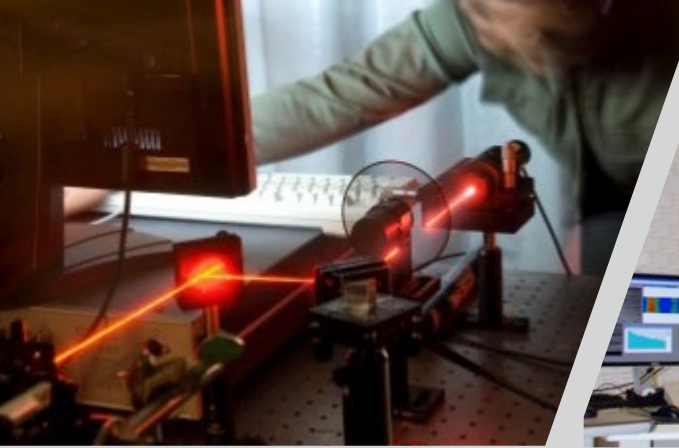


# Materials Research Laboratory Central Research Facilities Orientation for New Researchers

## Orientation Contents

- Overview of MRL
- Safety
- Practical Procedures
- Policies
- Resources





**Laser and Spectroscopy**



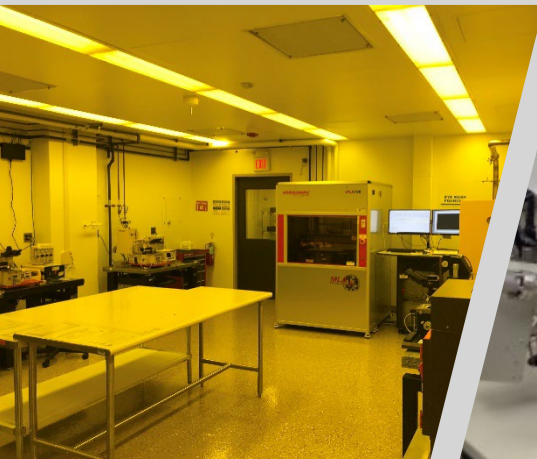
**Electron Microscopy**



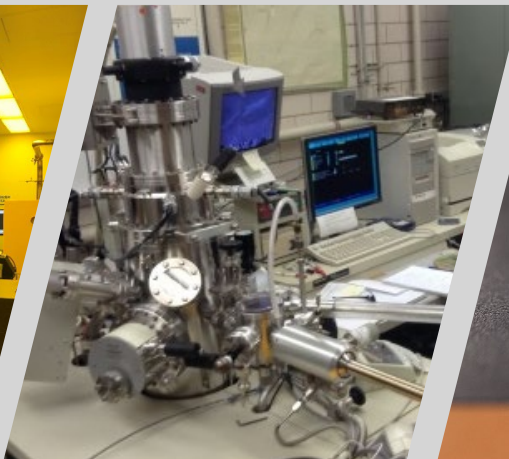
**Scanning Probe Microscopy**

# MRL – Instrumentation Cores

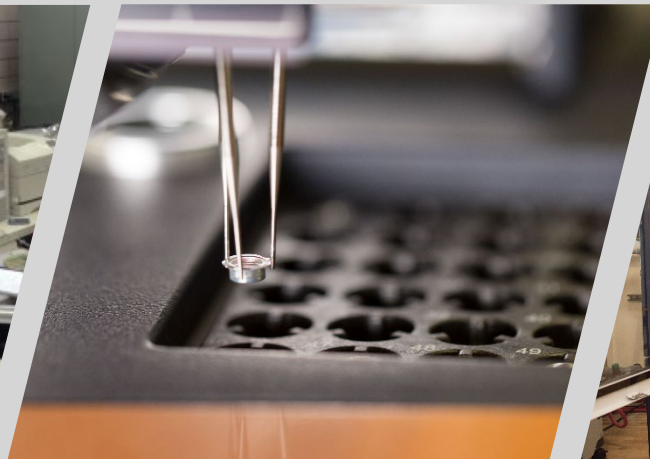
**Micro/Nanofabrication**



**Surface Analysis**

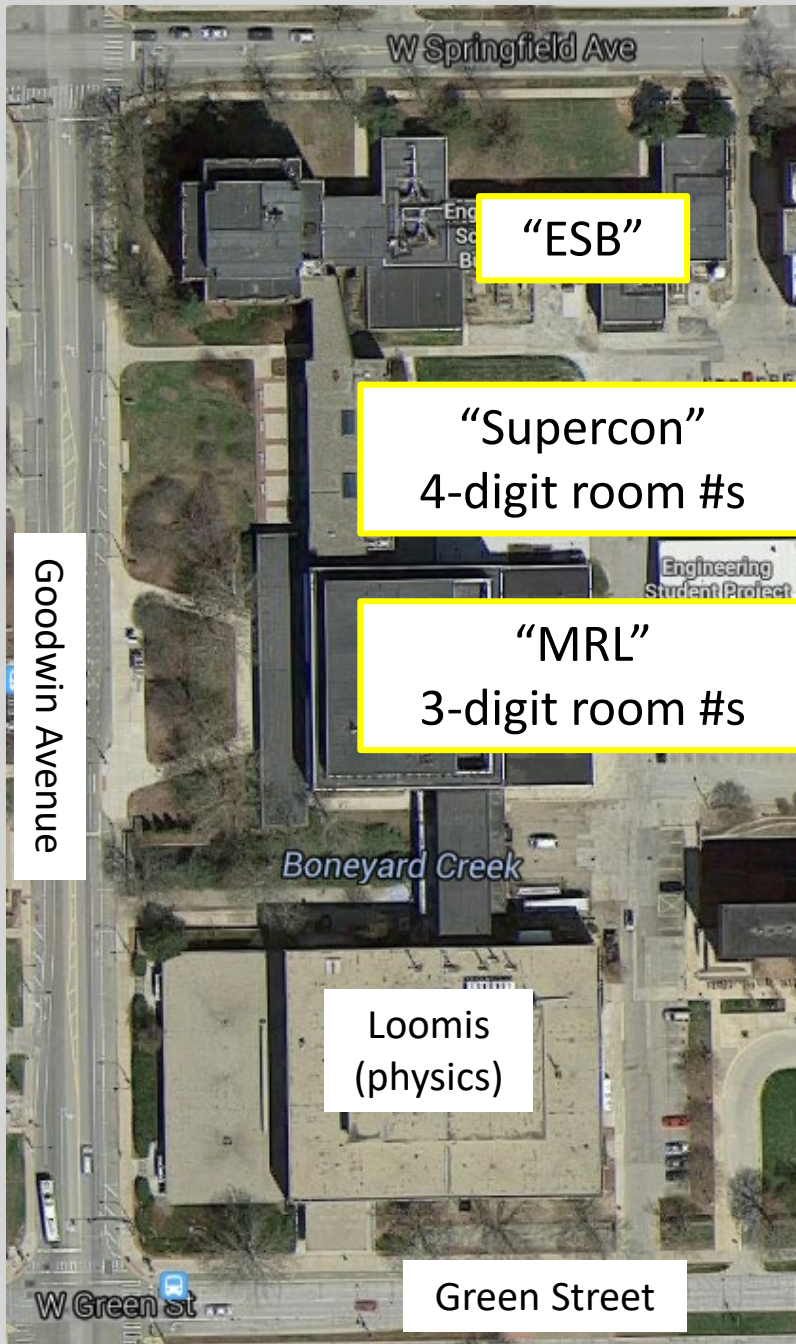


**Soft Materials Analysis**



**X-Ray Analysis**





Most Central Research Facilities labs are in the basement or 3<sup>rd</sup> floor of MRL or Supercon



## Safety

- Contact Information
  - Emergencies
  - Buddy System
  - PPE
  - Labeling Containers
  - Transport and Disposal of Materials
  - Materials Safety
- 

# Safety Contact



MRL safety specialist

**Maisie Kingren**

2004 Supercon

[mlswans2@illinois.edu](mailto:mlswans2@illinois.edu)

- Chemical waste questions and issues
- Lab safety questions

[safety@mrl.illinois.edu](mailto:safety@mrl.illinois.edu)

# Door Signs

in front of every lab

## AUTHORIZED PERSONNEL ONLY - HAZARDS PRESENT

Room number

Name	Title	Office
Stephan Burdin	Principal Investigator	217-333-0386
Timothy Spila	Principal Investigator	217-244-0298
Kathy Walsh	Principal Investigator	217-300-6662

Staff contact information

- in case of instrument problem
- contact right after an emergency

Potential safety hazards in the room

• Compressed Gases - INERT

• Cryogens

Low/No Corrosives

Low/No Explosive Materials

Low/No Flammable

Low/No Health Hazard

Low/No Oxidizers

Low/No Toxics

Low/No Water Reactive

For medical/safety emergencies, call 911

No biological or radioactive hazards present.

# Building Emergency Action Plan the “BEAP”



## **BEAP—annual training on what to do and where to go in case of an emergency**

- Training is on Compass: [go.illinois.edu/MRL-BEAP](https://go.illinois.edu/MRL-BEAP)
- BEAP instructions:  
<http://mrl.illinois.edu/safety/building-emergency-action-plan-training-instructions>
- BEAP training is required to log in to the MRL instrument scheduling system

# Emergencies and Accidents



- In case of a serious injury or other emergency, get help *immediately*
  - Call 911 from a cell phone
  - Get medical attention! (err on the side of caution)
- If your injury is not serious, go to your nearest health care provider
- Notify Susan Logan ([sklogan@illinois.edu](mailto:sklogan@illinois.edu)) within 24hrs  
Fill out Injury/Incident Report forms because:
  - MRL needs to address safety issues
  - Insurance may need this paperwork to cover your medical costs
- In case of fire or hazardous chemical release:
  - Pull the fire alarm
  - Call 911 from a cell phone
  - If you hear a fire alarm, you must leave the building immediately



# Working During Non-Business Hours

The building is locked on nights and weekends (request a key)

Don't let strangers into the building

Buddy system

- Have someone within shouting distance who can help you in case of an emergency
- If you're doing anything hazardous, **don't work alone** (*a buddy must be present for hazardous tasks*)

SafeWalks and SafeRides phone numbers  
are on the back of your i-card



# No Food or Drinks Allowed in Any of the Labs





Your food may contaminate your work  
or damage equipment!

Your chemistry may contaminate your food!

# Personal Protective Equipment

## PPE

- 
1. Protects YOU from
    - the process that you're performing
    - the materials that you're handling
  2. Protects YOUR SAMPLES or equipment from you (skin particles, oils, etc.)
- 

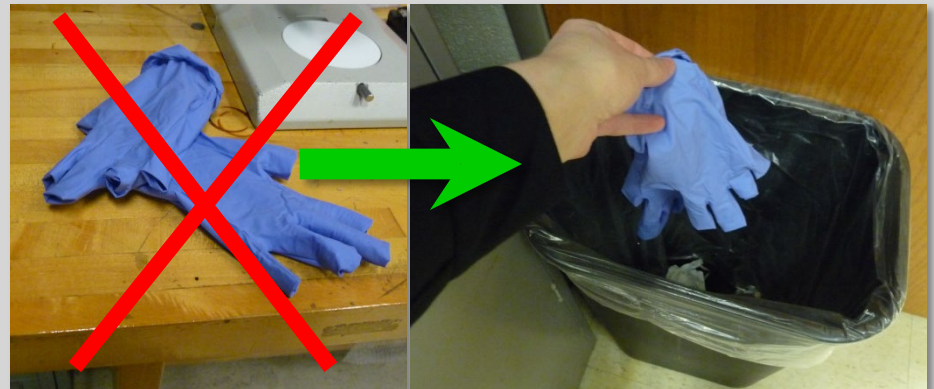


# PPE is for Lab Use Only



Do not touch personal items or “common fixtures” with gloves

Throw out gloves after you’ve used them once







# Safety Data Sheets

## SIGMA-ALDRICH

sigma-aldrich.com

### SAFETY DATA SHEET

Version 5.2  
Revision Date 07/01/2014  
Print Date 08/19/2014

#### 1. PRODUCT AND COMPANY IDENTIFICATION

##### 1.1 Product identifiers

Product name : Bismuth(III) selenide  
Product Number : 401080  
Brand : Aldrich  
Index-No. : 034-002-00-8  
CAS-No. : 12068-69-8

##### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

##### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA  
Telephone : +1 800-325-5832  
Fax : +1 800-325-5052

##### 1.4 Emergency telephone number

Emergency Phone # : (314) 776-8555

#### 2. HAZARDS IDENTIFICATION

##### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**  
Acute toxicity, Oral (Category 3), H301  
Acute toxicity, Inhalation (Category 3), H331  
Specific target organ toxicity - repeated exposure (Category 2), H373  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

##### 2.2 GHS Label elements, including precautionary statements

Pictogram 

Signal word : Danger

Hazard statement(s)  
H301 + H331 : Toxic if swallowed or if inhaled  
H373 : May cause damage to organs through prolonged or repeated exposure.  
H410 : Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)  
P260 : Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
P264 : Wash skin thoroughly after handling.  
P270 : Do not eat, drink or smoke when using this product.  
P271 : Use only outdoors or in a well-ventilated area.  
P273 : Avoid release to the environment.

Read SDS to understand hazards associated with each material you use

#### 2. HAZARDS IDENTIFICATION

##### 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**  
Acute toxicity, Oral (Category 3), H301  
Acute toxicity, Inhalation (Category 3), H331  
Specific target organ toxicity - repeated exposure (Category 2), H373  
Acute aquatic toxicity (Category 1), H400  
Chronic aquatic toxicity (Category 1), H410

For the full text of the H-Statements mentioned in this Section, see Section 16.

##### 2.2 GHS Label elements, including precautionary statements

Pictogram 

Signal word : Danger

Hazard statement(s)  
H301 + H331 : Toxic if swallowed or if inhaled  
H373 : May cause damage to organs through prolonged or repeated exposure.  
H410 : Very toxic to aquatic life with long lasting effects.

Precautionary statement(s)  
P260 : Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.  
P264 : Wash skin thoroughly after handling.  
P270 : Do not eat, drink or smoke when using this product.  
P271 : Use only outdoors or in a well-ventilated area.  
P273 : Avoid release to the environment.

Questions? Email Maisie Kingren: [mlswans2@illinois.edu](mailto:mlswans2@illinois.edu)

# Labeling Containers

## Sample containers and chemical containers *must* have labels!

No “mystery materials”! Please write clearly!

## Secondary containers must have:

- Name, netID and **MRL user number**
- Full chemical name
- Warning statement
- Solution or mix concentrations
- Preparation date

Avery labels (transparent sticky sheets) can be bought in the MRL storeroom

Waste containers must also be labeled “WASTE”

**The Basic Parts of A GHS-Compliant Label**

1 → **n-Propyl Alcohol**  
UN No. 1274  
CAS No. 71-23-8

2 → **DANGER**

3 → Highly flammable liquid and vapor. Causes serious eye damage. May cause drowsiness and dizziness.

4 → Keep away from heat/sparks/open flames/hot surfaces. No smoking. Avoid breathing fumes/mist/vapours/spray. Wear protective gloves/protective clothing/eye protection/face protection. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present. Continue rinsing.

5 → Fill Weight: 18.65 lbs. Lot Number: B56754434  
Gross Weight: 20 lbs. Fill Date: 6/21/2013  
Expiration Date: 6/21/2020

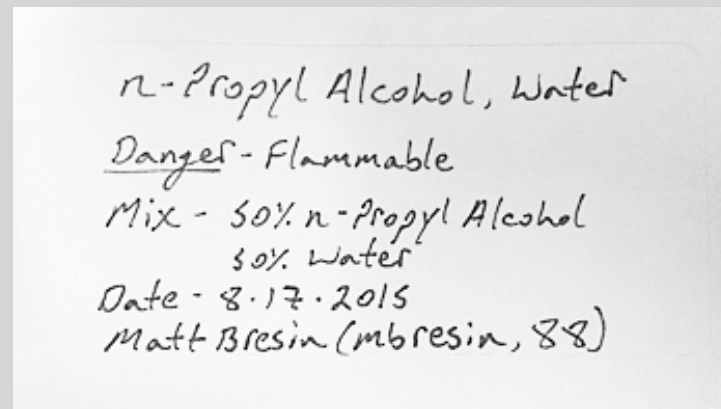
6 → See SDS for further information.

Acme Chemical Company - 711 Roadrunner St. - Chicago, IL 60601 USA - www.acmechem.com - 123-444-5567

1. **Product Identifier** - Should match the product identifier on the Safety Data Sheet.
2. **Signal Word** - Either use "Danger" (severe) or "Warning" (less severe)
3. **Hazard Statements** - A phrase assigned to a hazard class that describes the nature of the product's hazards
4. **Precautionary Statements** - Describes recommended measures to minimize or prevent adverse effects resulting from exposure.
5. **Supplier Identification** - The name, address and telephone number of the manufacturer or supplier.
6. **Pictograms** - Graphical symbols intended to convey specific hazard information visually.

Sample label courtesy of Weber Packaging Solutions - www.weberpackaging.com

<http://blog.weberpackaging.com/?p=1626>



# Transport of Material

Use freight elevator for:

- Compressed gas cylinders
- Cryogenic dewars
- Chemicals
- Carts and heavy objects
- Equipment

**Do not travel with hazardous materials**



- Carry materials without using gloves in public areas



- Secondary containment is required for liquids > 500 mL



# Waste Disposal

If you generate waste at MRL, bring it back to your own lab or dispose of it in specified containers as instructed.

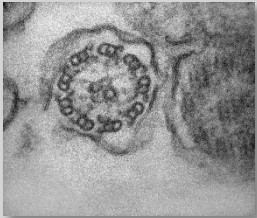
Samples left in the lab are potential hazards. Take your samples with you or dispose of them, as appropriate.





# Biological Materials

**All biological materials must be approved by MRL's biosafety staff *before* they are brought to MRL**



- Biological: anything that is, or was, alive and derivatives of those things (proteins, plants, cells, etc.)



- Biological materials must be described on your proposal or change of scope



- **Be specific** in your description of materials  
Don't just say "cells," "proteins," "drugs," or "polymers"

**Fixative is available for free** (email [mrl-biosafety@illinois.edu](mailto:mrl-biosafety@illinois.edu))

[mrl-biosafety@illinois.edu](mailto:mrl-biosafety@illinois.edu)



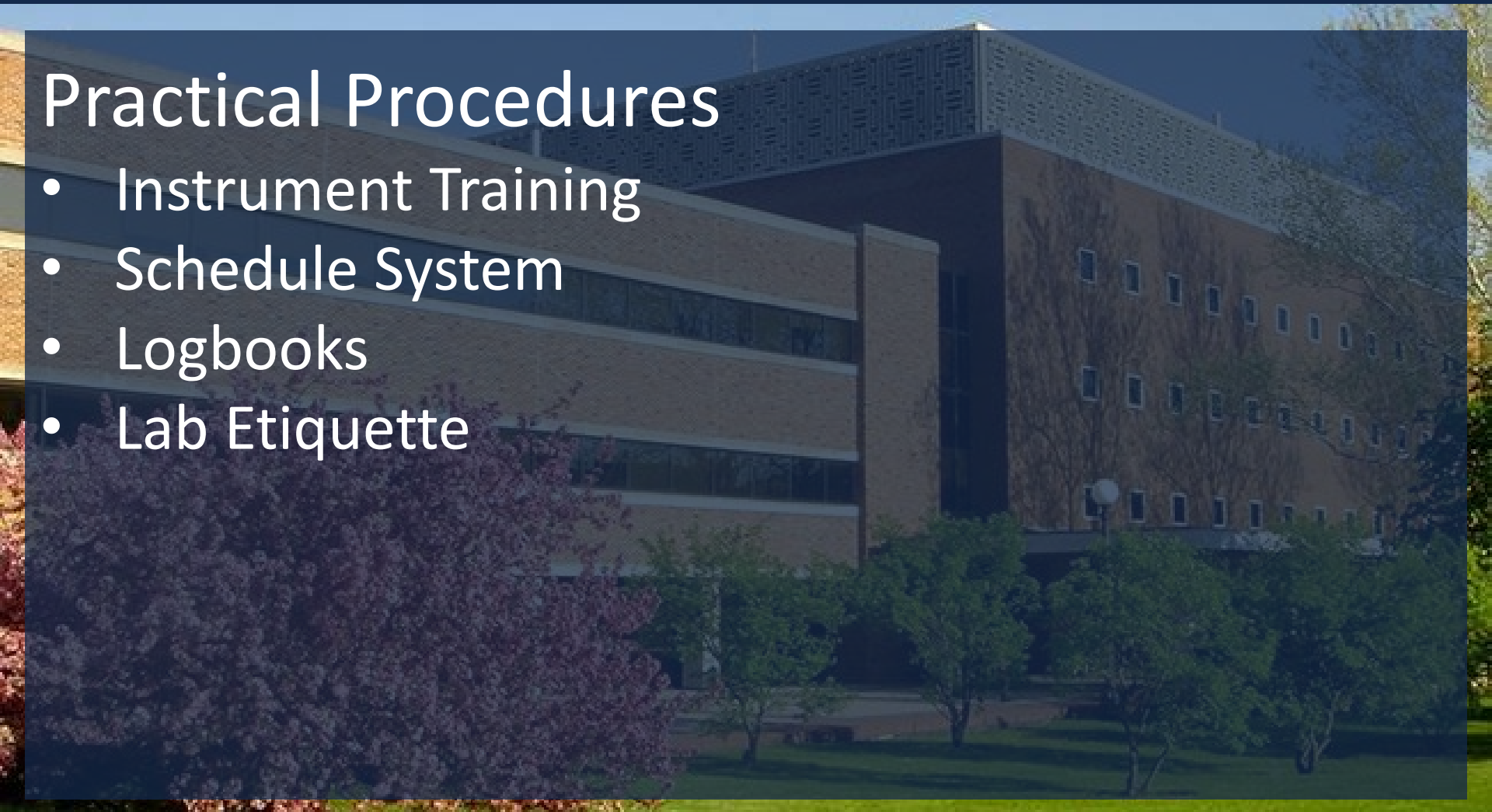
MRL Biological Safety Specialist  
Kristen Flatt, [flatt1@illinois.edu](mailto:flatt1@illinois.edu)

# Materials Safety at MRL

- Prior approval is required before bringing new or hazardous materials to MRL
- Submit a "Change of Scope" proposal to adjust your project description if your materials change
- Discuss materials with MRL staff for *each* instrument (different instruments may need different safety precautions)
- Have the SDS available for review

## Practical Procedures

- Instrument Training
- Schedule System
- Logbooks
- Lab Etiquette





# Procedure





# Changing Your Proposal

- Add a new technique → Submit a change of scope
- Add a new material → Submit a change of scope
- Change your funding source for the same project → Email [mrl-facilities@illinois.edu](mailto:mrl-facilities@illinois.edu)
- Create a new project → Submit a new proposal
- Change your PI or research group → Submit a new proposal

New proposal or change of scope: <http://mrl.illinois.edu/facilities/become-user>

# How to Use the MRL Schedule System



University of Illinois  
Materials Research Lab  
Online Scheduling System

# How to Use the MRL Schedule System



Please watch the short video tutorial at  
[go.illinois.edu/MRLschedulesystemvideo](http://go.illinois.edu/MRLschedulesystemvideo)

# Pre-Training

Some techniques require additional safety trainings, pre-reading, or training videos before instrument training

- Microfab Facility – Cleanroom training & HF trainings
- Laser and Spectroscopy Facility – Laser safety training
- X-Ray Diffraction Facility – Analytical X-ray safety training
- Training videos or MRL training courses
- Discuss project with staff



# In-Person Training

- Be prepared
  - Complete all pre-training requirements
  - Bring something to take notes with
  - Ask questions
- Be on time
  - Email staff in advance if you must be late or absent
- Demonstrate safe and effective operation of the instrument



# Lab Keys

- Instrument training and the BEAP must be completed first
- Key request: [my.mrl.illinois.edu/keys/request](http://my.mrl.illinois.edu/keys/request)
- Annual BEAP training is required to maintain key access: [go.illinois.edu/MRL-BEAP](http://go.illinois.edu/MRL-BEAP)
- Some labs have restrictions (ex: daytime access only)
- Request an "Outside Door Key" for night/weekend use
- Pick up/return physical keys in the main office
- Always carry your i-card



# Scheduling Etiquette

- Most instruments are used by a large number of researchers—be considerate!
- Don't reserve time you don't expect to use.
- If you can't use your scheduled time, cancel as soon as possible. Check sign-up rules to see restrictions on late cancellations.
- Until you're good at the instrument, schedule time during workday hours when staff are around.

# Logbooks

- Accurately report your instrument usage
  - Failure to report this accurately is theft of instrument time
- Fill in each box completely
- Record the amount of any consumables used (example: thickness of gold sputtered)

Time In	Time Out	Date	Code	Hours Used	User Number	Name	Advisor
8:33	4:14p	1/23	A1	8	1138	<i>H. Solo</i>	<i>I. Jones</i>

**Important to staff and other users!**

Sample	Scanner	Transducer	Probe Used (S/N)	Probe Left On	Comments	
1	cement	S	S	MS01121007	MS01121007	OK

# Instrument Computers

- MRL instrument computers are not long-term data storage (data can get lost)
- Data transfer procedures vary by instrument
  - USB vs. internet, shared folders
  - Virus-scan your USB drive before bringing it to MRL
- Instrument computers are for research use only
  - Don't install software
  - Be cautious about malware

# Instrument Care

- Don't try to fix instrument problems yourself
  - Staff contact info is posted on the lab door sign
- Keep equipment in a usable and clean condition
  - Return accessories to their designated storage location
  - Equipment and consumables are for use in the MRL Facilities only



# Philosophy

## Be Safe

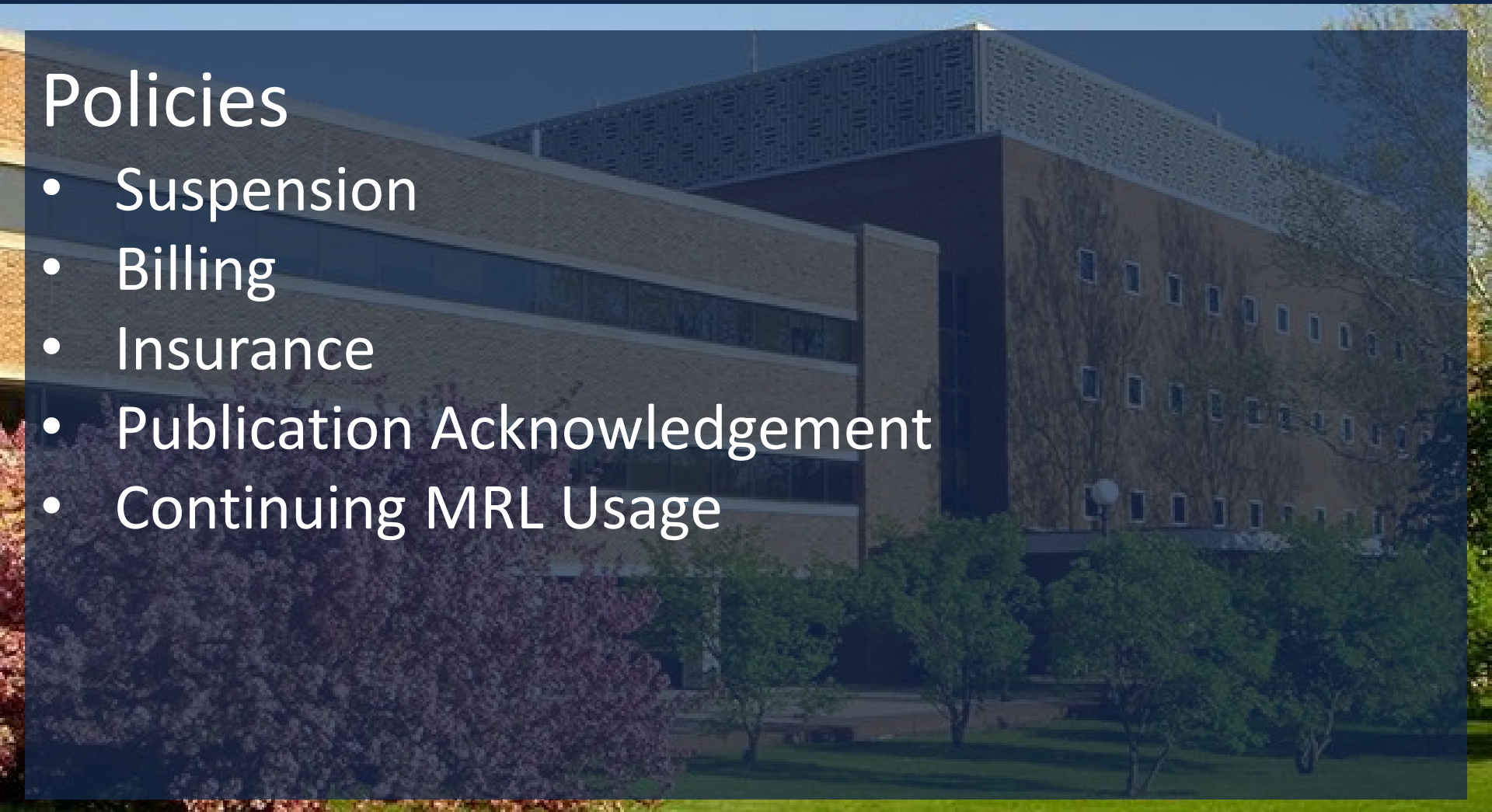
- Operate the equipment as instructed by MRL staff
- Follow safe work practices and report any accidents
- Properly dispose of materials
- Notify MRL staff if equipment problems or unsafe or improper behavior occur
- Read all communications from the MRL facilities (safety posters, instrument status or procedure updates, etc.)

## Be Courteous

- Respect other researchers' rights to use facility resources
- Respect their samples and processes
- Clean up the instrument area at the end of the session

## Policies

- Suspension
- Billing
- Insurance
- Publication Acknowledgement
- Continuing MRL Usage



# Suspension Policy

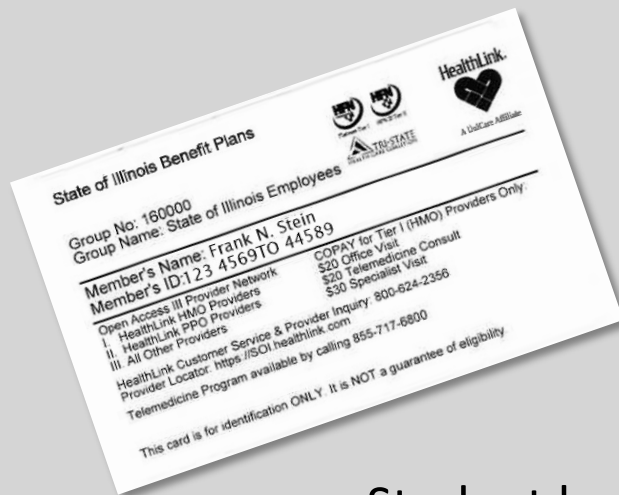
The MRL Suspension Policy aims to ensure that research is done safely and courteously

- May lose access to an instrument or to all MRL facilities
- Duration may be for a limited time or permanent
- Retraining is generally needed for reinstatement of access

# Billing Policy

- Sessions are charged in ½-hour increments
- Your account is charged for the greater of the reserved time or the logbook time
- If late to or miss training, your account will still be charged for the first part of the session

# Health Insurance



**If you are working at MRL during the summer, make sure your health insurance continues.**

Student health insurance doesn't automatically continue when you are not registered.

Opt in through the Office of Student Health Insurance:  
<http://si.illinois.edu/>

# Publication Acknowledgement

All publications that incorporate results obtained through the MRL Central Research Facilities must include the following acknowledgement:

*“...was carried out in part in the Materials Research Laboratory Central Research Facilities, University of Illinois.”*

Please also send a copy of your publication (or the DOI) to:  
[mrl-facilities@illinois.edu](mailto:mrl-facilities@illinois.edu)



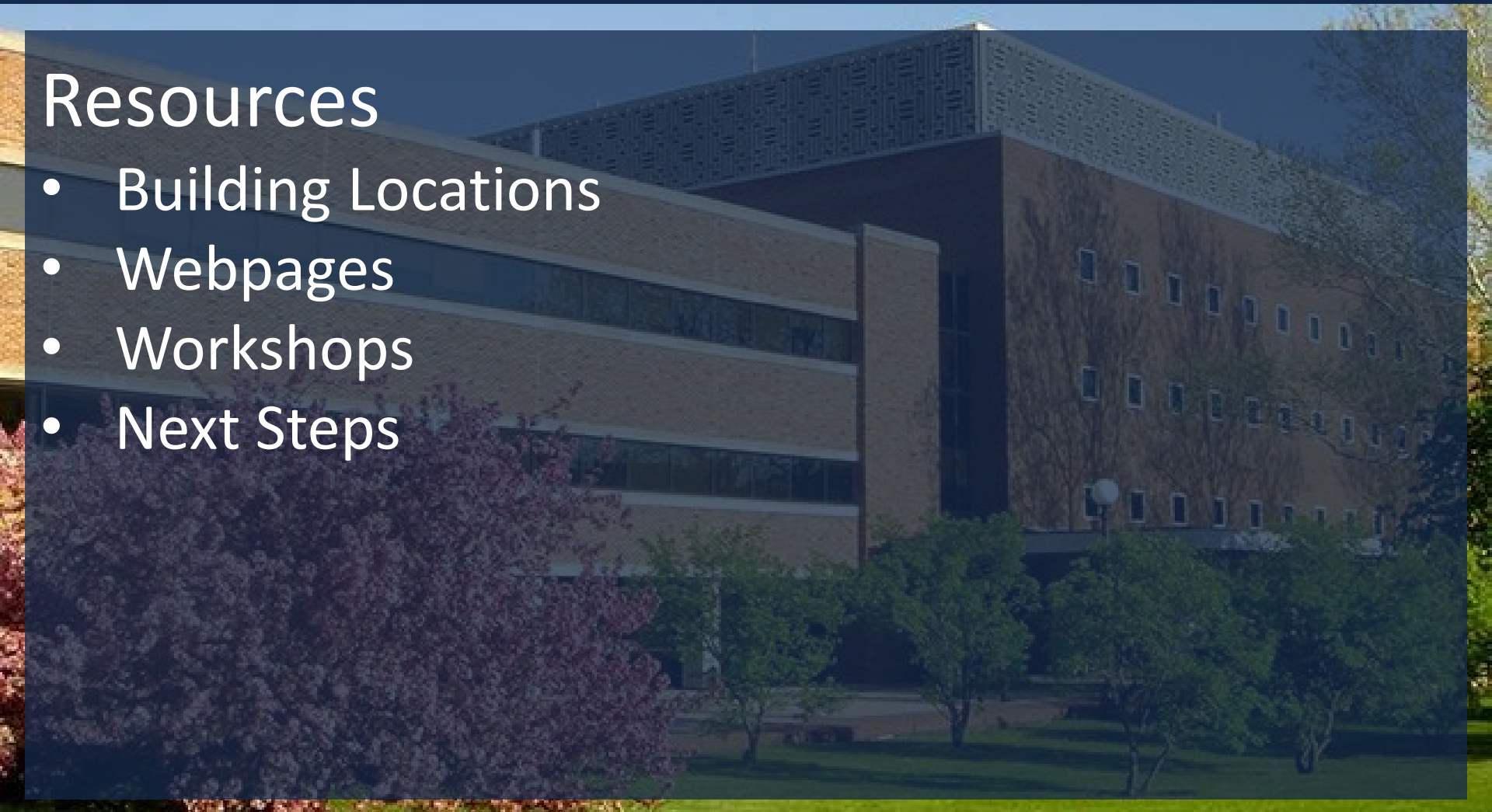
# Continuing MRL Usage

- Graduated students may continue working at MRL with
  - An active appointment on campus
  - Proof of health insurance
- Non-campus (academic, government, start-up, business, industrial) usage of MRL is welcome
  - Training and self use
  - Staff-run samples
  - <http://mrl.illinois.edu/facilities/become-user/non-university-illinois-academic-and-government-agency-users>
  - <http://mrl.illinois.edu/facilities/become-user/business-or-industrial-users-includes-ui-enterprise-works>



### Resources

- Building Locations
- Webpages
- Workshops
- Next Steps



# Storeroom

## MRL/Physics Shipping-Storeroom

- 1<sup>st</sup> floor, between MRL and Loomis
- netID, university password, and CFOP (billing account number)
- Self check-out (record items using computers at the counter)
- Pick up or mail packages or borrow carts



# Computer Lab

## 264 MRL

- Computer lab with printers
- Open ~ 9am to 5pm
- Computer registration on the MRL ethernet network
- Basic and advanced computer support
- Poster printing
  - Available to people in MRL or Physics research groups
  - [go.illinois.edu/mrlposter](http://go.illinois.edu/mrlposter)
  - Research posters only

[engrit-help@illinois.edu](mailto:engrit-help@illinois.edu)

# MRL on the Web

## **mrl.illinois.edu**

Staff directory, instrument specs, proposal submission, upcoming seminars and workshops

## **mrl.illinois.edu/facilities/become-user**

How-to guides and additional information



<https://www.facebook.com/MRLfacilities/>  
<https://www.facebook.com/MaterialsResearchLab/>



<https://twitter.com/MRLatIllinois>



Recorded webinars,  
training videos, etc.

<https://go.illinois.edu/MRLYouTubeChannel/>

# MRL Workshops



## **Advanced Materials Characterization (AMC)**

2-day workshop

First week of June every year

Introduces techniques and instruments available at MRL

## **Specialized Instrument Workshops/Seminars**

Throughout the year

Announced on the schedule system login page and by email



# Next Steps

- Complete the quiz based on this orientation video
- Complete the BEAP training: [go.illinois.edu/MRL-BEAP](https://go.illinois.edu/MRL-BEAP)
- You'll be able to log in to the schedule system after you've successfully completed
  - orientation
  - BEAP
  - and your proposal has been approved
- These updates are done manually, so please give us a few days to finish the processing

Thank you for your attention!  
mrl-orientation@illinois.edu