



NanoFab Lab Manual: Safety



NanoFabrication Facility

ADVANCED SCIENCE RESEARCH CENTER



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* For urgent safety matters, if staff are unavailable, contact Aldo Orlando on his cell phone:	91 (646) 673-2897
For fire and medical emergencies, contact:	
Public Safety EMERGENCY	91 (212) 650-7777

- For fires, contact CCNY Public Safety and the immediately evacuate and alert others in your area to do the same. Close doors and walk quickly to the nearest exit. Activate nearest red fire-alarm pull box. Use North or South stairs only. DO NOT use Central stairs or elevators.
- For medical emergencies, contact CCNY Public Safety. Report the nature of the injury, exact location of injured person(s), and any hazards. Render First Aid or CPR only if qualified.
- You must inform staff of all safety related incidents or concerns in a timely manner. For non-urgent matters, staff can be reached via their individual emails or the Nanofab email (nanofab@gc.cuny.edu).

- For useful equipment and facility information and updates, be sure to join the Nanofab Slack workspace:



CUNY ASRC NanoFab
cunyasrcnanofab.slack.com

This contact list is posted next to all telephones in the cleanroom.

ADVANCED SCIENCE RESEARCH CENTER

THE GRADUATE CENTER
CITY UNIVERSITY OF NEW YORK



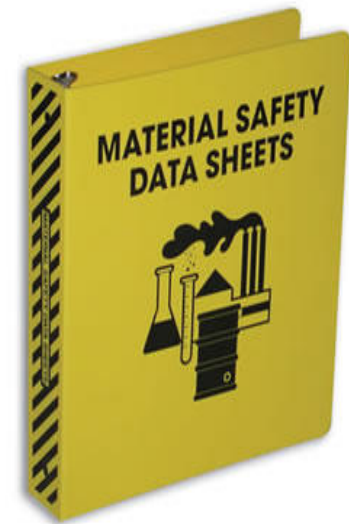
Material Safety Data Sheets

Also known as MSDS and SDS (Safety Data Sheets).

Before working with a chemical, the MSDS must be thoroughly reviewed.

Copies of the MSDS's for all chemicals can be found in:

- The gowning room
- The NanoFab01 Drive
- NanoFab [website](#)



Emergency Response



In the event of a fire:

- If the fire is small enough, use the fire extinguisher to put the fire out if you have been instructed on how to use it.
- Notify others in the cleanroom and evacuate the lab.
- Notify cleanroom staff.

In the event of a medical emergency:

- Call Public Safety (91 (212) 650-7777) if you need immediate medical assistance.
- Follow procedures described in this document specific for each type of event.

In the event of flooding or a utility problem:

- Contact staff.
- Shutdown water supply if you can identify the source.



Alarm Systems and Exits

Fire Alarm: Exit the cleanroom and the building.

Gas Detection Alarm:

- Blue Alarm (Danger Level): Exit the cleanroom and building.
- Orange Alarm (Warning Level): Exit the cleanroom.
- Green Light: Normal/safe conditions.



Emergency Alarms

Emergency Gas Off (EGO) and Fire Alarm is located in the gowning room next to the Material Safety Data Sheets.

Emergency Gas Off (EGO): if a gas leak is detected, press the EGO button

Fire Alarm: in the event of a fire, pull the fire alarm

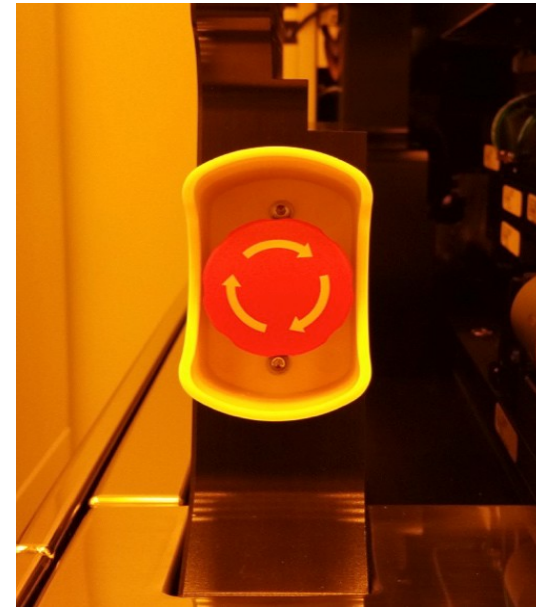


Equipment EMO Buttons

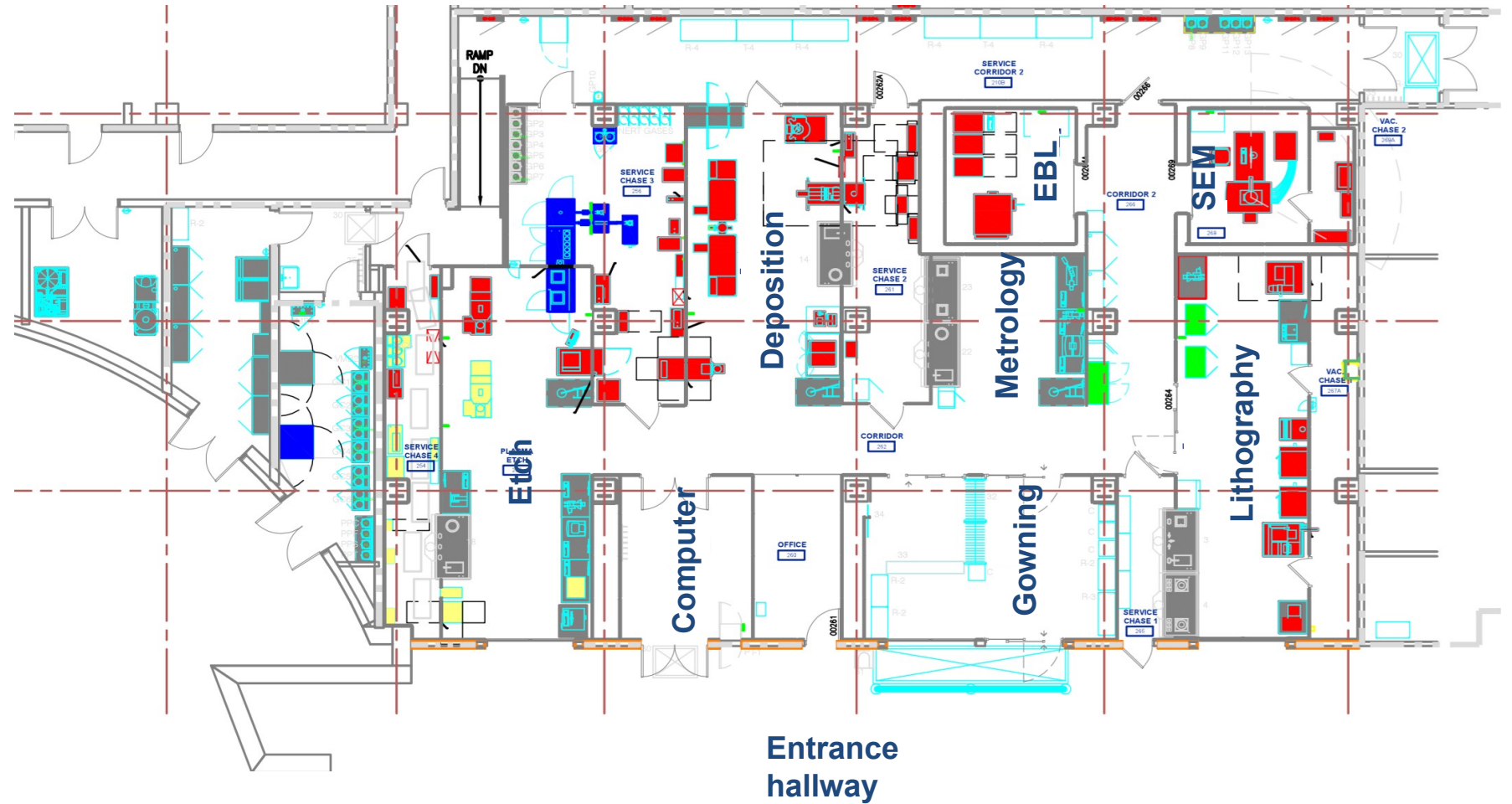
Only push in the event of life threatening emergencies such as visible flames or electrocution.

A process malfunction is NOT an emergency.

Pressing the button will damage the instrument.



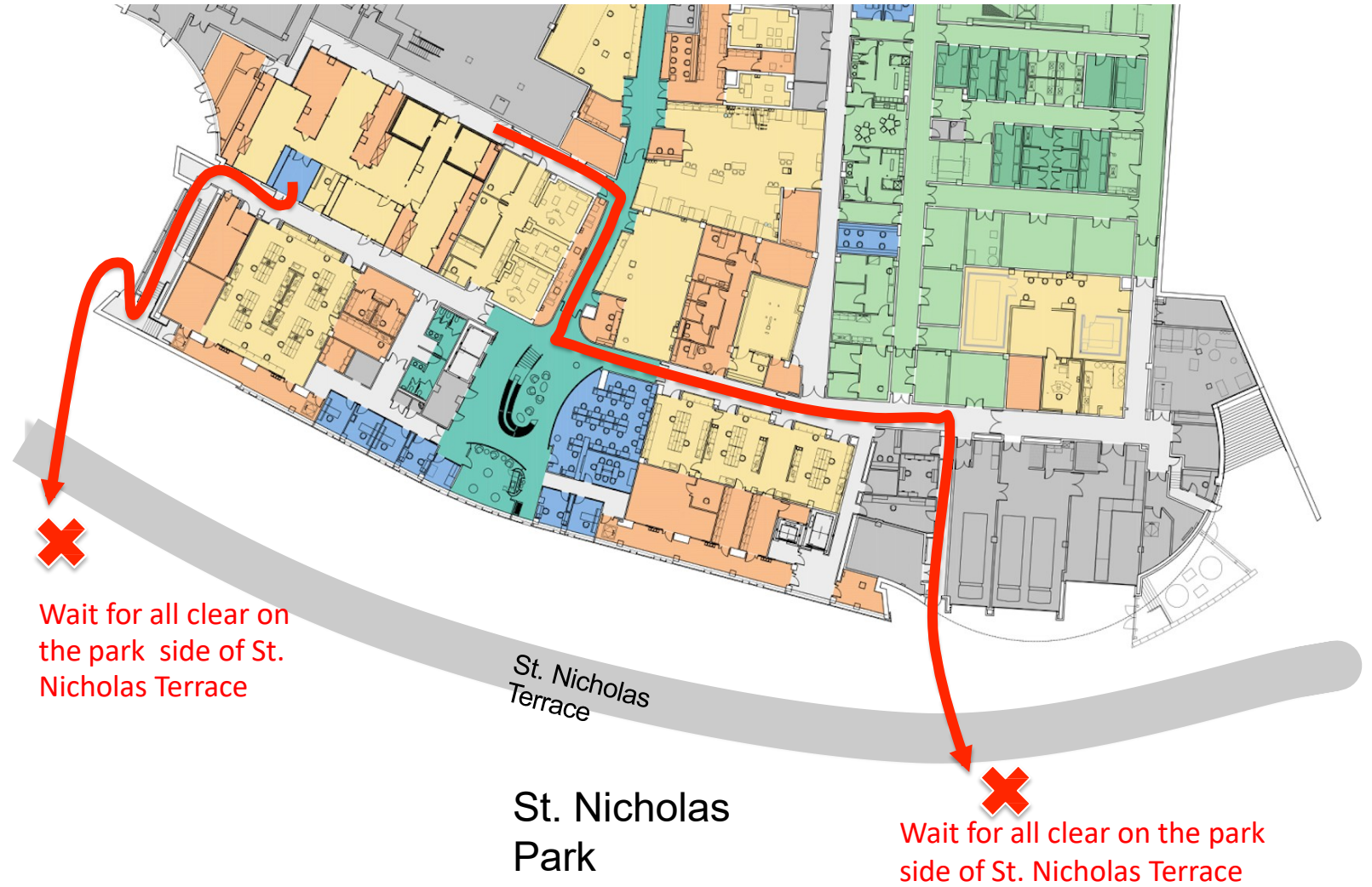
Cleanroom Layout



Cleanroom Egress



Building Egress from the Cleanroom



Evacuation Procedure

Secure your process.

Do not de-gown, keep your gown on.

As you proceed to an exit door, ask other lab members to follow.

Exit the building through the nearest exits.

The assembly area for the NanoFab is across St. Nicholas Terrace on the park side of the street.

Remain available to pass on details you have about events that lead to an evacuation.

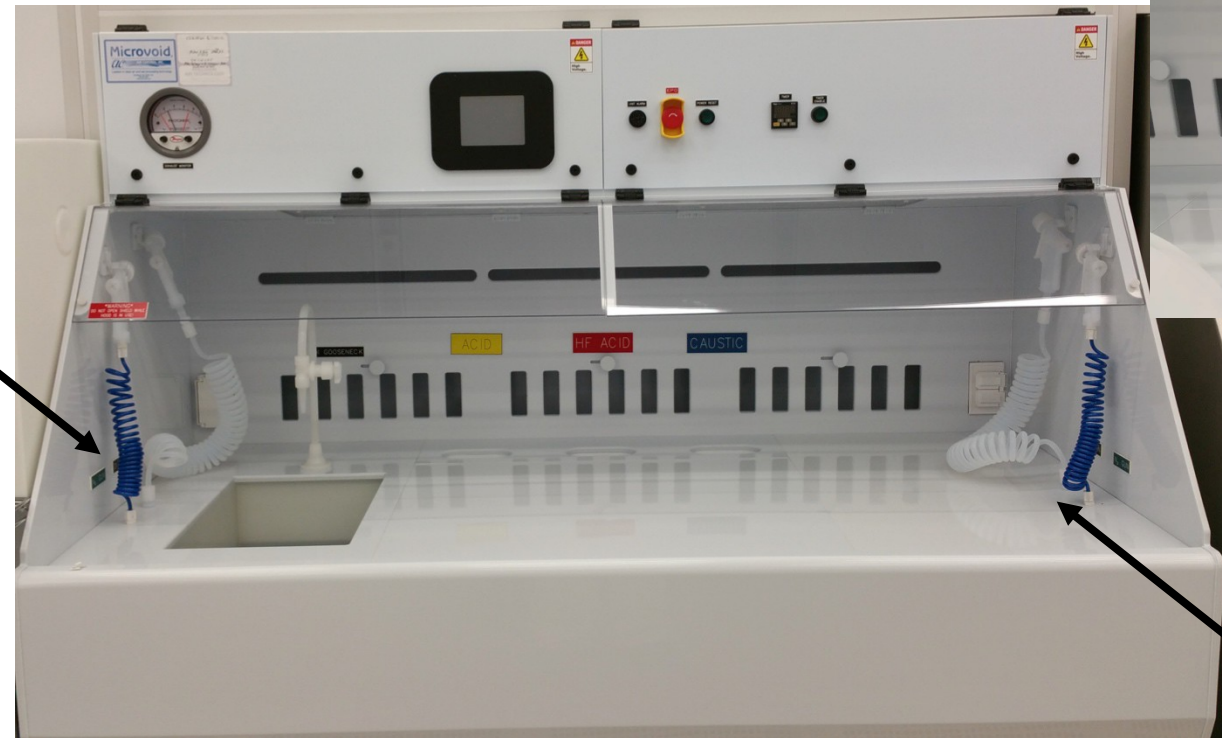


Hoods and Carboys

Nitrogen gun
(blue hose)



- Always check to make sure exhaust is above .1 inches of water.
- Notify staff if below the lower limit.



- Pour waste into appropriate carboy.
- Chutes are labeled directly above.

Di water gun
(white hose)



Chemical Handling

Special training is required before members are allowed to use the chemicals in the cleanroom.

Chemicals should be handled under their designated fume hoods at all times.

- White Hoods: Acids
- Stainless Steel Hoods: Solvents and Caustics

When dispensing chemicals, use a chemical label to label the following:

- Chemical Name (no formulas)
- Your Name
- Date and Time



Chemical Handling

Assume any liquid is potentially dangerous.

- Contact staff to dispose of unidentified chemicals.

Only use tanks and glassware as they are designated.

When using hot plates, only heat Pyrex beakers and constantly monitor the temperature.

Keep gloves dry and clean.

- Double glove or put on new gloves when needed.



Chemical Handling

Uncap only one bottle at a time and pour slowly.

Do not pour chemicals back into storage bottle.

Replace chemical bottle cap securely and chemical free.

When mixing chemicals:

- Pour acids into water (exception being Piranha)
- Do not mix acids and solvents
- Do not mix halogenated solvents with non-halogenated solvents
- Label all mixtures



Chemical Handling – PPE

Personal protective equipment (PPE) is required when working with acids.

- Chemically resistant gloves, face shield and apron.
- Safety glasses must be worn under the face shield at all times.
- Make a cuff in the gauntlet gloves.

PPE is located next to the acid benches.

Never wear PPE outside of the wet bench area.

Inspect PPE before and after use.

- Check for holes, stains and other indicators of contamination.

PPE is chemical resistant – not chemical proof.



Handling Chemicals – Donning PPE



1. Inspect Apron



2. Tie Apron



3. Wipe Face Shield with IPA



4. Put on Face Shield



5. Adjust Face Shield

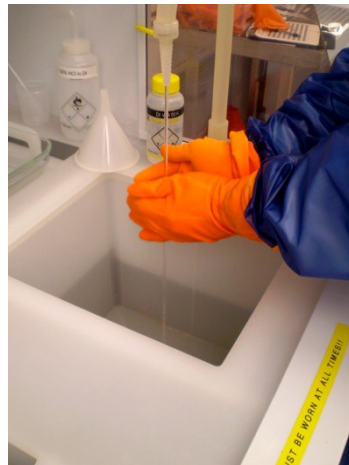


6. Put on Trionic Gloves over Apron sleeves



Chemical Handling – Removing PPE

1. Check gloves, apron and face shield for contamination. If not easily cleaned, throw away.



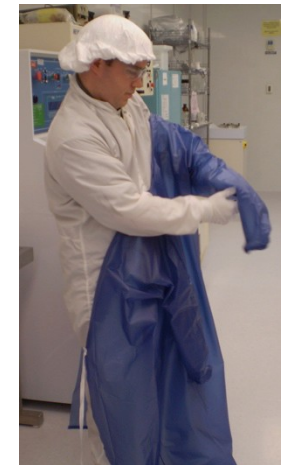
2. Wash gloves



3. Dry Gloves using a towel



4. Remove and Hang Face Shield



5. Remove and Hang Apron



Chemical Handling – Clean Up

Dispose of chemicals in designated carboys or chemical waste bottles.

Rinse glassware/plasticware 3x with DI water and blow dry with nitrogen gun to dry.

- Glassware/plasticware is no to be left in the hood to dry.

Return glassware/plasticware storage racks/storage bins and clean up work area.

If a chemical bottle is empty, triple rinse with DI water, cross out the chemical name and label bottle as “Rinsed 3x”.

Please review our [Glassware Policy](#) on our website for full glassware policy details.



Chemical Handling – Clean Up

All solid waste that has come in contact with photoresist and chemicals must be discarded in either the red sharps or hazardous waste bins.

Dispose needles, pipettes, razor blades, wafers and other sharp objects in red “sharps” bins.

Non-contaminated wipes are **NOT** to be disposed of in the hazardous waste bins.



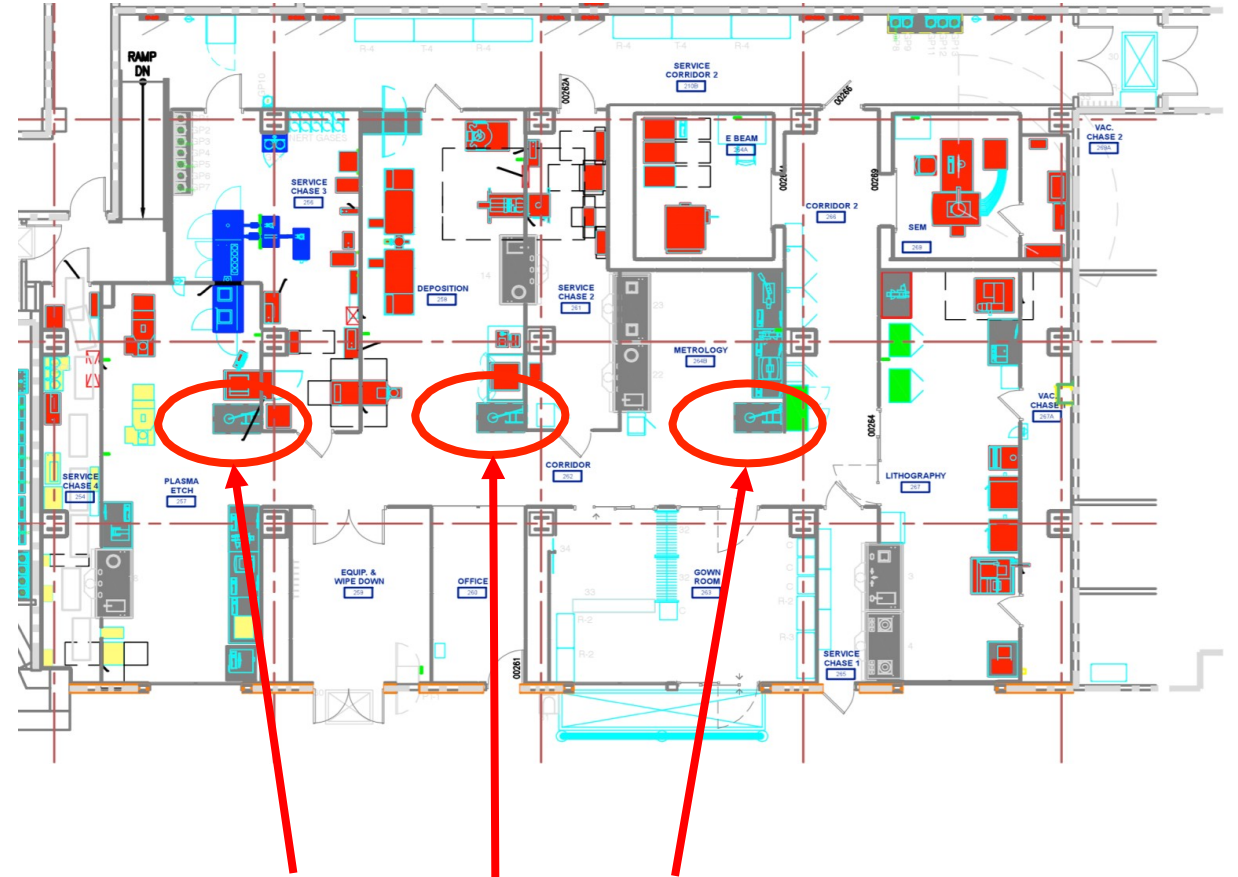
Hazardous Waste Bin



Sharps Bin



Showers and Eye Wash Stations



Chemical Storage

Common chemicals are supplied by the NanoFab.

- For use in NanoFab ONLY.
- Chemicals are stored in lab member accessible labeled cabinets throughout the lab.



Content List



Special Chemicals

Special Chemicals: chemicals not supplied by the NanoFab.

Special Chemicals must be approved prior to bringing them into the NanoFab.

Fill out the [New Materials Request Form](#) to request approval.



Chemical Spills

Simple Spill

- Does not spread rapidly.
- Is not toxic.
- Does not endanger people or property (except by direct contact).
- Does not endanger environment outside of building.
- Contained entirely in the fume hood.

Large Spill

- Spreads rapidly.
- Toxic.
- Endangers people or property.
- Endangers outside environment.
- More than ½ a gallon of liquid.
- Any amount of HF.



Chemical Spills – Simple Spill

Check self for contamination.

Check bench and floor for contamination.

Warn surrounding users of spill.

Contact cleanroom staff for cleanup.



Chemical Spills – Large Spill (Normal Hours)

Check self for contamination.

Block off area from other cleanroom members.

Notify cleanroom staff.

If the area is safe, wait at the cleanroom entrance until the staff arrives to transfer any relevant information about the spill.



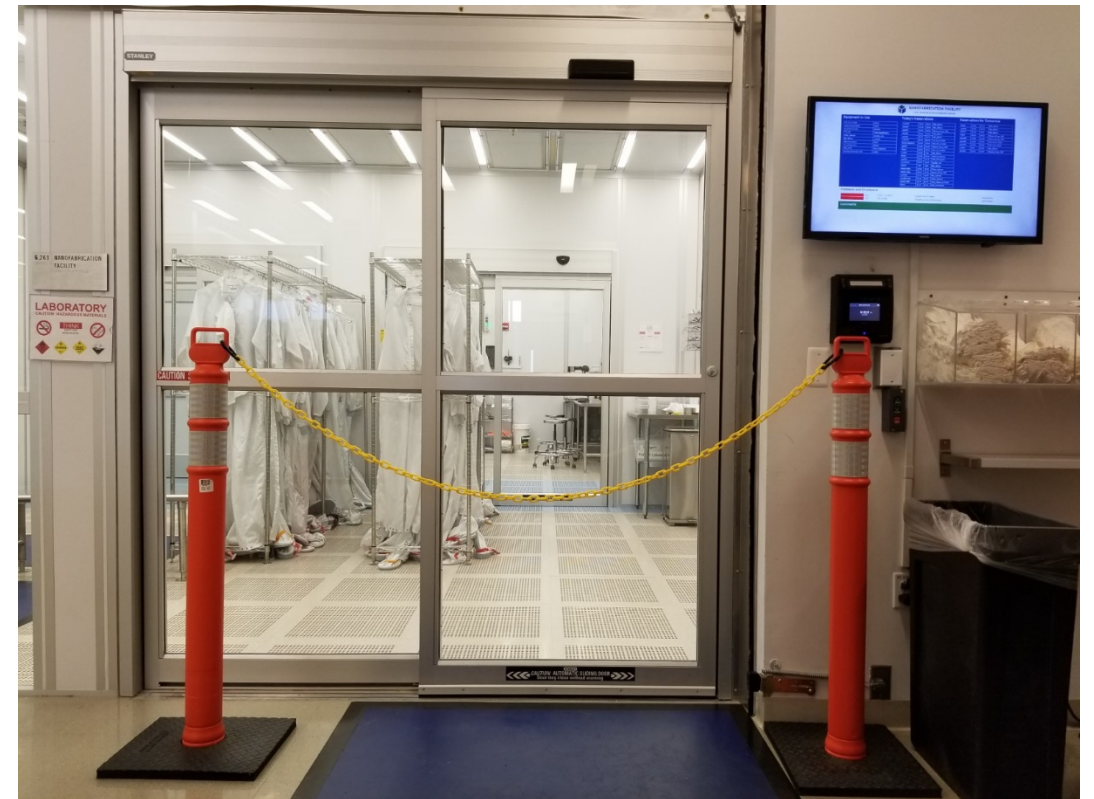
Chemical Spills – Large Spill (After-Hours)

Check self for contamination.

Alert other cleanroom members to evacuate.

Block entrance of cleanroom.

Notify cleanroom staff via email and alert Public Safety (91 (212) 650-7777).



Emergency: Chemical Exposure (not HF)

Have someone call Public Safety (91 (212) 650-7777) and notify staff.

- The person calling Public Safety should find the MSDS for the chemical and have it ready for them when they arrive; needs to stay with the exposed person.

Remove the affected clothing.

Rinse the exposed areas with water for 15 minutes using a safety shower or eye wash.

Notify staff after exposure using the posted Emergency Contact Information.

In an emergency, the deck hoses are usually your closest source of water.



Emergency: Eye Exposure

Lab members should assist a colleague in the event of an eye exposure.

Flush eyes for at least 15 minutes – NOT LESS.

- Use an eye wash station.
- Sinks have DI guns that can be used followed by an eye wash.

Contact staff for assistance or call Public Safety (91 (212) 650-7777).

Follow up eye exposures with a visit to a medical professional.



Emergency: HF Burns

HF acts as an anesthetic, you may not feel the burn until damage is already done.

Have someone call Public Safety (91 (212) 650-7777) and notify staff.

- The person calling Public Safety should find the MSDS for the chemical and have it ready for them when they arrive; needs to stay with the exposed person.
- MSDS is located in the gowning room.
- Bring calcium gluconate gel to the ambulance and continue to apply.

Remove affected clothing, flush with cold water for 5 minutes.

Massage calcium gluconate ointment from First Aid Safety Stations onto exposed area.

Notify cleanroom staff after exposure, using the posted Emergency Contact Information.



Emergency: TMAH Exposure

TMAH is used in photoresist developer @ ~3%.

It is hazardous by ingestion, inhalation, skin exposure and eye contact.

Exposure to concentrations >15% may cause respiratory or heart failure– a ganglion inhibitor.

If exposed:

- Flush exposed area with water for 15 minutes.
- Notify cleanroom staff after exposure, using posted Emergency Contact Information.

If medical assistance is needed, have someone call Public Safety (91 (212) 650-7777).

- The person calling Public Safety should find the MSDS for the chemical and have it ready for them when they arrive; needs to stay with the exposed person.



Emergency: General

If you see someone who is in distress, you are automatically their safety buddy.

Call Public Safety (91 (212) 650-7777).

Be sure you are wearing proper protective equipment before helping the victim.

Take MSDS to the Emergency Room.



First Aid for Other Incidents

Chemical Inhalation

- Check area for safety.
- Close open containers.
- Move victim to safety.
- Call Public Safety (91 (212) 650-7777).
- Resuscitate with rescue breathing if necessary and qualified.

Chemical Ingestions

- Call Public Safety (91 (212) 650-7777) and notify staff.
- Immediately go to ER.



First Aid for Minor Incidents

Thermal Burn

- Immerse burned area in cold water.
- Cover with sterile dressing.
- Call Public Safety (91 (212) 650-7777) if severe.

Bleeding

- Place clean pad and pressure on the wound.
- If excessive, get medical attention.

Clothing Fire

- Stop, drop & roll or douse victim with safety shower.
- Call Public Safety (91 (212) 650-7777).

