

The Advanced Materials Engineering
Research Institute
at
Florida International University



Users' Guide

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General Rules for MNRF Access

Access to the Motorola Nanofabrication Research Facility is regulated and controlled by the AMERI management and staff. Once a request has been submitted to AMERI through the office manager, for recurring access to the facility, along with the proper certifications/trainings/documentation, the individual will be added to the AMERI Users list. Access to the MNRF is gained through a second application specifying the individual's requirement for use of the cleanroom. It is a violation of AMERI policy to allow unauthorized personnel to enter either the AMERI or the cleanroom without permission. Further instruction is provided below regarding the specific process by which access may be obtained.

Gaining Access

Accessing AMERI Laboratories

Access to any of the laboratories located within the AMERI facility is obtained in the following manner:

1. The applicants sponsor must submit a request in writing to AMERI management via the AMERI access form.
2. The request will be conveyed to the AMERI director for approval.
3. Upon approval, the required EH&S courses for general access must be successfully completed, with certifications and forms emailed to the AMERI office manager.
4. Once this process is complete, user access badge will be activated for AMERI access.

Accessing the Cleanroom

1. Follow the same procedures as above for access to the AMERI Laboratories.
2. The applicants sponsor must submit a request in writing to the AMERI lab manager, schedule training and take exam in the Cleanroom Practices & Protocol.
3. Successfully complete the training and exam in Cleanroom Practices & Protocol.

Accessing the AMERI laboratory Fume Hoods

1. Follow the same procedures as above for access to the AMERI Laboratories.
2. Complete the applicable EH&S course requirements for fume hood/chemical handling/and PPE, and submit to the AMERI office manager.

Accessing the Equipment

1. Follow the same procedures as above for access to the AMERI Laboratories.
2. Contact the applicable tool manager and schedule training and a practical demonstration of your knowledge and ability to competently operate the equipment in accordance with the established AMERI procedures.
3. When you have received notification of your approved certification to operate the equipment, schedule your use through the AMERI Facility Online Management system (FOM).

Scheduling does not apply to general use minor equipment, such as microscopes, hotplates, etc.

For further discussion on use of the cleanroom equipment, see the sections below titled "Equipment Use", and "Reporting Problems".

Access for Guests

Guests to the AMERI facility and cleanroom are welcome but must be escorted by an authorized facility user at all times. Participation (guests for more than 2 days) in lab activities is only permitted with a completed AMERI access form and completion of FIU and activity specific trainings. The escort is responsible for seeing that the guest complies with all AMERI rules and is instructed in AMERI/FIU safety and emergency evacuation procedures. Guests are not permitted after normal business hours (M-F, 9am- 5pm) without special permission previously obtained by AMERI management.

Hours of Operation

AMERI is open for approved laboratory work 24 hours a day except when the FIU Engineering Center and/or AMERI is closed due to exceptional circumstances or scheduled and unscheduled repairs/maintenance, as made known by signage or other notification. AMERI support staff is available during normal business hours (M-F, 9am-5pm). Additional after-hours support coverage may be provided on a case-by-case basis as required. To find out if FIU is open or closed (i.e. on a holiday, or weather event), call x74357, or 305-348-HELP.

MNRF Cleanroom - Signing In / Out

All Users and Visitors of the Nanofabrication Laboratory must fill out the sign in/out log at the entrance to the cleanroom. Those with a PantherID cardkey must also swipe their card through the magnetic lock on the gowning room door (Room EC1655A), in order to record their visit. Upon leaving the cleanroom, write down the time of exit, so that it indicates that you are no longer in the cleanroom. Failure to follow these procedures constitutes a Safety violation. It is not necessary to swipe your badge through the electronic lock when exiting the gowning room.

Street Clothes/Attire

- No Open-toed shoes or High heels/flats
- No Shorts or Skirts (exposed bare legs)
- No Excessive make-up
- No Strong perfume/cologne

Restrooms

There are no restrooms in the MNRF Cleanroom nor within the AMERI facility, therefore users are advised to pre-plan their work sessions accordingly, as de-gowning and re-gowning can take some time. The nearest restrooms are located in the lobby of the Engineering Center, northwest of the main AMERI entrance.

Personal Items; book bags, accessories, etc.

The Gowning Room to the Cleanroom is of limited space and has no accommodations for storage of the personal belongings of MNRF Users. Arrangements should be made for storage of such items prior to accessing the Gowning Room.

Item Transfer Into Cleanroom

There is no “pass-through” for bringing smaller items, such as tools, substrates, work materials, etc. into the cleanroom. When bringing such items from outside to another user already in the cleanroom, the Gowning Room should be used to conduct the exchange.

The item should be cleaned by wiping down with 50/50 IPA/DI H₂O. During this process, the individual receiving the item should not leave the entrance door open for long lengths of time (i.e. when conducting conversations), so as to avoid having both doors open simultaneously and developing contamination within the cleanroom.

Larger items, such as furniture or equipment can be introduced through the blue double doors, located on the West wall adjacent to the fume hoods of the Class 10k space. The duration which these doors are opened to the outside hallway, should be minimized.

Cleanroom Attire

Safety Glasses

Safety glasses or prescription glasses with side shields are to be worn at all times in the Nanofabrication Laboratory except when performing tasks with which they interfere, such as viewing a sample through an optical microscope.

Full Bunnysuit/Coverall

Cleanroom users are required to follow the full gowning procedure applicable to the Class 100 region of the Nanofabrication Laboratory, regardless of the classification of the region in which they will be working.

Garment Types

Disposable and /or re-usable (Tyvek) garments are available for AMERI users of the Cleanroom as well as visitors. Those performing tool maintenance and repair, or another activity which is believed may soil or damage the garments, are asked to dispose of garments after use. It is recommended to change to new garment weekly or as needed, e.g. garment tear or contamination.

Gowning/De-gowning Sequence

Upon entering the gowning room, follow the gowning procedure as illustrated by the instructional poster mounted on the wall. Pay attention to the sequence in which the garments are to be donned, as shown by the procedure: Shoe vacuuming and covers are put on before entering the gowning room.

Gowning

1. First don the disposables = hair cover -> mouth cover -> gloves
2. then the bagged garments = coverall -> boots
3. from the wall mount bin get = safety glasses
4. Finally, check your appearance in the mirror, looking for loose hairs, undone snaps, exposed skin, etc. Verify you are properly gowned.

When finished working in the cleanroom, inspect garments for damage or stains and replace if needed. De-gown in the following manner:

De-gowning

1. Remove safety glasses, boots, and unzip coverall and remove.
2. Place boots in a small zip lock bag.
3. Place bagged boots and coveralls in large zip lock bag with your name and store on shelf.
4. Remove disposable gloves and discard into trash (outside gowning room)
5. Remove mouth cover, hairnet, and booties, and discard into trash

Headphones / Music / Ear Plugs

Headphones are not permitted when the individual is considered an active participant in the "Two Person" safety rule. Music is not permitted when anyone in the Cleanroom is conducting work that invokes the Two Person Safety Rule. This also applies to the wearing of hearing protection, such as ear plugs, therefore the operating of loud equipment (that would require hearing protection) is not permitted when any individual in the lab is engaged in activity that invokes the two person rule for safety.

Forbidden Materials

The following items are not to be brought into any of the Cleanroom areas:

Food and/or Drinks

Paper and notebooks (that are not cleanroom paper)

Cardboard, woods, packing materials, powdered materials

Pencils (any type)

Backpacks and unnecessary personal items

Aerosols and lubricants

Adhesives, glues, duct tape

Exceptions:

Equipment manuals, instructions, process sheets, and MSDSs printed on standard paper are allowed in the Cleanroom for reference, but it is requested they be bagged and their presence be kept to a minimum and that they be stored or removed when not in use.

Utilities

Connections

Adjustments and connections to the “house-supplied” utilities, such as electricity, equipment cooling water, Nitrogen, compressed air, house vacuum, etc., should NOT be performed by MNRF Users. This includes adjustments to process gas regulators. Contact MNRF staff to request any necessary changes. Any problems with utilities, such as power outage, surges, gas leaks, etc., should be reported to MNRF staff immediately.

Emergency Off

Many of the tools in the AMERI facility and the MNRF have their electrical power run to gray metal boxes that house an electrical disconnect switch. These boxes have a red handle on their right-hand side. In the event of any serious problem with the equipment that calls for immediate shut down, this lever is to be pulled down to remove all electrical power from the system. Under no circumstances are lab users to open any of the electrical disconnect boxes. In addition, some equipment is also equipped with a red “EMO” (Emergency Off) button on their front panel. This button serves the same purpose, of shutting the equipment down quickly, however it does not de-energize all of the equipment back to the wall supply, as does the gray disconnect switch. Lastly, some labs in the AMERI facility are equipped with the same type of “EMO” button, which will turn off the power to all of the equipment facilitated in that room, instantaneously. This action should be taken in the event of a fire or other out of control situation in which an immediate shut down is required. Notify the AMERI manager and staff whenever an emergency shut down is performed.

Power Outages

What to do

In the event of a power outage, the Engineering Center is equipped with emergency lighting that lights automatically with the loss of power to the building. Lab users should remain still and not move about until the emergency lighting comes on. This is particularly true for those working with chemicals at the time of power loss. Once emergency lighting is on users must secure processes and exit the lab until the situation is resolved and notification to return is given by the AMERI manager or staff.

Back-up Power

The ion beam and electron beam systems have dedicated UPS battery back-up systems

that will keep their ion pumps working and columns under high vacuum for a number of hours. The water chillers serving the electron microscopes however are also back-up power, and therefore will support these systems in the event of a power outage.

Recovery

In the event of a power outage, lab users are not to reset any breakers or restore any support equipment (vacuum pumps, water chillers, etc.) that does not come back on-line automatically. Equipment users should contact the tool or lab manager to notify them of the specific equipment problem.

Equipment Use

Access and Training

Access to the MNRF Cleanroom does not constitute permission to use the tools and equipment it contains. This permission is obtained through the tool manager, once training has been received. In order to use any of the equipment located in the Cleanroom, contact the AMERI manager or staff. Once training has been received, and permission granted, additional notification must be made to the AMERI manager and staff when a Lab User intends to either perform processing that is not currently supported, or when the substrate, materials, or process are non-standard. Training records will be kept and maintained by the AMERI manager and staff, with different tools requiring different frequencies of renewal. The more complex the equipment, the more frequent the requirement to demonstrate competence in order to maintain or achieve certification on that equipment. Users will be notified approx. 30 days in advance of pending certification expiration.

Scheduling Use

The MNRF is a multi-user laboratory, and as such requires coordination of the use of its available resources. This is accomplished via the Facility Online Management program (FOM). This program gives lab and tool status in real time. Tool scheduling may be done in advance by reserving tools, and is generally a first-come, first-served basis, which consequently rewards advance planning. At times the lab may be more busy than others, in these cases it is recommended that users share tools as needed rather than blockout many tools at once for a process, e.g. photolithography bay. AMERI projects take first priority during standard working hours and in case of emergency, where other users may have to shift schedules to gain tool access. Prior notice will be given in such cases.

Assistance and Permission

Prior to performing any work using the thin film process equipment located in the MNRF, Lab Users are to provide the AMERI manager and staff with a proposed process flow. Process support is available through the AMERI manager and staff. Once the proposed work is approved, it must be scheduled so as not to conflict with any other work that has been previously scheduled.

Reporting Problems

Facility related- If the source of a problem has been identified to be one of the utilities, i.e. electricity, exhaust, house vacuum, house nitrogen, cda, cooling water, or environmental conditions (room temperature, noise, etc.), you should discontinue work and report the problem to the AMERI manager and staff. The AMERI manager will then convey the problem with the FIU Facilities Manager for investigation and remedy.

Equipment related- Problems that can be identified with the functionality of any equipment should be reported immediately to the appropriate tool manager, and logged in the Equipment Log book for the tool. Lab users should not attempt to make repairs to equipment or support equipment (such as vacuum pumps, chillers, etc.), unless accompanied by the tool manager responsible for that piece of equipment.

Process related- When process results do not meet expectations, or the outcome indicates some form of misprocessing, contact the tool manager and the AMERI manager for consultation. Process problems can often be avoided by consulting with these individuals at the outset of a project. Whether the problem is the result of experimental error, special (hidden) environmental variables, or contaminated materials, the experience of the AMERI manager and tool manager should be able to provide a useful perspective.

Conduct

As a matter of protocol, activity in the Cleanroom is to be conducted deliberately and methodically, not in a reckless or haphazard manner; the highest level of professionalism is expected. Unnecessarily rapid motion and activity is discouraged as it adds turbulence to the airflow and will increase airborne particulate. Conflicts in unscheduled use of equipment are to be referred to the AMERI manager and staff if the Lab Users are unable to resolve in an amicable and professional manner.

Housekeeping

All Lab Users are expected to clean up after themselves each and every time they use the facility. The AMERI operates under a "Zero Impact" philosophy, where the lab and all tooling are left in a clean and ready state for the next user, with no sign of the last user or process. Failure to do so will result in loss of access privileges.

1 to 3 Strike Rule

An observed failure to comply with the rules for use of the Nanofabrication Laboratory will result in loss of access privileges. Depending upon the severity of the infraction, a violator may have his or her access privileges revoked after just one incident, particularly in cases involving unsafe practices. Repeated disregard for Cleanroom protocol will not be tolerated, and will result in a loss of access privileges if the behavior is witnessed after warnings have been issued. When applicable, the sponsor will be notified of any

misconduct and of unsafe practices. The sponsor will also be notified if Cleanroom privileges are revoked. Cleanroom privileges will not be re-instated until sufficient evidence of the completion of training and compliance to the rules has been demonstrated. In the case of severe safety violations, Cleanroom access may be irreversibly revoked. Malicious behavior will be reported to FIU administration and law enforcement authorities.

Visitors

Visitors to the MNRF are to be signed in and escorted. The escort is to assist the visitor(s) with instruction on proper gowning protocol. If a visitor is expected to re-enter the lab within the present work week, their garment should be placed on a hanger and tagged for identification. Otherwise, the garment is to be discarded into the laundry bin after use. VIP visitors are also asked to sign the guestbook.

MNRF Contacts:

AMERI Facility Manager

Patrick Roman

202-294-8602

proma016@fiu.edu

Cleanroom Engineer

Steward Schwarz

786-853-0138

sschwarz@fiu.edu

Cleanroom Safety

FIU EHS Training

Safety training is required before being allowed to work in the Cleanroom or AMERI Lab spaces. There is a core list of courses that are to be taken for general lab access, as well as some particular courses that relate to a specific form of hazard (i.e. exposure to lasers, radiation, etc.). These courses are available on-line at: <https://fiumdl.fiu.edu/> in the EH&S menu of the site. In order to access the training classes on-line you must setup a moodle account.

The core courses for general lab access are:

FIRE SAFETY

LABORATORY HAZARD AWARENESS

HAZCOM: In Sync With GHS

Use of chemicals, gasses, and fume hoods also requires the following:

PERSONAL PROTECTIVE EQUIPMENT [PPE]

CHEMICAL FUME HOOD SAFETY

COMPRESSED GAS SAFETY AWARENESS

Access to room EC1660 also requires taking the following course for training on working with lasers:

LASER SAFETY

Radiation training is required for access to the equipment in the XRD suite, room EC1662:

RADIATION SAFETY

Once all the requisite safety training has been successfully completed, copies of the training certificates are to be submitted to the AMERI office manager before access will be granted.

Two Person Safety Rule

When working in the Nanofabrication Laboratory, a two person rule is to be applied. Any activity, including processing, facility and tool repairs and maintenance, etc. that can present a potential danger, are not to be attempted without there being a second person within earshot. This includes (among others) activities that involve working with chemicals, working aloft, and working with electrical and mechanical hazards.

Emergency Response Plans

Individuals in the AMERI facility at the time of an emergency are expected to act in full accord with the Emergency Evacuation policy established by FIU. Detailed instructions can be found in this policy, which is located on line at:

http://www.fiu.edu/~ehs/safety_policies/policies_fire_emergency_evac.htm

In addition to the FIU Emergency Evacuation policy, the following steps are to be followed when one is in any part of the Cleanroom at the time an emergency alarm is sounded:

Emergency Evacuation from Cleanroom

1. In the event of an evacuation, personnel in the Cleanroom are to notify others in the cleanroom that they are to evacuate, and immediately leave the area via either the gowning room, or by unlocking the blue double doors on the west side of the room, adjacent to the fume hoods.
2. Pull (activate) an emergency alarm
3. If possible, prior to exiting the AMERI facility, check to see that the sign in/out log has been removed from the gowning room entrance. If it has not yet been gathered then do so, and take it with you as you evacuate the building.

4. Upon leaving the building, gather with the other evacuees on the East lawn or parking lot, and/or at a safe distance from the building.
5. Gather with others that you see wearing cleanroom garments, and call the roll (attendance) from the sign in/out log. If any person in the log remains unaccounted for, this discrepancy is to be made known to the evacuation coordinators.
6. After the roll has been taken, you may remove the remainder of your cleanroom garments.

Emergency Exits

In the case of an emergency, lab users may exit the Cleanroom via either the Gowning Room, 1655A, or the blue double doors located adjacent to the fume hoods on the west wall of the Class 10k space. Upon egress, lab users will find the NW exit of the AMERI facility to be the closest. If however, this exit is obstructed, the exit at the SW corner of AMERI may also be used.

Chemical Safety

Commonly used terms

The following sections address procedures for using chemicals and gases in the AMERI laboratories. Some useful terms in discussing safe handling of these materials are:

TLV –Threshold Level. A level of exposure to a chemical deemed to be safe.

MSDS –Material Safety Data Sheet. Contains important information for the safe handling, storage, and use of a given chemical.

NFPA label – The system used to identify the potential for various hazards associated with a particular chemical, as established by the National Fire Protection Association. This label consists of a diamond with four parts, the top three of which (red, blue, and yellow) each have a rating with a 0-4 scale (4 being most severe).

Odor Threshold – An imprecise and inconsistent detection limit for chemicals and gases that produce a smell. Although not reliable due to human variation and reliance upon health conditions, the detection of an odor produced by a chemical or gas is useful in many cases as it generally lies many times lower than the TLV, and can serve as an early indicator of the chemical presence.

Vectoring –The process of spreading chemical contamination through touching surfaces that come in common contact with unprotected lab users.

PPE –Personal Protective Equipment. Gear worn during the handling and use of chemicals (typically wet chemicals, but also refers to respirators, heat and impact protection, and other work hazard protection that is worn).

Gas Regulator –A gauge and valve combination used to adjust gas pressure. Not a shut off valve.

Wet Bench – A fume hood with a design that permits unobstructed access to the work surface due to the laminar design of airflow either below the deck or across the surface (front to back). Synonymous with fume hood.

Spill Pillow/Mats –A pillow made of absorbent material to assist in the confinement and cleaning of a chemical spill.

Open container vs. Opened container - An open container is one that currently has its cap or lid removed. An opened container is one that may or may not currently have its cap or lid in place, but has had it removed previously, breaking the factory seal.

Handling of Chemicals

Personal Protective Equipment [PPE]

Personal protective equipment [PPE] is to be donned whenever opened containers of chemicals are being handled, including previously opened containers that have the lid or cap on.

PPE consists of:

- Chemical apron (reusable or disposable)
- Disposable Nitrile gloves
- Acid and solvent resistant gloves
- Safety glasses
- Face shield

The proper sequence for donning PPE is:

- Safety glasses & nitrile gloves
- Chemical apron
- Face shield
- Chemical resistant gloves

The proper sequence for removal of PPE is the reverse order:

- Chemical resistant gloves
- Face shield
- Chemical apron
- Safety glasses & nitrile gloves

Additional tips:

- Inspect all PPE items for contamination and/or damage, e.g. pin holes in gloves, before use and replace as needed. Rinse and dry PPE after each use.
- When wearing chemical resistant gloves, a cuff of approx. 1" – 2" should be made to catch any dripping of liquids that may come from getting their outer surface wet, including water from rinsing.

- The outer surface of reusable chemical aprons should be considered chemical contaminated when handling.
- Disposable chemical aprons and gloves should be treated as solid chemical waste, and disposed of in the manner prescribed in that section of this document (i.e. rinsed, bagged, and labeled).

Chemical aprons, chemical resistant gloves, and face shields are not to be worn in any area of the lab except while performing chemical processing at the **wet benches** and fume hoods, so as to prevent **vectoring** of chemicals to other areas and surfaces. Telephones, keyboards, hotplates, thermometer containers, thermocouple displays, notebooks, work surfaces, pens, markers, eyeglasses, cell phones, door and cabinet handles, cleanroom garments, etc. are common objects that are easily contaminated in the course of working if care isn't applied not to touch them while donning. Once contaminated, the **vectoring process** can repeatedly transfer chemicals from these surfaces throughout the lab, from person to surface to person, potentially spreading the chemical over large distances, including your car and home. Vectoring of chemicals can only be minimized through constant awareness and attention to contact of PPE and storage containers. *Always treat these items as though they are contaminated. Never assume them to be free of the presence of chemicals after their first use.*

Storage

Open chemical containers other than bench use squirt bottles and polymer containers, should be stored in the fume hood storage under cabinets. Acids, alkalines, bases, and caustics are to be stored in the corresponding fume hood/chemical bench. Open solvent containers must be stored in the solvent benches. Previously unopened (i.e. factory sealed) containers only may be stored on shelves with like chemicals. Once opened, these containers may only be stored in containment bins with compatible chemicals (does not include slurries, photoresists, DI water, and neutral pH non-corrosive chemicals).

Transportation

A bucket with a handle that is specifically designed for transportation of chemical containing bottles is to be used when transporting gallon sized containers further than a few yards. Such a container may be carried short distances, when using two hands, and carrying no other items. Only transport one gallon-sized container at a time. Do not wear chemical gloves (but do not remove nitrile cleanroom under-gloves) when handling chemical containers for transport, as you may contaminate the outside of the container with other chemicals, and/or transfer chemicals from the outside of the container to door handles and other surfaces. Chemical resistant gloves are to be worn when the chemical container is ready to be opened and used at the work station. Be aware of chemical contamination from the container to your nitrile gloves when handling previously opened containers, and change them for clean gloves after handling the container.

Labeling and Labware

All chemical holding containers, including beakers, must be properly labeled with the correct NFPA hazard diamond information. This information is found in the MSDS, and is to be determined prior to pouring or using any chemicals (see section titled "MSDSs"). In addition, chemical labware and other containers that are in use are to be labeled with the chemical name, user's name, contact information (telephone number) and date poured. If it is not possible, or prudent (i.e. container is an oven) to label the container itself, appropriate signage is to be placed in close proximity to the container, with the required information. All labware is to be rinsed 3x, dried, and stored in the user storage box to reduce project and lab process contamination.

Containers

Chemicals are to be stored in compatible containers appropriate for long term storage. Open containers are not to be left unattended. Unlabeled containers are not suitable for any long or short term chemical storage.

Containers used to hold any chemical are to be triple washed with de-ionized water and rinsed when emptied. The outside of the container is to be rinsed and dried. Labels are to be removed and replaced with a "3X rinsed" label prior to placing for storage, which is to be removed prior to re-use. These containers are to be used for chemical waste.

Waste Disposal

Chemical waste is not permitted in any sink, fume hood, or wet bench basin in the AMERI facility. All waste is to be containerized in an appropriate chemically compatible and labeled container. An official, FIU EH&S chemical waste label is to be filled out with the required information and placed on the container. The properly labeled container is to then be stored in a storage bin that has been previously labeled to indicate compatible chemical storage (i.e. "solvents", "acids", etc.). Do not store waste in a storage bin with incompatible chemicals.

Wet Benches/Fume Hoods

Appropriate PPE (Personal Protective Equipment) is to be worn when working at a wet bench or fume hood with any potentially dangerous chemical, per FIU EH&S protocol. PPE should be cleaned after use and stored in prescribed areas after use.

Chemical Spills

Small spills

Lab users are permitted to tend to chemical spills covering areas smaller than hand-sized, if they feel confident in their ability to do so. Such spills should be absorbed using the chemical spill kit pads provided at all fume hood locations. Spill pads are to be bagged and placed atop the spill area, and labeled with the contents (chemical absorbed).

The AMERI manager and staff are to be notified of the spill and location of the cleanup area. Do not proceed with your work until a thorough clean up has been performed, and the waste has been properly disposed.

Large spills

Do not attempt to clean spills that effect larger than a hand-sized area. Report the spill to the AMERI manager and staff, and isolate the area (entire room in which the spill occurred and adjacent rooms). Remain at a safe distance where you can monitor access to the area until assistance arrives.

Safety Showers

There are three safety showers in the AMERI facility; one in the West corridor, one in the East corridor, and one within the Class 10k Cleanroom, just outside of the support room, 1655C. Each shower is painted green and well marked. There is an eyewash station incorporated into each shower which is activated by either the foot pedal, or the hand paddle. The shower is activated by pulling on the hanging triangular handle. Eye flushing is to be done using the eyewash, exposure to the hands can be flushed in any of the sinks, and the safety shower is to neutralize other chemical exposures, such as to the body, neck, legs, etc. **NOTE** that pulling the triangular handle opens the shower valve to release a large amount of water which will continue to flow at a high rate until the handle is pushed back upward, closing the valve.

MSDSs

Material Safety Data Sheets are required to be submitted to AMERI staff for approval prior to introducing any chemical/compound into the the AMERI facility for the first time. In addition, a live internet link to the MSDS is to be provided for inclusion in the AMERI MSDS look-up database at the AMERI website or FOM. The MSDS is to be used for instruction on safe chemical storage, labeling, flammability, and incompatibilities, as well as for detailed information on chemical composition and handling.

Introduction of Chemicals into the Lab

No chemicals in any form are to be brought into the Nanofabrication Laboratory without submission of the MSDS to the AMERI manager for prior approval.

Gas Cylinder Handling and Use

Governance

AMERI facility users are not permitted to move and or change out gas cylinders nor manipulate their regulators and/or valves without permission from the AMERI manager or staff. Permission may be given when regular and frequent access is required, only after appropriate training and knowledge of safe gas handling procedures has been demonstrated.

Contact the AMERI manager or staff if gas cylinder, regulator, or valve manipulation is required. Compressed gas safety awareness training is required, all cylinders must be securely fixed to a stable mount so as to not fall over, as well as be turned off after each use.

Odors and Threshold Limits

While many chemical vapors and gases cannot be detected using the human sense of smell, it should be remembered that there are also many instances in which a dangerous threshold of concentration lies below the average limit of detection by smell. Therefore, while smell should not be used as a primary means of detection for, or determination of, dangerous levels of vapor/gas concentration, the detection of any unusual odor should be considered a cause for heightened awareness of one's environment. As such, the detection of an odor should prompt investigation and possible action, and never be ignored. Make those around you aware, and report all unusual odors immediately. If the odor cannot be identified in a reasonable amount of time, initiate an evacuation, and notify the AMERI manager and staff.

Disposal of Sharps / Broken Glass

Sharps, such as needles, razor blades, glass pipetts, broken alcohol thermometers, broken glass containers, etc., are to be disposed of in the box labeled for "Sharps", located in the Class 1000 Cleanroom, room 1655C. In accordance with USCG601; *Laboratory Glassware Disposal Guidelines*, broken beakers and glassware are to be thoroughly cleaned of any substances they contained prior to placement in the box labeled for "Sharps" disposal. The person responsible for the breakage/generation of sharps, is responsible for its clean up. AMERI staff will dispose of the material after it has been placed in the bagged box. Never dispose of sharps in regular trash cans.

Further Information

Additional information regarding general lab and chemical safety, chemical compatibility, handling, storage, and labeling practices can be found at the following resources:

<http://ehs.fiu.edu/Programs/Chemical-Safety/Documents/EHS-DOC600.00%20-%20Chemical%20Hygiene%20Plan.pdf>

<http://ehs.fiu.edu/Training/Pages/Lab-Safety-Training.aspx>

<http://www.nfpa.org/>

FIU Support contact information:

[305-348-xxxx]

<u>Type of Service</u>	<u>Name of Dept.</u>	<u>Telephone number</u>
Report an Emergency	Emergency Response	x5911
Public Safety	Public Safety	x5911
Safety	EH&S	x2621
Custodial/housekeeping	Work Management	x4600
Telecommunications	EIC	x3034
Computer problems	EIC	x3034
Cleanroom issues	MNRF	x1651
AMERI issues	AMERI	x1651
Lock Hardware	Key Bank	x4677
Maintenance	Maintenance	x4600
Room Access	Public Safety	x5911
Intranet problems	UTS	x2284
Facility-related	Work Management	x4600
FIU Open/Closed?	Information	x4357