

SILANIZATION OF SILICON/PHOTORESIST MASTER

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Authors (P.I., others):

Name: Calixto Saenz Signature: _____
Name: _____ Signature: _____

Reviewed by CHO/Safety Representative for Lab:

Name: _____ Signature: _____

SCOPE AND APPLICABILITY

- Department: Systems Biology
- Research Group: Microfluidics
- Lab Bldg., Room(s): Goldenson 117
- Operation / Experiment: Silanization of Photoresist/Silicone Master
- Material(s): Tridecafluorooctyl-trichlorosilane
- Ventilation: General room Chemical fume hood Biosafety cabinet (A/B3, B2, B1) Snorkel Trunk

MATERIALS AND HAZARDS

Principal Materials Used	Corrosive	Irritant	Sensitizer	Reproductive toxin	Acutely Toxic	Carcinogen	Flammable	Combustible	Water-Reactive	Shock-Sensitive	Pyrophoric	Oxidizer	Biotoxin	Other Comments:
Tridecafluorooctyltrichlorosilane	X				X		X		X					Acutely toxic when on contact with water and alcohols

MSDS attached: Yes No MSDSs are also available at the following location:

- Shelf at Goldenson 117A
- EHS Department's Web page: <http://ehs.harvard.edu/news/material-safety-data-sheets-msds>

Describe equipment/instrumentation used to monitor/control hazards:

- ♦ Perform all procedures in a ventilated laboratory hood (chemical fume hood).
- ♦ Store bottles of tridecafluorooctyltrichlorosilane sealed tightly in cabinets.

Other comments, Chemical hazards, Precautions:

1. Tridecafluorooctyltrichlorosilane **reacts violently with water** releasing hydrogen chloride (HCL), incompatible with oxidizing agents, acids, alcohol and bases.
2. Absorb spilled material with suitable chemical binder. Shovel absorbent into suitable waste container. Do not allow water to directly contact spilled materials.
3. Tridecafluorooctyltrichlorosilane is a skin and eye corrosive and harmful by inhalation of its vapor. Respirable vapors or mists are irritating to the upper respiratory tract and bronchi. Harmful if ingested and lachrymator.

Special PPE Required:

- Safety glasses
- Goggles (chemical-splash goggles)
- Face Shield
- Chemical Resistant Cleanroom Coverall
- Protective Clothing (e.g. sleeves, footwear, head cover)
- Gloves/Gauntlets
 - Single
 - Double
- Respirator (If yes, contact EH&S for additional assistance)

Special Protective Clothing Required:

Protective Clothing	Nitrile	PVC (Vinyl)	Latex	Neoprene	Other:	Additional Specifications
Shoe Cover						
Full Body Cover					X	Polyester/Polyethylene coverall
Gloves/Gauntlets						♦ Tri-polymer blend gloves (Nitrile/Neoprene/Natural rubber). ♦ For splash protection; not for immersion protection.
Tridecafluorooctyltrichlorosilane	X		X	X	X	

NOTE: If special PPE and/or protective clothing is not required, standard PPE and protective clothing required in Part II of the Harvard University CHP must be utilized.

ADDITIONAL PRECAUTIONS

- Store silanizing agent in well ventilated storage flammable liquid cabinet.
- Container which has been opened must be re-sealed and kept upright to prevent leakage. Re-open used containers with caution.
- When deposition of tridecafluorooctyltrichlorosilane:
 - Use disposable plastic pipette and dispose in solvent/photoresist waste container located in the fume hood.
 - There should not be any silanizing agent left over in the foil cup after finishing the process. If it has, allow to evaporate away in the hood and dispose in solvent/photoresist waste container located in the fume hood.
- Stability: Stable in sealed containers stored under a dry inert atmosphere.
- Conditions to avoid: Combustible; avoid contact with heat, sparks or open flame.
- Incompatibility (materials to avoid): Reacts with water and moisture in air, liberating hydrogen chloride. Avoid contact with alcohols, acids, oxidizers.
- Hazardous decomposition products: Organic acid vapors, hydrogen chloride, fluorinated organics.

MATERIAL SAFETY DATA SHEETS

MSDSs are available in binder located on shelf at Goldenson 117A or electronically via EHS Department's Web page: <http://ehs.harvard.edu/news/material-safety-data-sheets-msds>

WASTE

Refer to the *Harvard Longwood Laboratory Waste Guide* posted at http://www.ehs.harvard.edu/sites/ehs.harvard.edu/files/lab_waste_guide.pdf

PROCEDURE

See document attached and also available electronically via HMS Microfluidics Web page: <http://hms.harvard.edu/sites/default/files/assets/Sites/Microfluidics/files/Silanization%20of%20Photoresist%20Master%20Protocol.pdf>

EMERGENCY PROCEDURES

Refer to the emergency flip chart titled “*EHS Procedures and Response Guidelines*,” posted in each laboratory and found on EHS’s webpage at http://www.ehs.harvard.edu/system/files/emergency_guidance_longwood.pdf

Skin contact: Flush with water.

Eye contact: Flush with copious amounts of water for 15 minutes.

Ingestion: Do not induce vomiting. If conscious and alert, rinse mouth and drink 2-4 cupfuls of milk or water.

Inhalation: Remove to fresh air. Resuscitate if necessary.

Chemical Spill:

- For small spills, Minimize the amount spilled and suppress resultant vapors. Do not direct **water at spill** or source of leak. Use non-sparking tools. Follow chemical spill response guidelines above. Don protective clothing, extinguish all ignition sources, and carefully apply vermiculite or other appropriate spill absorbent material to the spill. Place in durable containers for disposal. Any small spills should be wiped up immediately ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. All equipment used when handling the product must be grounded. Use personal protective equipment. Do not touch or walk through spilled material. Stop leak if you can do it without risk.
- For spill clean-ups, use Barricade™ or Responder™ gloves (*chemical breakthrough time > 8 hrs*). Viton™ or Silver Shield™/4H™ gloves are acceptable, as well. Do not wear nitrile gloves, due to the risk of direct or prolonged contact when cleaning up a spill.
- For a large spill, vacate the lab, deny further entry, and call EHS for assistance.
- Respiratory protection may be necessary in the event of a large spill or release in a confined area.

Fire:

- In the event of fire, evacuate and bar further entry.
- DO NOT apply water to fire as water will intensify fire and cause corrosive hydrogen chloride fumes to be produced. DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED

References:

- a. J. Sambrook, E. F. Fritsch, T. Maniatis, “Purification of Nucleic Acids,” *Molecular Cloning: A Laboratory Manual*, 2nd ed., Cold Spring Harbor Laboratory Press, 1989, pE.3-4.
- b. G. D. Clayton, F. E. Clayton, *Patty’s Industrial Hygiene and Toxicology*, 3rd ed., Wiley-Interscience Publication, John Wiley & Sons, Inc., 1981, p2567-84.