



Principal Investigator:

Joseph Lai (R-G05, x8965)

Secondary Contacts:

Mike Walter (A-105, x8951)

Emergency Information:

Staff Member: 202-370-7738 (cell)

BBR (Gary Bors): 202-510-8577

BBR (Quintin Miller): 202-590-6188

All other emergencies: 911

Purpose:

This area is designed for the operation of the microwave plasma chemical vapor deposition diamond growth systems and ion sputtering.

All laboratories and facilities on the Broad Branch Rd. campus are controlled areas. Specific training must be completed and documented before working in this laboratory / facility.

Specific Hazards:

- Compressed gases in cylinders are present in this lab. These are located at the south end of the space. Relocation or changing of cylinders is prohibited unless specified by the PI and proper gas cylinder training has been performed.
- Combustible gases such as hydrogen and methane are present. The methane cylinders are stored in a ventilated gas cabinet, and the hydrogen generator is vented through the same exhaust system. The exhaust/fume hood should always be checked for proper ventilation before any work is done inside the lab. Contact the staff or a BBR engineer if something is not working properly.
- Carbon Dioxide gas is used in this space. Regular leak checks must be done.
- The microwave power supplies generate very high voltages (up to 10kV DC). Under no circumstance should a user repair or modify the equipment.
- CVD systems use very high microwave power. Each system has a possibility of radiation leakage. Leak check with a microwave leak detector is recommended before starting each experiment. Users should never operate the system if there is more than 2.5 mW/cm² present (OSHA standard 29-CFR-1910). Contact the staff for help.
- Ultra-violet light is emitted from the viewports on each of the CVD systems during operation. Exposure to skin or eyes should not exceed 1 mW/cm² periods greater than ~16 minutes. UV protection goggles or filters are required when viewing inside the chambers.
- Lots of chilled water flows through the lab space to cool all the equipment. Sometimes leaks can occur and care must be taken given that there is an abundance of electricity. If left unchecked, flooding and overheating of the equipment may occur. Therefore, all leaks must be reported and fixed before any experiments are run.
- The sputtering process produces bright light. Care should be taken not to directly observe without eye protection.

Rules of Operation:

- All potential users in this space must be trained by the PI or a qualified staff member.
- Training should include supervised operation for the first few experiments (improper settings in the software can cause damage to the equipment.)



- Users should have an experimental plan that is reviewed by the PI before operating the equipment.
- Use of personal protective equipment (PPE) is required during operation and cleaning of the chambers such as UV-protective eyewear and gloves for cleaning inside the chamber.
- Chilled water, ventilation, and the CVD systems should be checked for leaks and operating properly.
- When in doubt, stop and contact the PI or a qualified staff member
- Safety is the responsibility of every user that is working in this lab space.
- SDS and this safety plan will be located at the entrance of the lab.
- After hours usage of the lab is permitted only by prior approval from the PI
- Report all accidents/incidents as soon as possible to the PI or to a safety committee member.

Compressed Gases

- Compressed gasses have an inherent pressure hazard and can create hazardous conditions.
- All cylinders must be secured using wall straps, stands, or carts designed for this purpose.
- Regularly check connections and hoses for leaks.
- Notify PI or the safety committee of damaged or defective cylinders and regulators.
- Changing or transportation of cylinders in this lab should not be performed by users.

Emergencies:

In case of fire:

- Sound the fire alarm
- If trained to fight an incipient fire, use the appropriate fire extinguisher (likely located in the hallway). Make sure to keep your back to an unblocked exit.
- Evacuate the building.
- Call 911 to notify emergency services.
- Do not let unauthorized personnel enter the building.
- Wait for the all clear from emergency response personnel or authorized persons (e.g. Gary Bors or the Directors).

Laboratory User

I agree that I have thoroughly read and understood this laboratory safety document. I have access to this safety information at all times when I am working. I have been trained to be able to identify the hazards to which I may be exposed and to follow the work practices and procedures discussed in this document. I certify that I will conduct my research work safely and that I will be responsible for following stated safety policies.

User Name (Print)

User Signature

Date

Principal Investigator

I certify that the information presented in this safety document is accurate and complete. I agree to comply with all safety procedures and to fully train and supervise all researchers under my direction.

PI Signature

Date