Lab Policies of the George J. Kostas Nanoscale Technology and Manufacturing Research Center Lab

1. Swiping In and Out:
All students must swipe in and out using the Diebold swiper located to the left of the bouffant caps.

2. Improper Use of Instruments:
You are expected to follow the instructions that are provided for using each instrument. Due care and attention is emphasized. When you are trained please take notes so that you will remember the steps in case you do not access the instrument for a while. In case of instrument failure during your usage you should bring it to the center staff's attention immediately. If you do not let us know and the center staff finds that you intentionally withheld the information from them, then you will be barred from accessing the lab. In no situation should you try to troubleshoot it unless you are specifically authorized to do so.

3. Instrument Access:
Instruments should be accessed only after you have booked them online. The lab fees generate funds for Kostas facility maintenance. More usage of instruments will result in lower lab fees for everyone. Using an instrument without booking or using an instrument for more hours than what you have booked for is prohibited. If found you would be barred from access to the facility. Cancellation of booking can be done up to 24 hours in advance through the website. However if you are unable to keep your scheduled appointment on an instrument and want to cancel it within the 24-hour window please send an email to the center staff. In the event the center staff cancels your booking for any other reason than that stated here you would not be charged for the booking.

4. Allowing Others to Access the Lab Without Authorization:
We forbid you from allowing unknown users to access the lab. We understand that visitors of your lab might want to see how the devices are made. If you want to take them into the lab please notify the center staff a week in advance.

5. Dress Code:
No open toed shoes are allowed in the lab. No shorts and skirts should be worn. The following gowning procedure is strictly enforced for entering all clean rooms except the metrology bay.

GOWNING PROCEEDURE:
1. Put on a pair of **blue shoe** covers. These will help your shoes slide into the coveralls more easily.
2. Pick out a coverall from the hangers. If a coverall is not available in the hangers then look for it in the bin of your size. Remove the coverall from the package and throw away the plastic bag in proper waste receptacle.

3. Put on the coverall. Try not to let the garment touch the floor.
4. Put on a bouffant cap and a face mask.
5. Pick out a hood from the hangers. If a hood is not available in the hangers then look for one in the bin of your size. Remove it from the package and throw away the plastic bag in the proper waste receptacle. Put on the hood.
6. Pick out boot knee-highs from the bin in your size. Remove them from the package and throw away the plastic bag in the proper waste receptacle. Put on the boots.
7. Put on latex gloves.
8. Safety Glasses: Put on safety glasses. Eye protection should be worn at all times while you are in the clean room.
9. Acid Garments: All garments needed for chemical etching are provided by the Kostas center. Please sign up for training for the proper procedure for using these garments.

6. Safety:

We request that you be careful when handling chemicals. You should strictly follow this procedure in case of a safety issue. Safety issues can cause a chemical spill, fire alarm, fire in the lab, etc. Your safety is our concern. Pay attention during your first walk through the lab. For after-hours access to the lab we advise that you follow a buddy system. Please pay attention to your surroundings at all times. We also advise against playing loud music from speakers or headphones while accessing the clean rooms since this will prevent you from hearing any emergency messages coming through the audio system.

6.1 In case of chemical spill:

You should wash yourself if the chemical has spilled on you. The procedure will be explained to you during the walkthrough. There are 2 safety showers that are easily accessible in the lab. One is located at the beginning of the Thin Films Bay. The other one is located in the chase at the end of the Wet Etch Bay. In case of emergency there is another safety shower that is accessible to the clean room. It is located outside the class 10 area past the two glove boxes on the left in the corner. Once you clean yourself call the center's staff to notify them of the spill.

6.2 In case of fire:

In case of fire in the lab use the fire extinguishers in the lab to put it out. There are 5 fire extinguishers in the lab. 2 are inside the lab and 3 are in the chases. Please locate and note the locations of these extinguishers. If the fire is uncontrollable and the fire alarm comes ON please evacuate the lab in an orderly manner following the exit signs. Emergency exits are located at the end of each bay. The doors at the end of the bays will lead you to the chases where the exits are located. Please familiarize yourself with these exits. The fire alarms are the red boxes with white lights that say FIRE on the sides of the lights. These alarms/lights are located in each bay and chases that are attached to the bays. Please familiarize yourself with these alarms, as there are many other types of alarms in the lab. If the fire is due to your process

that is being carried out in the lab please call the center's staff immediately after it is extinguished.

7. Chemical Labeling:

You should be present in the lab whenever you use chemicals during a process. In case of extended usage you should label the chemicals and should provide contact info where you can be reached. Leaving out chemicals without labeling is forbidden. Even with labeling, long-term storage (>1 week) of used chemicals on the wet benches is also forbidden.

8. Beaker Cleaning and Cross Contamination Color Codes for Beakers:

Please pay attention to the labels on glass containers, beakers, and petri dishes; they are there for good reason. We strictly enforce the color codes to avoid cross contamination during various processes so that users can achieve best results. You alone are responsible for cleaning and returning all beakers to the areas they belong. All beakers are labeled with a color code. (i) **Green labels** are for the furnace area ONLY (ii) **Blue labels** are for Acid etching ONLY (iii) **Yellow labels** are for lift off ONLY (iv) **Red labels** are for developer ONLY.

9. Chemical Storage and Empty Containers:

Acids, Solvents, and Bases are each kept in a separate cabinet and should be returned back to this same cabinet when you are finished using them. If you are unsure of what group your chemical falls under you should find this out before using this chemical in the lab.

When you have emptied any bottle of its contents you are responsible for rinsing that bottle and labeling it as 3X rinsed with your initials. You can follow either on the following methods for rinsing. (i) Fill bottle with DI water then dump the water down the drain 3 times. (ii) Place the bottle to be rinsed under the DI water and run the water into the bottle for 5 min (timers are available). Once either of these methods have been accomplished then using a sharpie you will write 3X and your initials on the side of the bottle to identify that it has been properly rinsed and return it to the collection bay area location in the back chase.

10. Waste Removal:

If you fail to adhere to the proper procedure for disposal of chemicals it would be counted as strike against you. EPA regularly monitors and strictly enforces chemical disposition. We implement rules in our lab so we strictly adhere to EPA regulations. If there are findings that we violate the EPA rules, we are liable for fines that can run to hundreds of thousands of dollars. Chemicals are classified into Acids, Bases, and Solvents. If you don't know the classification, then please contact one of the lab staff. Acid and Base waste is **always** put down the drain. They are neutralized by the wastewater treatment system on the first floor. Solvents are always collected in a **clearly labeled** waste container. These containers are present in trays beneath the wet etch bays. If you don't find one please follow the procedure for cresting a new one.

Labels and Procedure for Waste Removal:

- Use triple rinsed bottles that are labeled as triple rinsed only.
- Take a HAZARDOUS WASTE label off the windowsill in the chase above the waste disposal bin.
- Fill in the following in the label
    1. Investigator
    2. Phone#
    3. Building
    4. Container Size
    5. Principal Constituents (with the % and **FULL CHEMICAL NAME**)
    6. Check the Hazardous Waste Classification that pertains to the chemical being disposed of.
- Once the label is finished put it on the waste container and place it under the hood in the bin provided.
- When the waste container is full, fill in the date and place it in the blue bin labeled "Hazardous Waste Satellite".
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11. Disposal of All Sharp Objects:

There are yellow and red waste containers set up in each bay for the purpose of collecting all small sharp object. These include razors, syringes, and broken wafers. For broken glasses there is a large cardboard waste container located in the chase by the hazardous waste collection station. This is to be used for all glass that needs to be disposed of. This means all broken and unbroken glass should be put in this container for disposal.

12. MSDS Book and Procedures:

The MSDS book is located at the beginning of the chase in the wet etch bay. If you do not find an MSDS for the chemical you are using the web site to locate one is http://www.ehs.neu.edu/laboratory_safety/material_safety/ If we are not currently using a chemical you would like to bring into the lab you will need to submit this chemical for approval by sending the MSDS to the proper PI for the area you are bringing the chemical into.

I (students name) _____ state that I have read and understand all of the items listed on this document. I also understand that I am responsible for my own materials and waste that I bring into and use in the clean room. It is not anyone else's responsibility to clean up after me but myself.

Signature _____ Date _____