

Scope

This document is a reference manual covering the basic operational policies for use of the facilities in Polvani's Laboratory. It applies equally to both resident and non-resident users, and governs both safety and laboratory use rules.

All users are expected to have read and understood these procedures.

It is impossible to define a policy for every conceivable situation. Rules and policies are no substitute for common sense. Under these conditions, anyone who fails to act in a professional, safe and responsible manner while in the SNS will be banned from further use of the facility at the discretion of the management.

Users' suggestions and feedback on the facility, its staff, its operation, and its equipment are welcome at all times. Please feel free to direct your suggestions to Pasqualantonio Pingue.

General Procedures

Categories of People

Staff- Full or part time employees of Polvani's Laboratory.

Users- People working on an approved research project at SNS (students, postdocs etc., both SNS and non-SNS).

Visitors- People visiting the laboratory for a brief time and having no affiliation with a User research project.

Service Personnel- People in the facility to service equipment and facilities. This includes both SNS and non-SNS employees.

The clean-room facility is for the exclusive use of SNS staff and users affiliated with and working on specifically approved research projects.

Other use requires approval of the Director of the facility. Being a graduate student at SNS does not guarantee access to the facility. Use of the facility by any individual is a privilege that can be revoked by the facility management at any time.

ACCESS

An orientation and training process is required before any new user can receive a key to work in the facility. In general, this is a three part process:

Part 1. Orientation

Prospective users are taken through the laboratory by a staff member, discussing general rules, safety procedures, emergency exits, etc. After this session, a user can be issued a key allowing basic access to the laboratory.

Parts 2 and 3 are required in order to use any chemicals in the laboratory.

Part 2. Chemical Safety Lecture

This lecture by a Staff member covers basics of The Laboratory Standard, chemistry and chemical safety.

Part 3 Chemical Practical

This is the final section for full chemical authorization. It is done generally 1 on 1 with a staff member. Emphasis is on proper technique in using chemicals and chemical safety protective equipment.

For users who will not be using chemicals, parts 2 and 3 may be waived at the discretion of the management.

**The access authorization will be restricted to specified clean-room facilities.
(see the CLEAN ROOM USER LIST)**

BASIC SAFETY RULES

A few obvious rules are:

- **Do not** bring anything into the clean room which is not absolutely necessary for the work you are doing.
- **Do not** use pencils or erasers in the clean room.
- **No smoking** anywhere in Polvani's Laboratory.
- **Do not** wear dirty clothes, particularly muddy boots or shoes into the clean room.
- **Unpack** cardboard boxes outside the clean room. Do not take packing material inside.
- **Newspapers** may **not** be brought into the clean room.
- **Clean** off equipment, parts, tools, etc. before bringing them into the lab.
- **No** backpacks, canvas bags, etc. in the lab.
- **No** food and **No** gum.
- **No** musical distractions (stereos etc.).

Acetone and Flammable Solvents

Acetone is widely used throughout the facility. It is a very flammable solvent with a low flash point, (i.e. it can be ignited at a low ambient temperature). Because of this it presents a significant fire hazard. A spill of a gallon bottle of acetone could cause a catastrophic fire or explosion.

It should not be transported except in chemical buckets. Solvents should also be handled with care in the hoods and not used near hot plates. **Spilled solvent can be ignited by the hot plates.** The resulting fire could easily be drawn up into the exhaust ducts, again with catastrophic consequences. **Spilled solvents can also react explosively with chemical oxidizers present, e.g., peroxides, nitric acid.** Spilled solvents should be contained immediately with spill control pillows.

Hydrofluoric Acid

Hydrofluoric acid, HF, presents a significant hazard for personal injury. It is widely used in the lab in its pure form, diluted, and as the active component of BOE, Buffered Oxide Etch. It is used for etching silicon dioxide and particularly for stripping the native oxide prior to further lithographic processing. HF, however, is a very hazardous chemical, much more so than any of the other acids. Its danger comes from its effect on flesh.

Pay attention: HF aspiration it is very dangerous! Work at any time in the chemical hood environment!

Wear neoprene protective gloves and plastic glasses.

At the concentrations used in the laboratory, an HF "burn" is initially painless. You may not even know that you have gotten a splatter on your hands, arms, face, or in your gloves. The acid however will silently eat away at your flesh. The fluoride ion is not consumed in this process and is soluble in tissue, so the damage penetrates deeper and deeper, until it comes to the bone. About this time the excruciating pain begins. It is too late, however, to reverse the considerable tissue damage. At some point, it enters your blood stream and goes everywhere scavenging Ca ions, totally messing up the ionic chemistry of your nervous system. At some point, if left untreated, you die.

Simple washing of an HF splash is not sufficient to prevent damage. It does not wash off; it is already dissolving you and will continue to do so until you receive **medical attention specific to HF burns** (including deep injections to neutralize the penetrated acid). **Be sure that medical personnel know that it is an HF burn and know that it requires specific treatment different from a common acid burn.**

As first aid use the Ca paste that you can find in the chemicals room, spreading it on the damaged part of your body, and call the following number:

CENTRO ANTIVELI-FONDAZIONE MAUGERI (Pavia)

Ph# 0382-24444 (24h)

HF etches silicon dioxide very well. Therefore, it also etches glass. It must not be kept in a glass bottle, used in a glass beaker or disposed in a glass waste bottle. Plastic labware is available for this purpose.

HF, like all other chemicals, must only be used in the chemical hoods. It is not acceptable, for example, to take a beaker of acid into the process area to strip a sample just prior to loading in a vacuum system (SEM, thermal evaporator or DC-RF sputtering).

Peroxides

All peroxides are highly oxidizing materials. Considerable energy can be released in their reactions with common materials. Some peroxide compounds are unstable, and can explode. We have hydrogen peroxide in the facility. Extreme care should be used in mixing solutions containing peroxides. **Peroxides are incompatible with all forms of organic solvents and flammable materials.**

Liquid Nitrogen & Helium

Nitrogen & Helium , are hazardous gases ??? Yes, it's true. More people die of asphyxiation by nitrogen or helium than by any of the "toxic" gases. We use liquid nitrogen and helium for many things in the laboratory. They are transferred to dewars for cold traps, to cool down the He3 and dilution fridges and as purge gases for all vacuum systems. A large liquid storage tanks are located in the so called "magnet room" in our lab.

When you open the LHe dewar wear cryo-gloves and look at the pressure indicator: if the pressure is to high (maybe the one-way valve is closed...) open the lateral main valve and wait until the pressure lowers before opening the top aperture!

It is very important that you open the door (one foot wide) whenever filling a liquid nitrogen tank!!!! Failure to provide proper ventilation can lead to asphyxiation!!!!

I don't care it's the middle of the winter, put on a coat and open the door anyway!