Spin Coater

Standard Operating Procedure

Lab: Engineering Sciences Building 155

Department: Materials Science and Engineering

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Section 1: Overview

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

Synopsis:

This SOP is written for guiding the safe operation of the spin coating equipment; protect the lab personnel from potential chemical hazard and risk.

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

The following risk assessment and guidance has been developed to assess the hazardous activities, risks and identify appropriate prevention and control measures. A simple implementation check is provided to assist schools in demonstrating that control measures are being implemented.

Materials:

Name (CAS #, other ID)	Hazards
SU-8 Series Resists	Combustible liquid; Toxic to aquatic life; toxic if inhaled; causes serious irritation; causes skin irritation; harmful if swallowed; may cause an allergic skin reaction; may cause drowsiness and dizziness; may cause respiratory irritation; suspected of causing genetic defects.
PGMEA photoresist remover CAS #: 108-65-6	PGMEA is a clear, colorless liquid with a sweet fruity odor. It is irritating to the eyes, skin and nasal passages. High inhalation concentrations can cause CNS depression. It may form explosive peroxides and has a vapor explosion hazard.

Relevant References for Material Hazards:

- MSDS for PGMEA: http://www.sigmaaldrich.com/catalog/product/sial/484431?lang=en&region=US
- MSDS for SU-8: http://cnl.colorado.edu/cnl/images/MSDS/microchem%20su-8_resist.pdf

Equipment Hazards:

- Use of spinner: slip/trips/fall; crush/pinch point; splash risk

- Live electrical testing: electric shock
- Use by inadequately trained personnel: various unexpected dangers

Technique Hazards:

- Hazards occur when chemicals are not properly handled, cleaned. The equipment is not being correctly operated. Equipment operated by unauthorized users.

Personal Protective Equipment

- Avoid release the chemicals to the environment;
- Wear gloves and lab coats;
- Wear eye/face protection;
- Do not eat, drink or smoke when operating fume hood or spin coater.

Engineering Controls

- Chemical fume hood,
- Biological safety cabinet,
- PPE.

Section 3: Procedures

Operation of the Spin Coater and Clean Procedures

1. Match the mark on chuck to the mark on motor valve when load the chuck.
2. Pick the right chuck. Substrates must be large enough to cover the entire ring of the chuck. If there is no chuck that could fit the size, load your sample on a bigger PDMS stamp, or consult other lab personnel.
3. Attach the chuck onto the motor with adhesive carbon tapes. DO NOT press it too hard or shake it laterally on the valve.
4. Turn on the power supply.
5. Check the parameters for the spin process (i.e. dwell time, ramping and rpm). Too fast ramping and too high spin rate could result in damaging of the mechanical parts of the equipment and possibly damage to the sample.
6. Clean the chuck after the spin coating process is finished. Acetone can only be used to wipe out the metal disk, not the rubber seal ring. Most chemicals being used are sticky or corrosive to other parts. Large amount of chemicals being spun will stay on the alumina foil.
7. Replace the contaminated aluminum foil with new ones after the process. Take the black container out from the spin coater slowly with the dirty foil covered. **NOTE: MAKE SURE NO CHEMICALS FLOW INTO THE MOTOR.**
8. Dispose the replaced foils into the waste bag aimed for contaminated wastes in the blue cabinet. No foils should go directly into general trash cans.

Handling and Storage:

For SU-8 and PGMEA
All chemicals should be safely operated inside the fume hood. Lab personnel should have PPE protected during the operation.

Handling precautions: Use only non-sparking tools. Properly ground containers before transferring product. Avoid static discharge. Empty containers may still contain flammable/combustible residue or vapors. Extinguish all ignition sources before purging container. Wear recommended personal protective equipment.

Storage requirements: Store away from heat, sparks, open flame, and strong oxidizing agents. Store under nitrogen atmosphere if possible. Product will absorb water if exposed to air. Keep containers tightly closed when not in use. Store in carbon steel, stainless steel, or Teflon.

Regulatory requirements: Follow all applicable local, state, and federal requirements

Section 4: Emergency Response

First Aid Measures - SU-8
Inhalation: No occupational exposure limits have been developed for this material. Where exposure through inhalation may occur from use, NIOSH approved respiratory equipment is recommended.
Ingestion: If a large quantity swallowed, give lukewarm water. DO NOT induce vomiting. Risk of damage to lungs exceeds poisoning risk. Get medical attention immediately.
Skin contact: Rinse with water for 15 minutes while removing contaminated clothing and shoes. Wash affected area with soap and water. Wash contaminated clothing.
Eye contact: Rinse immediately with water, flush for 15 min. lifting eyelids frequently. Get emergency medical assistance. Prompt action is essential.

First Aid Measures - PGMEA
Inhalation: Remove exposed person to an uncontaminated atmosphere. For severe exposure, use oxygen if a qualified operator is available and if breathing is difficult. If not breathing, give artificial respiration. Seek medical attention immediately.
Eye Contact: Gently lift eyelids and flush immediately and continuously with copious amounts of water for at least 15 minutes. Do not allow the victim to rub or keep eyes tightly shut. Consult an ophthalmologist immediately.
Skin Contact: Rinse with flooding amounts of water, while removing contaminated clothing, for at least 15 minutes. Wash with soap and water. Seek medical attention immediately. Wash clothing before reuse.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the conscious and alert person drink 1 to 2 glasses of water.

Fire Fighting Measures
Extinguishing media: Dry chemical, carbon dioxide, foam, water spray, and fog.
Special fire fighting precautions: Do not enter fire area without proper protection. Fight fire from a safe distance/protected location. Heat may build enough pressure to rupture closed containers, spreading fire, increasing risk of burns/injuries. Use water spray/fog for cooling. Avoid frothing, steam explosion. Burning liquid may float on water. Notify authorities immediately if liquid enters sewer, public waters.
Unusual fire or explosion hazards: Heat from fire can generate flammable vapor. When mixed with air and exposed to ignition source, vapors can burn in open or explode if confined. Vapors may be heavier than air. May travel long distances along the ground before igniting and flashing back to vapor source. Fine sprays/mists may be combustible at temperatures below normal flash point.

Checklist:

☐ Read (Material) Safety Data Sheets.