

Nanotech User Facility Policies

Center for Nanotechnology

University of Washington

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This document is a reference manual covering the basic operational policies for use of the NanoTechnology User Facility (NTUF) at the University of Washington. The NTUF houses state-of-the-art instrumentation and serves multiple clients, providing qualified users with 24/7 access.

All NTUF users must understand and adhere to the following policies before using laboratory equipment.

It is impossible, however, to define a policy for every conceivable situation. Rules and policies are no substitute for common sense. Anyone who fails to act in a professional, safe, and responsible manner while in the NTUF will be banned from further use of the facility.

Users' suggestions and feedback on NTUF operation and equipment are welcome at all times. Please feel free to direct your suggestions to the laboratory manager.

1. General Procedures

1.1 Categories of Users

- **Professional Staff** - Full or part time NTUF employees
- **UW Academic Users** - University of Washington faculty, staff, postdoctoral fellows, and graduate and advanced undergraduate students working on an approved research project at NTUF
- **Other Academic Users** - Faculty, staff, postdoctoral fellows, and graduate and advanced undergraduate students from other universities or colleges or state and federal laboratories conducting an approved research project at NTUF
- **Industrial Users** - Engineers and/or scientists from non-academic facilities working in the laboratory on an hourly basis

All of the above users fall into one of two access categories:

- **Regular-hours Users** - Users working during regular business hours Monday to Friday when NTUF staff is available for assistance
- **Off-hours Users** - Users qualified to work in the NTUF at times other than regular business hours Monday to Friday (additional training and evaluation are required for users to earn off-hours status)

1.2 Access

The NTUF is only available to users affiliated with and working on research projects that have been approved by the NTUF manager. Based on successful completion of training in the use of NTUF equipment, NTUF staff will activate the user's Husky card (or "white card" issued to an external user) to grant them access to the facility. The laboratory manager will request activation of the card from the WTC to allow them access to the first floor of Fluke Hall. The activated card provides the individual authorization to enter the facility. Sharing of cards or allowing unauthorized access to the facility

is not allowed. Loaning of cards to others is a serious violation. Non-authorized persons are prohibited from accompanying, observing, or helping users at work, unless specifically approved by the laboratory manager.

New training is required for users who are inactive for more than one quarter. For those who are inactive for more than two months, warm-up sessions will be required.

We strongly encourage all NTUF users to participate in NTUF workshops in Societal and Ethical Issues (SEI) in Nanotechnology. Announcements on these and other SEI training events will be sent to all users. A link to the SEI portal of the National Nanotechnology Infrastructure Network can be found on the NTUF home page.

1.3 Hours of Operation

Normal business hours are 9 a.m. to 5:30 p.m., Monday through Friday. All regular-hours users must schedule their work during these business hours and reserve the needed equipment online. Undergraduate users must perform their work during business hours and are not eligible for off-hours access. The laboratory is open to qualified off-hours users 24 hours a day, seven days a week. Users must undergo off-hours training with the NTUF staff person responsible for the desired instruments to qualify for 24 hour access. More information on rates and hours is provided in section 2.3.

1.4 Facility Governance and Appeals

The laboratory manager is responsible for the continued operation of the facility. Use of the facility is at the sole discretion of the management. The laboratory manager and staff are responsible for maintaining and enhancing the equipment and other resources of the facility, and for ensuring that operational policies are followed. Authority and responsibility for safe operation of the laboratory flows from the director to the laboratory manager to the staff. On matters involving equipment usage or safety, all users must follow direct instructions from the staff.

Both staff and users are expected to act in a courteous and professional manner at all times. Deviations from this norm by either users or staff should be immediately reported to the laboratory manager. If at any time a user feels unfairly treated by a staff member or strongly disagrees with the rules imposed by a staff member, they should discuss the situation with the laboratory manager. The sequence of appeals is from the laboratory manager to the director.

2. Equipment Use and Availability

2.1 Registration

Potential new users should register online at: https://depts.washington.edu/ntuf/facility/new_user_app.php to indicate interest in using the NTUF. Provide all of the information requested on the three-step registration form. The laboratory manager will assess the proposed research project(s) for availability of tools and processes, as well as for project feasibility and safety, and will arrange for any required training. Upon completion of these steps, the laboratory manager or NTUF professional staff can authorize users of the NTUF for access to the facility and online instrument reservation.

Much of the equipment in the facility is delicate and direct hands-on access is restricted. While hands-on access is an important part of the educational process, rules and procedures for the use of instruments are in place to assure their continued smooth operation. Violation of these procedures or carelessness in operation can result in damage to the equipment, downtime, and considerable expense. Carelessness or damages caused by improper operation while using any of equipment may result in suspension of user privileges for either a specific instrument or the facility as a whole.

The chemical and bio safety hoods in NTUF are considered instruments. Users must be specifically trained and authorized to use the hoods and are required to attend sessions on chemical or bio safety and chemical or bio use prior to using any chemicals or biologicals in the facility. Use of any hazardous chemicals, organisms, or biological derivatives in the NTUF must be approved in advance by the laboratory manager.

2.2 Equipment Scheduling

Users can reserve available time on instruments through the NTUF website - <https://depts.washington.edu/ntuf/facility/user.php> or contact NTUF staff for instruments having no online scheduling - and must sign up for such use in advance. Failure to cancel an unneeded reservation results in inefficient utilization of resources, and the full reservation will be charged to the user. Users are strongly encouraged not to over-book popular equipment and make every effort to utilize at least 75% of the equipment time reserved. If billing records show regular or habitual under-utilization of your reservations, you will be billed for the full equipment time reserved.

Users who need assistance from a staff member have priority for system access during the normal working day (Monday – Friday, 9:00 a. m. to 5:30 p.m.). This priority does not extend into evenings or weekends. This, however, is not an excuse for indiscriminate bumping of scheduled users except in an extreme emergency situation. Please DO NOT sign up for more than TWO hours per day during regular hours, in order to leave more slots open for other users. If needed, users can extend their reservation if there is free time on the instrument after the reserved time.

Users are encouraged to schedule time with a staff member one week in advance if staff assistance is needed in the use of any instrument. It is the responsibility of users to initiate such scheduling. All scheduled users need to coordinate with the laboratory manager to avoid conflict with resources. If a user needs priority access to the tools, s/he can ask the laboratory manager, who reserves the right to change the schedule for the use of the lab and instruments as needed.

2.3 Equipment Charges

Users are charged for use of the scanning electron microscope (SEM), transmission electron microscope (TEM), atomic force microscopes (AFMs), laser scanning confocal microscope, Raman confocal microscope, optical microscope, surface plasmon resonance tool (Biacore SPR), atomic layer deposition tool (ALD), X-ray diffraction (XRD) system, ellipsometer, direct laser writer, optical and soft lithography shop, and SEM and TEM sample preparation tools including ultra-microtome, diamond saw, and gold/carbon sputtering. Equipment charges help pay for expendables and maintenance costs and are calculated on an hourly basis, except for the lithography shop which is charged by the month. Industrial and academic users are charged at different rates. External academic user fees are larger than the internal UW rate by the amount of UW overhead expenses (~15%). Industrial rates are chosen to be comparable to those charged by commercial suppliers of equivalent services where applicable. Users will be billed at the end of each month for accumulated user charges. For UW users, this will be done via budget number. External users should supply a purchase order number against which charges can be billed. Failure to pay usage charges will result in cancellation of NTUF use privileges. Users may discuss charges with the laboratory manager, if they have any questions.

For UW users only: whenever your budget number changes, please update the budget number in your web account under the “Personal Information” link so that NTUF staff can maintain current, accurate account numbers at all times and avoid unnecessary bookkeeping costs. If you wish to charge usage to multiple accounts, please inform the laboratory manager, so that special arrangements can be made.

2.4 Problems

Problems with equipment, malfunctions, breakdowns, *etc.*, should be immediately reported to the laboratory manager. Users should not try to fix or adjust anything. NTUF equipment is expensive and much of it is very delicate. Considerable damage can be done at a great cost of both money and downtime by well-meaning attempts to fix damages. There is no reason for any user to use a tool on anything, with the exception of a small screwdriver or Allen wrench for sample mounting. If users damage equipment by not consulting staff members or by disregarding the suggestions provided by the staff members, these users will be held responsible and may be charged for any needed repairs, in addition to facing possible suspension of access.

Do not call the NTUF staff at home in the evenings or on weekends about minor problems with the equipment or your process. Please contact the appropriate staff member at work the next business morning. Obviously, major problems such

as fire, smoke, or equipment alarms should be reported immediately. Emergency Contact pockets are posted on the doors to both labs. If in doubt, call the laboratory manager first.

Any emergency involving injuries, fire, chemical spills, etc., should be reported to UW Environmental Health and Safety (EH&S). The phone number for EH&S is posted in each telephone station in the laboratory.

3. Laboratory Practice

3.1 Visitors

Users are discouraged from bringing visitors for tours in the facility. A “visitor” is defined as anyone without an assigned key. The laboratory manager can schedule tours in advance for any visitor. Users should not bring visitors during training, qualifying, or warm-up sessions without special permission.

3.2. Storage

The laboratory manager will assign a limited amount of storage space to facility users. Storage space should be used for keeping samples. No chemicals of any kind may be stored in sample storage drawers. Chemicals approved by NTUF staff are only to be stored in designated, ventilated chemical cabinets. Private stocks of glassware are not to be kept in the drawers. Please use storage space wisely or it will be assigned to someone else. Do not put any material in a drawer that is not assigned to you. Be sure to label all stored items with your name and date. NTUF staff may dispose of items left in unassigned spaces, as well as items labeled as belonging to non-active graduate students and research groups. See the laboratory manager for space allocations. No additional dry boxes, desiccators, cabinets, etc., may be left in the laboratory without permission.

3.3. Phones

Phones are provided throughout the laboratory for staff and users. To place an off-campus call, first dial nine (9). Long distance calls may not be made without an access code. Facility phones are not a substitute for office phones for UW users. Users should not routinely make or receive calls in the laboratory. The facility will not routinely take messages for users.

3.4. Computers

Computers are available to staff and users for data analysis and other research activities. Users will get passwords from the laboratory manager or staff for access to some of the computers. Users are encouraged to move their data files from computer hard drives with a USB Flash Drive at the end of each session. No USBs are allowed on computers controlling the tools. Data storage in NTUF computers is temporary and may be deleted at any time.

The laboratory manager and staff will delete data files over time. Installation of any application software or resetting of default parameters is not allowed or must be approved in advance by the laboratory manager.

3.5 Hazards

All laboratory users are required to follow good lab safety practices including but not limited to proper attire, use of personal protective equipment, and good chemical hygiene. In addition, any users not following the NTUF lab safety practices in their entirety will be denied further access to the facility. When handling materials for sputtering, evaporation, SEM, or TEM studies, please wear clear vinyl gloves to minimize contamination of equipment. Purple nitrile gloves are required when using solvents and chemicals of any kind. Special safety equipment is required for individuals working with cryogenic (liquid) nitrogen. Please contact NTUF staff for specific cryo N2 training before using this resource.

4. Optical and Soft Lithography Shop

The NTUF provides a photolithography/soft lithography shop to design and build devices for use with our characterization equipment. Access to the shop is restricted to users that have completed the necessary training courses, paid the monthly fee, and are working on specifically approved research projects. Users who access the shop for EBL sample preparation, using UV ozone and oxygen plasma cleaners, and other tools must be trained and approved by NTUF staff.

4.1 Access and Scheduling

Users can reserve time for use of the entire shop through NTUF staff, or through the website, if available. To limit damage to photosensitive materials, the door must remain closed during operation under yellow light. Users entering the shop are recommended to wear UV protective glasses (and required to do so when the UV lamp is on), and lab coat.

The shop in Fluke 115E shares preparation space with other instruments. Access to the PMMA spin coater, nitrogen gun, and workspace are shared between soft lithography and EBL prep. Please be considerate of others' need for access to Fluke 115E. If you experience a conflict and are unable to resolve the issue, please contact an NTUF staff for arbitration.

4.2 Provided Materials

The NTUF stocks a limited number of materials and supplies for use within the shop. Reasonable quantities of positive and negative resists and various supplies are included in the monthly fee. Additional materials including PDMS kits, wafers, and other high value items are available for purchase at cost. Throughout the facility only NTUF staff is allowed to change compressed gas cylinders. Please let NTUF staff know if a cylinder is empty. Also, do not adjust gas regulators unless specifically trained to do so as part of your instrument training.

4.3 Hazards

The soft lithography shop is subject to additional hazards associated with UV radiation from the flood exposure system, and chemicals handled at the wet bench. White lab coats are available in the entryway of Fluke 115E. UV glasses are required for anyone in the soft lithography shop when the mask aligner is in use. It is the responsibility of the individual using the aligner to notify anyone entering the room that UV eye protection is needed. A number of the chemicals in the lab can be hazardous if they are not handled properly. All chemicals have been carefully sorted and arranged based on reactivity for safe storage. Please replace all chemicals in their proper locations when you have finished with them. Utilize the chemical fume hood when working with solvents and use labeled glassware for small aliquots. If you cannot find dedicated glassware for the reagent you are dispensing, be sure to label your reagents with name, date dispensed, and your initials. Dedicated waste containers have been pre-labeled for most reagents in the lab. Always notify staff in the event of a chemical spill.

4.4 Waste Disposal

Always use the correct vessels to dispose of chemical waste. If you have any questions about chemical handling or waste disposal, please contact a NTUF staff person; do not proceed if you have doubts about the correct handling of chemicals. Waste containers for each solvent are located under the fume hood. A list of proper disposal techniques for provided and approved materials is posted in the shop. Acetone and IPA are not to be rinsed down the sink; please capture in a beaker and transfer to the "All Solvents" bottle under the hood.

4.5 Biosafety

The cell culture area is a BSL-2 area and is restricted to users who have a biohazard assessment on file with EH&S. There are blue smocks for use in the cell culture area. Please do not wear these smocks outside of the lab area. Do not store flammable liquids in the refrigerator as this creates the potential for explosion and fire. We cannot permit yeast in the cell culture area due to the likelihood of contamination. The autoclave is for staff use only.

5. Acknowledgments

NTUF users agree to acknowledge usage of the facility in their scientific publications and to provide bibliographic references for archival papers and conference proceedings enabled by NTUF, as they appear, and upon request. A suggested acknowledgment is:

“Part of this work was conducted at the University of Washington NanoTech User Facility, a member of the NSF National Nanotechnology Infrastructure Network (NNIN).”

Occasionally NTUF staff may request input in highlighting research done at NTUF for reporting to the NSF National Nanotechnology Infrastructure Network. Users’ cooperation in response to these requests is greatly appreciated.