Nanostrip

Standard Operating Procedure

Lab: Beckman Institute 3710

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Section 1: Overview

Type of SOP: ☒Process ☒Hazardous Material ☐Hazardous Class of Materials ☐Equipment

Synopsis:

The purpose of the SOP is to describe how to clean samples using Nanostrip and the hazards associated with Nanostrip. Nanostrip is a mixture of sulfuric acid and hydrogen peroxide which is comparable to Pirhana.

Section 2: Risk Assessment Summary (Hazards and control measures)

Materials:

Material (name, CAS #, other ID)	Hazards
Nanostrip ® Contains: Sulfuric Acid Peroxymonosulfuric Acid Hydrogen Peroxide Water	Oxidizer Harmful if swallowed Fatal if inhaled Skin corrosion and irritation Carcinogenic Toxic to reproductive organs Target organ toxicity (Respiratory, teeth, nervous system) Corrosive to metals

Relevant References for Material Hazards:

- MSDS for this material: MSDS#1 MSDS#2

Equipment Hazards:

- Hotplate: releases toxic gases (Sulfur Dioxide and Sulfur Trioxide) if heated to boiling or partial evaporation
- Be aware of other nearby materials: reacts violently with caustics and water. Reacts with organics, metal salts, ammonia, nitric acid, and reducing agents. Ignition is possible when contact is made with some of these materials.

Hazardous Conditions:

- Acute toxicity is unknown, so it may or may not cause damage from light, long term exposure (such as by inhalation). Nanostrip is highly corrosive to eyes and skin. Nanostrip burns mouth and stomach, and may be fatal if ingested. Inhalation causes severe mucous membrane burns, laryngeal, tracheal, bronchial, and pulmonary edema; and possibly shock and collapse. Overexposure causes coughing, choking, and dizziness.

Technique Hazards:

- Hazardous liquid is kept at high temperatures for an extended period of time. Let the nanostrip cool down before attempting to empty it into the waste container. Do not attempt to move until you are sure it is cooled down, or you might drop the Nanostrip, causing a spill.

Personal Protective Equipment

- Safety glasses, nitrile gloves, a non-flammable lab coat are necessary at minimum. A safety apron and face shield are optional.
- Make sure your lab coat sleeves do not hang (tuck them into your gloves if necessary)

Engineering Controls

- Nanostrip should be used inside an operational and inspected fume hood
- Nanostrip must be kept at least six inches back inside the hood at all times

Section 3: Procedures

Removing Photoresist and/or Cleaning Wafers or Glass

1. Place beaker or large glass container on hotplate. Do not turn on hotplate yet
2. Pour necessary amount of Nanostrip® into a beaker or glass container large enough to hold the liquid with no chance of overflow once wafers/sample is placed within beaker. *In fume hood!
3. Place sample in beaker
4. Turn on hotplate, heat to 60C or until boiling. To achieve this, turn the hotplate to “8” in Beckman.
5. Once Nanostrip® is to temperature, leave heated for 30 minutes.
6. Turn off hotplate and allow to cool
7. Transport samples, wafers, or glass slides to a separate glass container that is filled with DI water
8. Move the separate glass container that is filled with DI water and your samples into the sink. Rinse for a few minutes with DI water.
9. Dispose of used Nanostrip in waste container.
10. It is suggested to use new Nanostrip each time, but it can potentially be used for one week before disposal.

11. Submit waste container after 3 months or once it is full. Fill out chemical waste description form and submit to designated Chemical Waste Disposal Person.

Spill procedure

- Neutralize the spilled Nanostrip immediately by covering it with baking soda (found in the hood). Ensure adequate ventilation. DO NOT use paper towels, rags, or other oganic materials to absorb the spill because ignition is possible. Sweep up the neutralized spill with absorbing pad or broom and dispose of in neutralized waste container. If the spill is too large to be cleaned, immediately evacuate the area and call 911. Close doors if possible to prevent the vapors from spreading.

Section 4: Waste Disposal/Cleanup

- Wait until Nanostrip has fully cooled before emptying it into the waste container.
- Dispose of used Nanostrip in waste container.
- Nanostrip can be used for one week before disposal.

Submit waste container once it is full. Fill out chemical waste form using the DRS website online (see directions on the box account)

Section 5: Emergency Response

- If on skin or hair: remove contaminated clothing and rinse with water for 15 minutes. Call poison control and seek medical assistance.
- If in eye: rinse with water for at least 15 minutes, occasionally lifting upper and lower lids and rolling eyeball. Remove contact lenses if possible. Seek medical assistance after flushing eye.
- If inhaled: move to fresh air and seek medical assistance immediately.
- If ingested: do not induce vomiting. Drink large amounts of milk or water. Do not give milk or water to an unconscious patient. If vomiting occurs, keep head low to prevent Nanostrip from reaching lungs. Seek medical attention immediately.

Section 6: Additional Information

Advice:

- Wait until the Nanostrip has cooled before attempting to pour it into the waste container. If you are uncomfortable pouring out the Nanostrip, seek the assistance of someone else in the lab. If a drop of Nanostrip splashes onto your glove, remove the glove immediately.

Checklist:

☐Read (Material) Safety Data Sheets.
☐Get trained to use Nanostrip by someone who has used it for a while
☐Check surrounding area for potential hazards
☐Wear appropriate PPE

☐Another researcher is nearby and knows the hazards present.
☐The required glassware is of the proper size to accommodate all steps of the procedure.

References:

Cyantek corporation MSDS: http://nano.tau.ac.il/mncf/images/MSDS/Nano-Strip-MSDS.pdf
KMG MSDS: https://us.vwr.com/assetsvc/asset/en_US/id/13485998/contents
UPenn Nanostrip Procedure: https://www.seas.upenn.edu/~nanosop/Nanostrip_SOP.htm
Extra SOP with pictures (MNCF): http://nano.tau.ac.il/mncf/images/SOP/Piranha_SOP_MNCF.pdf