

# Lab Safety Plan for SEM Room (Rm114)

## 1. Basic Information

**1.1 Laboratory Locations Covered by this Plan.** Nanophotonics Center (Engineering & Technology Lab Building) Rm 114 (SEM Room).

### 1.2 Location of (M)SDSs, and any Other Laboratory Documents for this Room

In the Literature Holder mounted on the wall next to the door

## 2. Emergency Assistance Information

### 2.1 Group's Emergency Contact Information

Prof. Jing Li                      806-401-9289

Weiping Zhao                    806-317-5636

### 2.2 Advisors

Prof. Hongxing Jiang    806-834-5739 (Office)

Prof. Jingyu Lin            806-834-5383 (Office)

### 2.3 Secretary

Qing Feng                      806-834-2094 (Office)

### 2.4 TTU Environmental Health and Safety (EH&S)

Daytime Emergencies (M-F, 8:00 am -5:00 pm)      806-742-3876

Non-daytime Emergencies (24 hrs/day, 7 days/week)      806-742-3328

### 2.5 TTU Emergency Maintenance

Any Time                      806-742-3328

### 2.6 TTU Police (UPD)

Emergency 9-911

Non-Emergency 806-742-3931

**3. Required Training for Working in this Room**

3.1 Safety Awareness Training

3.2 Hazard Communication

3.3 Chemical Hygiene Plan Training

3.4 Laboratory Safety

3.5 Radiation Safety

**4. Standard Operating Procedures (Attached)**

**5. Record of Training (in the literature holder mounted on the wall next to the door)**

## **Safety Precaution for SEM operation**

1. Check the vacuum of the system. Every day when operating, record the pressure on the logbook.

Gun vacuum should be smaller than  $4E-7$  Torr and chamber vacuum should be smaller than  $5E-5$  Torr

2. When venting, do not exceed the pressure of Nitrogen gas 1.5 psi

3. Release the door lock open of SEM before venting. It will prevent over pressuring the chamber during venting.

4. Always center the stage before venting (Click OK when it prompts to center the stage)

5. Load sample carefully, do not pressure the stage (Alarm sounds when you exert the pressure)

6. Close the door as soon as sample is loaded. (Within 5 minutes) Otherwise it will take a long time to pump down.

7. Do not increase the filament current to more than 2 A for Kimbal filaments and 3 A for Denka filaments. (Now we have Kimbal filaments)

8. General operation of SEM is at 30 kV. Don't operate SEM at 40 kV for more than 1 hour. (It will create problem in vacuum system)

9. For normal sample (less than 1 mm thick), don't increase stage height more than  $z=24$ mm.

10. Don't mess the wires on the back of SEM. Put the sign properly before disconnecting wires so that you can reconnect easily (if required)

11. EDX arm has lock at "5", don't bring it down, it will smash the stage.

12. In case of short time power failure, the pump will stop working but the computer will be running. Shut down the computer, press standby button, and wait for 30 seconds. Press stop (Red) button, wait for 30 seconds. Then restart the computer. Then start the pump as normally.

13. Refer to the manual or call Bob at 763-242-1262 (1-800-356-1090 ext 728) for any strange symptoms or emergency

## **E-beam lithography resist and chemical handling**

Basically chemical process and any other preparation of sample should be processed at another room designated for device fabrication processing.

1. Use fume hood located at another room for cleaning the samples. Dispose Acetone and Alcohol on the vessels marked "Used Acetone" and "Used Propanol"

2. Use spin coater, clean the coater with acetone after coating the sample.

3. Dispose the developer AZ400K in "Used AZ400K" vessel

4. Dispose the developer MIBK:IPA in "Used propanol" vessel

# Lab safety

Note for lab safety training/talk on Nov.20,  
2011

Environmental Health & Safety website: <http://www.depts.ttu.edu/ehs/Web/>

# Required documents

- SOPs for anything potentially dangerous
  - Including how to change MOCVD bubbler, dump sharp/chemical waste, use fume hood
- **Lab safety plan** – must have, in written form
  - Approved by PI
  - Risk analysis from EHS (optional)
  - eg. annual inspection, training
- MSDS
  - Storage(flammable/reactive)
  - Shipping requirements

# Training

- Location of first-aid, fire extinguishers and spill kits
- Personal Protective Equipments (PPE)
  - Gloves: one time use, take care to dispose in regular trash
  - Body cover: no exposed skin
  - Shoes: full foot coverage, no cloth or absorbent materials
  - Eyewear, respirator/ventilation
- Waste management
  - Waste chemicals: separately stored in labeled containers mark with full name and date.
  - Waste sharp items: special container or sharp edge secured



# Training

- Chemical Hygiene
  - Designated area - fume hood: sash below mark
  - Separate flammable/reactive/waste inside fume hood
  - Glassware: rinse after use, label if left in fume hood
  - Store chemicals accordingly
    - Separate flammable/inflammable, base / acid, HF
    - Specialized cabinet / refrigerator (EHS can provide)
  - Handle spills: call (2-3876) immediately if unsure
    - Use spill kits if comfortable
  - HF: especially dangerous, penetrate gloves in seconds.

## Chemical safety



### Precautions:

- Always wear protective clothing, including a face mask, goggles, rubber gloves, and apron when handling corrosive chemicals.
- Use the chemicals only in the designated area;
- Do not transport chemicals around the room in beakers.
- Never pour chemicals back into the original container.

## Storage waste chemical

Store chemicals in accordance with compatibility. Incompatible chemicals coming into contact can generate extremely violent chemical reaction resulting in catastrophic explosions.

- Store waste chemical near the floor to minimize the danger of falling from shelves.
- Store in areas that are cool, dry, and well-ventilated, and away from sunlight.
- Storage area should not be subject to rapid changes in humidity or temperature.

## Disposal chemical

Appropriate and adequate disposal of waste is critical in preventing unnecessary risk to the environment, as well as lowering the likelihood of unsafe conditions

### Hazardous Waste Disposal Pickup Request Form

- Select waste type –chemical/Bio waste
- Fill out the form completely
- Transaction Number will be sent by email after fill out the pick up request form. Label all containers with this transaction number.
- Once the form submitted, the pick-up will be scheduled for **Tuesday** and **Thursday** accordingly