

Principal Investigator:

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Emergency Information:

Strobel (cell): 720-261-2748

BBR (Gary Bors): 202-510-8577

All other emergencies: 911

Secondary Contact:

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Purpose:

This laboratory is used for general solid-state synthesis and wet chemistry. The lab is equipped with high-temperature furnaces, vacuum lines and a 200 Tonne Paris-Edinburgh press with high-current electrical cables. Chemicals, solvents and compressed gases are used regularly. Several hand tools are kept in this lab.

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. All General Laboratory Safety Rules apply in this space.

Instrument safety instructions

All users must obtain instrument-specific training in order to operate lab equipment. There are tutorials and manuals for each instrument. Before you start your experiment, you must spend time to read them for your safety. **All users must first become "authorized users" to be able to operate equipment independently.** Equipment in this lab includes:

1. MBRAUN high-purity argon glove box
2. Vacuum sealing station with H₂/O₂ torch
3. Fritsch planetary ball mill
4. Multiple furnaces and drying ovens
5. Portable low-pressure DAC gas loading system
6. 200 Tonne Paris-Edinburgh press



Equipment in synthesis lab – All equipment requires specific training from the PI.

For all equipment:

1. Understand all safety interlock systems and emergency shutdown procedures. You may not, under any circumstance, override any of the safety features.
2. Do not disrupt equipment configurations without first consulting the PI.
3. Always use the instrument log book and keep detailed notes.
4. Inform the PI immediately of any problems or safety incidents.
5. All users must consult with PI prior to working alone / after hours in the laboratory.

Chemical procedures

Study SDS sheets on all chemicals that you work with. Familiarize yourself with where the various chemicals are stored based on type, reactivity, and flammability. **Appropriate protection must be worn when working with chemicals and operating equipment including protective gloves, clothing and eyewear.** Chemical safety datasheets are available outside R109 and at <https://www.msdsonline.com/>.

Date each chemical to record the day it was opened. Only take what you need and do not return unused chemicals back to main reservoir. All chemicals must be stored in appropriate cabinets. Acids and Bases are never stored together. Only dilute mineral acids may be discarded into marble chip baths. No chemicals may ever be poured into any sink or drain. Chemicals that need to be disposed of shall be stored in appropriate cabinets with secondary containment until laboratory-wide storage removal is initiated (~biannually). When purchasing chemicals, try to buy as little as possible to minimize amounts stored. All samples must be labeled in such a way as to be immediately identifiable. Label templates with appropriate information are provided in R109. Unlabeled vials are a serious offense and can lead to loss of laboratory privileges.

All plans for chemical reactions and synthetic experiments must first be discussed with the PI and may require written approval. Any chemistry performed in the hood or on the bench that involves reactive compounds (*e.g.* flammable liquids, metals, strong acids or bases, strongly exothermic reactions or the potential for explosion) should be performed during standard working hours to ensure that if an accident should occur, the proper response will be promptly initiated. In order to perform any chemical reactions that involve potentially reactive substances or products (see above) or have the potential for explosion (*e.g.* distillations or vacuum evaporation) after-hour operation requires that a second person must be identified who is 1) in the building during such work 2) made clearly aware of the scope of the proposed work and the potential danger, and 3) is willing to check in frequently to ensure safety.

Furnace procedures

Solid-State Synthesis
Laboratory

All furnaces require specific training before use. In general, always wear the necessary personal protection equipment (PPE) during use of the furnace. This includes wearing all of the following: gloves, lab coat, safety glasses, long pants and closed-toe shoes. Always stand to the side of a furnace when opening the door; this will prevent accidental spills from having a direct path to you. When possible, let samples cool in the furnace before opening. Anytime that you are pulling hot items from the furnace, you must have a lab partner working with you during loading and unloading of materials. Operate the furnace at temperatures below the melting point of your materials unless you are using a crucible to contain the material. Crucibles are available the lower cabinets.

Additional safety information

- Double check your PPE! Personal protection equipment including gloves, goggles and lab coats must be used when necessary. All of these items are available in the lab.
- Users must follow all appropriate safety protocols when working with and transporting compressed gasses.
- Users must follow all appropriate procedures when using high-current/voltage cables.
- Fire extinguishers are located near the north laboratory door and in the hallway.
- The emergency eyewash is located at the sink. The emergency chemical shower is located near the PE press.

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