check the clipboard for the RCA clean bath. The RCA baths is perishable, since the H₂O₂ breaks down in about 1 hour in RCA1 and RCA 2. If you are incredibly lucky, someone added peroxide less than an hour ago and you can begin cleaning your wafers. Otherwise, you will have to prepare the solution. Check the sign-up list on the clipboard. If the bath is more than a three days old, you must mix a fresh batch for both baths, as detailed below, and make

a fresh pair of MOS clean gloves. If the bath is below the maximum level (about to spill out of the tank) add 100 ml of H_2O_2 to RCA 1, and 100 ml H_2O_2 to RCA 2 if it has been more than 1 hour since the last peroxide addition. If the bath is at its maximum level, prepare a fresh bath as detailed below. If the liquid level is too low to cover your wafers (this sometimes happens) prepare a fresh bath.

5. Attach a handle to the cassette holding your wafers, turn on the bubbler, and place the cassette into the RCA 1 bath. Place the teflon tweezers in the bath too. After 10 minutes (no more than 30 min.) remove the cassette and tweezers and place them in the dump rinser. Turn off the bubbler, replace the bath cover, and turn down the temperature to 20 °C.
6. Rinse the wafers and tweezers for two rinse cycles in the dump rinser.
7. Place the wafers and tweezers in the RCA 2 bath ($HCl: H_2O_2$) for 10 min. (no more than 30), turn on the bubbler. Remove the cassette and tweezers and place in the dump rinser. Turn off the bubbler, replace the bath cover, and lower the temperature to 20 °C. Turn off the heater power on the left side of the hood.
8. Rinse for two cycles in the dump rinser.
9. Place the cassette in the 50 : 1 HF solution for 20 seconds. Remove the cassette and let it drain for a 10 seconds (dripping back into the HF bin) before placing the cassette in the dump rinser. **Do not put the tweezers in the HF!**
10. Rinse for two cycles in the dump rinser.
11. Place the cassette into the spin rinse dryer. The cassette's H-bar should go in first. Close the door and press the green start button. The dryer will cycle through a pre-programmed sequence then stop.
12. Remove your cassette and proceed with the next process.

Preparing Fresh RCA Baths

Prepare a pair of "MOS Clean" gloves by putting on a pair of green nitrile gloves and scrubbing them thoroughly under the DI gooseneck tap. You will see soap bubbles on the surface of the gloves that are from the mold-release compound. Scrub the gloves together and rinse until the bubbles go away. These are now your MOS Clean gloves. They should touch nothing other than things in the MOS clean hood and furnace quartzware. Mark in the sign-up list that you have made a new pair of gloves.

Next, turn off power to the baths, and drain the tanks using the switch above the bench. Rinse the tanks thoroughly with DI water from the DI gun. Turn off the drain switch. Fill each of the tanks with DI water from the DI gun to the top of the marker visible in each tank (black mark on the back of the tank). Add 100 ml of HCl to the RCA 2 tank. Add 100 ml of NH_4OH to the RCA 1 tank. Turn the bath power on and set the temperature to 70° C. Once the baths are at temperature, add 100 ml of H_2O_2 to RCA 1, and 100 ml of H_2O_2 to RCA 2, and you're in business.