BU Photonics Center

8 Saint Mary's Street, 9th Floor
Boston, Massachusetts 02215
617-353-8899 / bu.edu/photonics

Boston University Photonics Center Shared Laboratory Usage Policy

Version: June 2019

Prepared By

Document Owner(s)	Project/Organization Role
Helen Fawcett	Director, Operations and Program Management
Cara Ellis McCarthy	Director, Finance, Administration and Personnel Mgmt
Thomas Bifano	Director

Version Control

Version	Date	Author	Change Description
1	10-31-06	Helen Fawcett	Document Creation
2	11-02-06	Helen Fawcett/Robert Schaejbe	Edits to original document
3	03-06-08	Helen Fawcett	Addition of Lab Policy and Procedure Posting and insertion in document
4	12-23-08	Helen Fawcett/Robert Schaejbe/ Anlee Krupp	Addition to Equipment Scheduling Policy, updated Appendix
5	03-04-09	Helen Fawcett/Robert Schaejbe/ Anlee Krupp	Clarification to Equipment Scheduling Policy
6	02-18-11	Helen Fawcett/Robert Schaejbe/ Anlee Krupp	Addition of Equipment training, modification to Equipment Scheduling Policy, and update and addition of appendices
7	11-25-14	Helen Fawcett/Robert Schaejbe/Anlee Krupp/Paul Mak/Alexey Nikiforov	Modification to Equipment Scheduling Policy and update and addition of appendices
8	11-05-16	Helen Fawcett/Anlee Krupp/Paul Mak/Alexey Nikiforov	Modification to entire document for updates on policies and procedures
9	4-19-17	Helen Fawcett/Beth Mathisen	Modification to remove the reference of IOL.

10	6-17-19	Helen Fawcett	Modifications to add Appendix F. Handling HF/BOE in OPF Lab and an update to section 4.4 Personal Productivity and Protection to include the restriction to HF/BOE use in OPF only at the Photonics Center. Updates to EHS laboratory safety training and general updating of the document.
11	1-29-20	Helen Fawcett/Thomas Bifano	Modifications to 4.4 Personal Productivity and Protection to clarify that the restriction to HF/BOE use in OPF only at the Photonics Center excludes the use of HF gas in any laboratory at the Photonics Center.

TABLE OF CONTENTS

1 INTRODUCTION

This document has been developed to explain the requirements of access and privileges to the shared laboratory facilities available at the Photonics Center. The document will describe what is expected of all members and the basic principles of practice and good workmanship standards that should be exercised at all times in the laboratory and cleanroom areas.

1.1 Mission Statement

The Boston University Photonics Center generates fundamental knowledge and develops innovative technology in the field of photonics. We work on challenging problems that are important to society, we translate enabling research discoveries into useful prototypes, and we educate future leaders in the field.

The mission is executed through:

- Basic research and scholarship in photonics.
- Academic and entrepreneurial programs and initiatives for students.
- Technology development for healthcare, defense, and security applications.
- Business innovation and commercialization of photonics technology.

The Photonics Center community of faculty, students, and staff engage in numerous interdisciplinary collaborations to further the field.

1.2 Changes in Policy

This manual supersedes all previous user policies and memos.

While every effort is made to keep the contents of this document current, Boston University Photonics Center reserves the rights to modify, suspend, or terminate any of the policies, procedures, and/or benefits described in the manual with or without prior notice to users of the facilities.

2 General Requirements for Lab Usage Agreements

2.1 Fundamental Research (on-campus and off-campus faculty and student research, education, and development of enabling technology)

The shared laboratories support the research and education of the students and faculty members. Access to the shared facilities is open to all academic members of the Boston University community. Access is also open to incubator companies who have an association with Boston University's research and entrepreneurship programs.

Outside not for profit organizations and universities are also eligible for access to use the shared laboratories and will be charged at for use of equipment and supplies as stated in the rate schedule agreements that are included with the Standard Laboratory Usage Agreement provided to external users through the Office of General Counsel.

2.2 Incubator Companies

The shared laboratories support the commercialization effort of incubator companies who have an association with Boston University's research and entrepreneurship programs.

Incubator companies housed at the University are required to sign the Standard Laboratory Usage Agreement to have access to and use the shared laboratories. Usage will be charged at internal rates. Once an incubator company leaves the University, they are still eligible to maintain rights of usage to the shared facilities by renewing their Standard Laboratory Usage Agreement, but will be charged external rates.

2.3 Outside Commercial Entities

If an outside company shows an interest in using the shared facilities, it must be clear that their use is research related. No production of manufactured products for sale is allowed using any University equipment or in any University facilities. *Outside companies must have a linkage to a faculty member and a letter of support for such a company must originate from a faculty member for submittal to the Director of the Center. The Director will determine if there is a benefit to allowing the company use of the facilities and what connection or contribution to faculty research can be made.* Outside commercial entities that use the shared laboratories must sign the required Standard Laboratory Usage Agreement and will be charged at the rates included with that agreement.

2.4 Research Grants with Outside Commercial Entities

If an outside company shows an interest in research collaboration with a faculty member at the Center, the outside company should submit a grant proposal to the

Office of Sponsored Programs. For clarity, production of a manufactured product for sale is NOT allowed on any university equipment or in any university facilities or by any university employees (including supported graduate students). If the grant is approved, the student being supported will have access to all shared facilities as in 2.1 Fundamental Research.

3 Use Policies for Shared Facilities

3.1 Safety

The safety and health of users is a priority. The Boston University Environmental Health and Safety Office (EHS) make every effort to comply with all federal and state workplace safety requirements. The shared laboratory workplace safety rules and regulations are as follows:

- Adhere to the standard EHS protocols at all times
- Follow all manufacturer suggested safety protocols for equipment or chemicals
- Ensure user is fully informed and understands the safety requirements for their process
- Complete general laboratory safety training annually and prior to requesting training in shared facilities. The Office of Environmental Health and Safety offers some in person training, but it is encouraged that all BU affiliated users take their safety training online via BioRAFT (https://bu.bioraft.com/)
- Participate in laboratory specific specialized safety trainings if applicable
- If you will be using a chemical fume hood in any of the shared laboratories, you must take an additional online training for hood usage protocols.
- If you are using Hydrofluoric Acid (HF) or Buffered Oxide Etch (BOE), you must review and follow the protocols in Section 5: Appendix F.

Each user is expected to obey safety rules and exercise caution and common sense in all work activities. Failure to do so will result in revoking access to the facilities. Section 5: Appendix A includes a one-page summary of safety information and contact numbers for reference. If a user finds a work area in an unsafe condition, they should immediately stop work and report the findings to the laboratory manager. If the area is in an unsafe condition, users should not attempt to use that work area or clean the area without the express permission of the laboratory manager.

3.2 Building Security

All users must follow the building security rules and regulations listed here:

- Follow the regulations per Boston University EHS Office
- The lab manager must grant access to the shared laboratories through the electronic card key access. Failure to be authorized by the lab manager and gaining entrance via other means may result in revoking privileges in the facility. Providing users with access to the laboratory who are not authorized may also result in revoking privileges to the facility.

Users are not allowed on Boston University property after standard working hours (Monday through Friday 8 am to 6 pm) without prior authorization from their supervisor and lab manager if shared facilities are to be used.

3.3 Personal Property

Any items that belong specifically to the user or the laboratory with which the user is associated must clearly be labeled with the name of the users' association or affiliation. If items are not properly labeled, it is NOT the responsibility of the lab manager to ensure that they are returned or not used by other users.

An example of labeling personal property would be
Sally Sells – Professor Starfish USE ONLY

Any materials or items that are labeled for shared laboratory use are assumed to be general use items and should be handled as such. Those items should be cleaned and stored after usage for the next shared lab user.

If property is deemed abandoned, the abandoned items will be removed and disposed of at the discretion of the laboratory manager.

3.4 Chemical Labeling

Per the safety regulations set forth by BU EHS, the user must label all chemicals and their associated waste properly. English must be used when labeling chemicals, notes and waste containers. Chemical information should use the chemical name, not the chemical formula. Users should alert and request permission from lab managers before bringing any chemicals or materials into the shared laboratory facilities that are not common stock items for compatibility and suitability for use in the labs/equipment. Failure to alert the lab manager with ample time for investigation will result in a failure to comply warning, unless that user has previous warnings and this escalates to a safety violation, at which point access to the shared laboratories will be suspended immediately (see 3.6). All chemicals that are used in the laboratories must be labeled with the name of the user, the PI of the group, an identification of the chemical(s) and a contact phone number for that user. If the user is leaving chemicals on a hood bench top to cool or for a process, this should also be indicated. Leaving a process or chemical also requires notification of when the process started and when the researcher expects to return to clear the materials. In the note of notification, the name of the researcher, the research group, a phone number and the chemical composition is expected to be included. This communication can be written on a cleanroom tech wipe and placed under the beaker or container.

Examples of proper chemical labeling/communication:
Sally Sells – Professor Starfish's group 617-353-3000. Acetone soaking bath started at 11/02/2016 2 pm. Will return at 2:30 pm.

Barnacle Bob will return at 4:30 pm to put the waste in the waste container. If there are questions, Professor Starfish can be reached at 617-353-2000. This beaker contains a mixture of piranha etch (3:1 mix of Sulfuric Acid + Hydrogen Peroxide)

Failure to comply will result in a warning and other protocols from section 3.6.

3.5 Visitors in the Workplace

For safety, insurance, and other business considerations, only authorized visitors are allowed in the workplace. When planning for visitors, users should notify the laboratory manager and confirm that the visitors might enter the facility and understand the restrictions placed upon the visitor. Visitors who are not authorized shared users of the laboratory are not allowed to be left alone or operate any of the shared laboratory equipment.

3.6 Failure to Comply with Policy

Failure to comply with listed regulations will result in a warning (verbal or written); a second offense will result in suspension of access to the laboratory for one week; a third offense will result in suspension of access for one month and until lab safety training and shared lab training requirements have been completed. If a user finds any infringement on safety or misuse of tools, they should report the violation to the lab manager. If the lab manager is unavailable, the user should report the incident to the main office of the Photonics Center.

NOTE: In case of a spill or emergency, if the BU EHS protocol is not properly followed, membership to all of the shared labs will be suspended until Laboratory Safety is completed as well as re- training for the lab in which the incident occurred. The BU EHS protocol is identified in the laboratory and the flip chart that can be found in each lab and is covered at annual laboratory safety training.

4 STANDARDS OF CONDUCT

4.1 Work Schedule

All users of the shared facilities are required to work during regular University hours and schedules unless given permission to do otherwise by both their immediate supervisor and the laboratory manager.

NOTE: Supervision is required at all times for undergraduate students when using shared facility equipment.

4.2 Equipment Training and Access to Shared Laboratories

If you are interested in getting trained to use specific equipment in the shared laboratories: Optoelectronic Processing Facility (OPF), Precision Measurement Laboratory (PML) and the FIB/TEM Facilities (FTF) of the Boston University Photonics Center, please use the following procedure:

4.2.a Provide proof that you have taken BU General Lab Safety Training and that the training is up to date. The BU Office of Environmental Health and Safety offers

some in person training. It is encouraged that all BU affiliated users take their safety training online via BioRAFT (https://bu.bioraft.com/)

4.2.b Laboratory safety training needs to be updated every 12 months.

4.2.c Contact the individual lab manager to arrange an initial consultation:

Shared Lab	Lab Manager	Email	Phone
OPF	Paul Mak	pmak@bu.edu	617-353-8869
PML	Anlee Krupp	ahk@bu.edu	617-353-9044
FTF/PML (CARY 5000 &FTIR)	Alexey Nikiforov	alnik@bu.edu	617-353-9045

4.2.d Once the lab manager is contacted, either an initial consultation will be arranged or the user will be asked to fill out a research goal form describing the intended application and providing information on:

- the nature and goal(s) of your research
- the process you use or intend to use to prepare your samples
- what you expect to gain from using the specific instrument
- the duration of your research/use of the instrument and how often you expect to use it
- faculty and/or company affiliation

4.2.e After initial consultation or research goal form submitted, training by the lab manager, a qualified user of the instrument, or video training will be provided.

4.2.f During training, a qualified user must be with you, by the instrument, at all times while you are learning to operate it. You are not permitted to use the instrument alone before being officially qualified.

4.2.g After the training, you must demonstrate to the lab manager that you can operate the instrument independently by passing a self-user qualifier, if applicable. You will then become a qualified user of the instrument and room access will be granted to you through the on-line Zaius Room Access System.

NOTE: For instrument specific training policies and procedures, please see Section 5: Appendices B-E.

4.3 Equipment Scheduling

All equipment for use in the shared laboratories is available for on-line scheduling. It should be noted that only self-users are allowed to access these calendars with permissions granted from the lab managers. All equipment must be reserved online using the Google calendar. If the reserved user does not make their reserved time within 30 minutes of the scheduled time, that piece of equipment becomes available to other users.

4.3.a All self-users are required to request their gmail account access to the shared laboratory of interest for equipment scheduling.

4.3.b Be sure to use the Equipment Scheduling Procedure (found at http://www.bu.edu/photonics/sharedfacilities) as a reference on how to sign up for equipment time and how to identify the equipment you are reserving including your identity and how to get in touch with you (the user email and phone number).

4.3.c Advanced scheduling is allowed up to 14 days before your appointment. Appointments made more than 14 days in advance WILL BE DELETED from the calendar. The laboratory manager must approve exceptions to this policy.

4.3.d On heavily utilized equipment, there is an established two hours maximum usage during 8 AM – 8 PM (M-F) with a maximum of six hours during the workweek (M-F), unless authorized by the laboratory manager of that shared lab. The Google calendar has this information posted on the equipment sign out. Please ensure you are selecting the appropriate length of time for that piece of equipment.

4.3.e If you cancel a scheduled appointment, remove your reservation from the Google calendar at least two hours prior to your scheduled appointment.

4.3.f It is considered a violation of the laboratory scheduling policy if any of the above is not followed. The consequences are outlined in the one-page Policy and Procedures for the shared laboratories (see Section 5: Appendix A for details – this is also posted in the laboratories)

- First violation – verbal or written warning.
- Second violation – loss of room access for one week.
- Third violation – loss of room access for one month and up to date lab safety training & equipment/shared laboratory re-training is required.

4.4 Personal Productivity and Protection

As a common rule, users of the laboratories should never work alone. There must be at least one other person in the laboratory beside you at all times in OPF. For PML and FTF, as a general rule someone else in your group should know that you are in the laboratory working on measurements.

Safety glasses and gloves are provided in all of the shared laboratories. Be familiar with the chemicals and materials that other users are using and be sure to follow the recommended guidelines set by BU EHS, the shared laboratories, and OSHA guidelines. Approved safety glasses must be worn at all times in the OPF lab, except during microscope viewing. For PML and FTF, safety glasses should be worn while using solvents and when completing any scribing/cleaving, sample preparation, and hood work.

In the BU Photonics Center Building, 8 Saint Mary's Street, liquid Hydrofluoric Acid (HF) and Buffered Oxide Etch (BOE) are limited to being used in the Optoelectronic

Processing Facility (OPF) only. Use of these chemicals is limited to OPF because appropriate PPE and Calcium Gluconate Gel are kept up to date and inspected on a regular basis. There should never be any pouring into transportable secondary containers to remove HF or BOE from OPF to any individual laboratory. See Section 5: Appendix F. Handling HF/BOE in OPF Lab, where it outlines all of the safety requirements and additional training for using these chemicals in OPF at the Photonics Center. In addition to required training for OPF, BU's EHS has further training for using HF and can be found here: https://www.bu.edu/researchsupport/compliance/laboratory-safety/high-hazard-chemical-program-2/hydrofluoric-acid-sop-lsc-template/.

NOTE: HF gas is prohibited in any laboratory at the Photonics Center.

4.5 Suggestions for Improvement

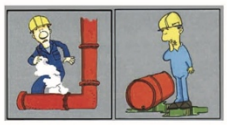
It is encouraged to add suggestions to the logbook or to communicate suggested improvements directly to the laboratory manager via email. The shared laboratories provide an environment conducive to enhancing educational and research areas of interest through continuous improvement.

5 Appendices

APPENDIX A – Posted Policy and Procedures one-page summary

BU Photonics Center **Shared Laboratory Facility** Policy & Procedures

Safety is our first line of defense... In case of **EMERGENCY**, contact the following offices:



Gas Leak/Chemical Spill:
24-hour EHS Emergency:
617-353-2105 (3-2105)

Fire/Life-threatening Medical Situation:
24-hour BU Police Emergency:
617-323-2121 (3-2121)

Minor Injury/Chemical Exposure:
Research Occupational Health
Program Office: **617-414-7647**

In addition to EMERGENCY calls, contact the appropriate lab manager:
Paul Mak - Lab Manager, OPF: **617-353-8869 (3-8869)**
Anlee Krupp - Lab Manager, PML: **617-353-9044 (3-9044)**
Alexey Nikiforov - Lab Manager, FTF: **617-353-9045 (3-9045)**

All EMERGENCY calls must be followed up with a call to BU Photonics Center Offices:
617-353-8899 (3-8899)

** For other emergencies, consult EHS safety and emergency instruction flip chart for the appropriate action and contact information.*

Policy & Procedures:

-Never work alone. There must be at least one other person besides you in the laboratory at all times in OPF. For FTF and PML, as a general rule, someone else in your group should know that you are in the laboratory.

-Approved safety glasses must be worn at all time in the OPF lab, except during microscope viewing. For FTF and PML, safety glasses should be worn while using solvents and when completing any scribing/cleaving and hood work.

-Equipment scheduling:

a) All equipment must be reserved online using the Google calendar and your own Google account.

b) If the reserved user does not make their reserved time within 30 minutes of their scheduled time, that piece of equipment becomes available to other users.

-Policy & Procedures are intended to create a safe and orderly work environment for everyone and will be strictly enforced. Repeat violations may result in the loss of room access, as follows:

a) First violation: Verbal or written warning.

b) Second violation: Loss of room access for one week.

c) Third violation: Loss of room access for one month;
up-to-date lab safety training & equipment re-training required.

NOTE: In case of spill or emergency, if EHS protocol is NOT properly followed, membership to all of the shared labs will be suspended until Laboratory Safety training is completed, as well as re-training for the lab in which the incident occured.

APPENDIX B – Zeiss Ebeam Writing Training Policy*

All users interested in training for e-beam writing must complete steps 1 - 8. Please contact the lab manager, Anlee Krupp (ahk@bu.edu, 617-353-9044) for initial consultation.

1. Your General Laboratory Safety Training must be up to date and renewed annually. The BU Office of Environmental Health and Safety offers some in person training. It is encouraged that all BU affiliated users take their safety training online via BioRAFT (https://bu.bioraft.com/)
2. Upon initial contact with the lab manager, level of training will be determined based on the following criteria:
    a. If you are a certified self-user of Zeiss imaging, proceed to step 3
    b. If you are not a certified self-user but have experience using SEM at another location, you will need to learn the operating procedures for using Zeiss imaging in order to become a certified self-user prior to e-beam training.
    c. If you have not used a SEM previously, you must complete full training for the Zeiss imaging prior to training on the e-beam system.
3. Once you are a certified self-user of the Zeiss imaging, and have had 10 hours of active usage on the instrument, you can begin e-beam writing training.
4. After completion of the video, contact the lab manager to arrange for training on the e-beam writing tool.
5. During the training period, a **certified self-user of the Zeiss Supra 40 or Zeiss Supra 55 for e- beam writing must be present at all times.** You are not permitted to use the instrument alone before official certification. Each time you are using the Zeiss Supra 40 or Zeiss Supra 55 for e-beam writing you must place the EBL in-use sign on the desktop to indicate the system is in use at that time.
6. After training, you must demonstrate confident and independent operation of the e-beam system to the lab staff. The lab manager will then certify the user (as an EBL self-user) or recommend more training.
7. Once certified as a self-user of e-beam writing, you will be allowed to schedule using the Google calendar for e-beam writing during M-F 8AM-8P.
8. Once you have accumulated a minimum of 10 hours of writing experience, and have shown improvement in e-beam writing to staff, you could have the privilege of using the Zeiss instruments for EBL 24 hours a day, 7 days a week.

* NOTE: It is expected that all users requesting training on the e-beam system have experience in creating design files for writing. This will not be covered as a part of the e-beam writing training.

APPENDIX C – Scheduling Policy for Zeiss Imaging and E-Beam Lithography (EBL) Posted in PML

The following is the policy for scheduling the Zeiss instruments to perform imaging and/or EBL within the Google Calendar.

1. Only a qualified self-user can make reservation using Google Calendar
2. Advanced scheduling is allowed up to 14 days before your appointment. Appointments made more than 14 days in advance WILL BE DELETED from the calendar. The laboratory manager must approve exceptions to this policy
3. No repetitive reservations (i.e. Every Monday, 1 p.m. to 3 p.m.) unless your laboratory group has approved scheduling per the laboratory manager. Staff members are exempt from this requirement.
4. During 8 a.m. and 8 p.m. Monday through Friday, the maximum appointment time allowed per day per user is 2 hours, with a max of 6 hours/week/user.
5. There is a color code on the PML Google Calendar: green for scheduling both Zeiss 40 Imaging and EBL and blue for scheduling the Zeiss Supra 55 Imaging and EBL. Users need to specify if the Zeiss Supra 40/55 will be used for Imaging or EBL.
6. When scheduling, users need to provide either a valid phone number and/or an e-mail address where the user can be reached.

   For example:
   Zeiss 40_Imaging_John Doe, jdoe@bu.edu Zeiss 40_EBL_Jane Doe, 617-353-8899
   Zeiss 55_Imaging_John Doe, jdoe@bu.edu Zeiss 55_EDS_Jane Doe, 617-353-8899
   Zeiss 55_EBL_Sally Sells, sally@bu.edu
7. Hours of operation: Both Zeiss instruments are open for use 24/7, with exception of EBL use. New EBL users can only use prime time (Monday-Friday 8AM-8PM) for EBL purposes. Once 10 hours of EBL experience is fulfilled, the user could have the privilege of using both Zeiss instruments for EBL on 24/7 basis**. If you cancel a scheduled appointment, please remove your reservation from the Google calendar at least two hours prior to reserved time.**
8. Users will be considered a “no-show” 30 minutes after their scheduled start time, and the timeslot will become available for other users. **Failure to use the tools at reserved times (“no- show”) is considered a violation of the Shared Laboratory Usage Policy.**
9. Each user is to sign in to the logbook after each usage. The “EBL in use” sign should be placed on the table next to the Zeiss during the appointment. The Zeiss instrument is closely monitored by surveillance camera. The sign provides recognition of usage.

NOTE: Scheduling by non-qualified user or improper format will be deleted without notice from the Google Calendar

Violations of this and/or the Shared Laboratory Usage Policy are subject to:
First violation – verbal or written warning.
Second violation – loss of room access for one week.
Third violation – loss of room access for one month and up to date lab safety training & equipment re-training are required.

APPENDIX D – FEI Focused Ion Beam (FIB) Training Policy*

All users interested in training on the FIB system must complete steps 1 – 7. Please contact the lab manager, Alexey Nikiforov (alnik@bu.edu, 617-353-9045) for initial consultation. **Potential FIB users need to provide a concise and clear description of the intended FIB application.**

Note: Self-user status on SEM or a prior SEM experience is a prerequisite to initiating FIB training.

1. Your General Laboratory Safety Training must be up to date and renewed annually. The BU Office of Environmental Health and Safety offers some in person training. It is encouraged that all BU affiliated users take their safety training online via BioRAFT (https://bu.bioraft.com/)

2. Upon initial contact with the lab manager, level of training will be determined based on the following criteria:
   a. If you are a certified self-user of Zeiss imaging, proceed to step 3
   b. If you are not a certified self-user but have experience using SEM at another location, you will need to discuss with the laboratory manager to become a certified self-user prior to FIB training.
   c. If you have not used a SEM previously, you must complete full training for the Zeiss imaging prior to use of the FIB system.

3. Once you are a certified self-user of the Zeiss imaging, you can view the initial FIB introduction video for the FIB system available at the following web address that requires Kerberos log in: www.bu.edu/photonics/sharedfacilities/fibtem-facility-ftf/.

4. After completion of the video, contact the lab manager to arrange for training on the FIB.

5. During the training period, a **certified self-user of the FEI FIB must be present at all times.** You are not permitted to use the instrument alone before official certification.

6. After training, you must demonstrate a confident and independent operation of the FIB system to the lab staff using a user's sample. The lab manager will then certify the user (as a FIB self-user) or recommend more training, especially for advanced techniques. Depending on the demonstrated proficiency with FIB, a user may be granted Limited Hours Access to FIB. Description of user samples and, if applicable, their preparation protocol needs to be provided.

7. Once certified as a self-user of FIB, you will be allowed to schedule using the Google calendar for FIB usage.

NEW SAMPLE TYPES/SAMPLE PREPARATION PROTOCOL CHANGES: If the user's FIB samples and/or their sample preparation protocol change, the user should notify the laboratory manager prior to using new samples in the FIB system.

APPENDIX E – FEI Transmission Electron Microscope (TEM) training policy

All users interested in training for TEM use must complete steps 1 - 7. Please contact the lab manager, Alexey Nikiforov (alnik@bu.edu, 617-353-9045) for initial consultation.

Note: Potential TEM users need to provide a clear and concise description of the intended TEM application.

1. Your General Laboratory Safety Training must be up to date and renewed annually. The BU Office of Environmental Health and Safety offers some in person training. It is encouraged that all BU affiliated users take their safety training online via BioRAFT (https://bu.bioraft.com/)
2. Upon initial contact with the lab manager, level of training will be determined based on the following criteria:
    a. If you have experience using a TEM at another location, you will need to learn the operating procedures for using FEI TEM in order to become a certified self-user.
    b. If you have not used a TEM previously, you must complete full training for the FEI TEM.
3. You can view the initial FEI TEM introduction video available at the following web address that requires a password that the lab manager will provide in order for you to log in: www.bu.edu/photonics/sharedfacilities/fibtem- facility-ftf/.
4. After completion of the video, contact the lab manager to arrange for training on the TEM.
5. During the training period, a **certified self-user of the FEI TEM must be present at all times.** You are not permitted to use the instrument alone before official certification.
6. After training, you must demonstrate confident and independent operation of the TEM system to the lab staff using either a user prepared TEM sample (preferred) or a standard TEM gold on carbon sample. The lab manager will then certify the user (as a TEM self-user) or recommend more training, especially for advanced techniques. Depending on the demonstrated proficiency the user may be granted a Limited Hours Access to TEM. Description of user samples and, if applicable, their preparation protocol needs to be provided.
7. Once certified as a self-user of TEM, you will be allowed to schedule using the Google calendar for TEM usage.

NEW SAMPLE TYPES/SAMPLE PREPARATION PROTOCOL CHANGES: If the user's TEM samples and/or their sample preparation protocol changes, the user should notify the laboratory manager prior to using new samples in TEM.

APPENDIX F – Handling HF/BOE in OPF Lab

All users interested in using Hydrofluoric Acid (HF) or Buffered Oxide Etch (BOE) must complete steps 1 - 7. Please contact the lab manager, Paul Mak (pmak@bu.edu, (617) 353-8869 for initial consultation and discussion for your research application and usage of these chemicals.

1. Your General Laboratory Safety Training must be up to date and renewed annually. The BU Office of Environmental Health and Safety offers some in person training. It is encouraged that all BU affiliated users take their safety training online via BioRAFT (https://bu.bioraft.com/)

2. Upon initial contact with the lab manager, the level of training will be determined based on the following criteria:
    a. If you have experience using HF/BOE at another location, you will need to learn the operating procedures for using OPF in order to become a certified self-user.
    b. If you have not used a HF/BOE previously, it may be recommended that a more senior member of the laboratory with HF/BOE experience shadow you for a few times using the chemicals to ensure proper handling and understanding of using these chemicals.

3. You must complete the OPF Laboratory Hood Safety Training video (http://www.bu.edu/photonics/opf-hoodsafety-training-video/) and corresponding quiz. This link is password protected, you must contact the laboratory manager to receive the password to watch the video and submit the quiz upon completion.

4. After completion of the video, contact the lab manager to arrange for a final review of processing.

5. During the initial training period, a **certified self-user of the laboratory with HF/BOE experience must be present at all times.** You are not permitted to use HF/BOE alone before official certification.

6. After training, you must demonstrate confident and independent handling of the chemicals. The lab manager will then certify the user (as an OPF self-user) or recommend more training. Depending on the demonstrated proficiency the user may be granted a Limited Hours Access to OPF. Description of user samples and, if applicable, the preparation protocol needs to be provided.

7. Once certified as a self-user of OPF, you will be allowed to schedule using the Google calendar for hood usage, but with HF/BOE you must always have a partner in OPF and are not to work alone with these chemicals.

NEW SAMPLE TYPES/SAMPLE PREPARATION PROTOCOL CHANGES: If the user's samples and/or their protocol changes, the user should notify the laboratory manager prior to using the process or samples.