ASRC Nanofab – Standard Operating Procedure:

Chromium Etch

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Principle of Operation

To remove chromium from a substrate – patterned or unpatterned.

Material Requirements

Equipment:

Substrate, glass Petri dish or beaker (for etchant), glass beaker (for rinse) and stainless steel tweezers

Chemicals:

Chromium Etchant (contains Ceric Ammonium Nitrate, Nitric Acid and water)

- Chromium Etchant Hazards
    - Chemical is corrosive to the eyes, skin and mucous membranes. Causes irritation and burns. Vapors severely irritate the respiratory tract.
    - Do not mix with strong oxidants or organic materials.
    - **Do not heat.**

Personal Protective Equipment:

Trionic gloves on top of nitrile gloves, apron, safety glasses and face-shield

Procedure

Chromium Etch

1. Rinse both beakers with DI water prior to beginning the process.
2. Stand the beaker to be used for rinsing on a few fab wipes in the hood and fill it with DI water so that the water level will cover the entire substrate.
3. Get a glass beaker that will fit your samples for processing – you should find one labeled “Chromium Etchant” on the shelves. Place it on fab wipes in the hood.
4. Carefully pour some of the Chromium Etchant into the glass beaker so that there is enough liquid to cover your submerged sample.
5. Calculate the etch time for your sample. You will need to know the thickness of your chromium layer. At 25°C, the chromium will etch at a rate of approximately 4 nm/min.
6. Put your sample into the etchant and soak for the appropriate amount of time calculated in the previous step. Agitation of the Petri dish will accelerate the etch.

DI Water Rinse

1. When the etch is complete, transfer the sample carefully to the DI water rinse beaker.

2. If you used tweezers to move the sample, make sure you leave them in the rinse beaker as well.
3. Let the sample and tools soak in DI water for 5 minutes.
4. Remove the sample from the rinse container.
5. Rinse the sample with DI water in the hood sink.

Sample Dry

1. After the water rinse is finished, blow the sample dry with the N_2 gun.
2. After getting most of the water off, you can dry the samples more in an oven or on a hotplate if allowable for your sample.
3. Inspect sample for traces of un-etched chromium. If features are small, use an optical microscope. If more etch time is required, place wafer back into Petri dish with the etchant for another 30 seconds while agitating. Repeat rinse and drying procedure.

Cleanup

1. The etchant may be used for multiple etches. For temporary storage (<1 day), placethe top of the Petri dish over the etchant and store on fab wipes in the back of the hood. Make sure the dish is clearly labeled “Chromium Etchant”.
2. Dump the etchant waste into the carboy designated for acids.
3. Rinse the Petri dish once with DI water, and dump it into the same carboy.
4. Dump the DI rinse beakers into the acid carboy.
5. Rinse all the containers again with DI water in the hood sink. This time, dump them into the sink within the process hood.
6. Return all labware to its proper location. The Petri dish and the beaker can drip dry on fab wipes in the hood; however, remember to move them back to their storage location once dry.
7. Wipe up any drips in the area with chemical wipes and dispose in the trash.
8. Store the Chromium Etchant in the nitric acid cabinet.
9. Inspect all of the PPE to ensure it did not come in contact with the etchant before returning it to its storage location.

Accident Procedure

Contact

- Skin: Remove contaminated clothing, wash skin with soap and water. **If there is any irritation, get immediate medical attention.**
- Eye: Immediately flush with water for at least 15 minutes while lifting upper and lower eyelids occasionally. **Get immediate medical attention.**
- Ingestion: Do not induce vomiting. **Get immediate medical attention.**

- Inhalation: Remove to fresh air. Resuscitate if necessary. Take care not to inhale any fumes released from the victim's lungs. **Get immediate medical attention.**

Spills

If a small, contained spill occurs, such as inside the hood, wipe it up with chemical wipes and dispose of them in the proper trash container. If a large spill occurs, evacuate the area and notify the cleanroom staff.

Revision History:

- Version 0.0 – Created September 8th, 2017
- Version 1.0 – Revised May 22, 2025