

Guidelines and Agreement for MaCS/AMCL/ASIL Usage

Scheduling and Handling Samples

MaCS includes MaCS, AMCL and ASIL at CAES.

Starting from October 1st, 2024, MaCS scheduling will be managed by INL and switched to the INL P6 system. The MaCS team collaborates with INL MFC P6 schedulers on the tool schedules. To request tool time at MaCS, users may either talk to MaCS Instrument Leads or send emails to macsscheduling@inl.gov. A scope of work and an acknowledgement of non-export-controlled project will be required before any tests can be performed at MaCS. Trained/signed-off users can request off-hour sessions.

Samples and planned experiments should be described in detail in the scope of work. The scope of work will be reviewed by INL Scheduler, MaCS team and the CAES Safety Officer (if rad samples). If a sample is brought into MaCS without awareness to INL scheduler, MaCS team and the CAES Safety Officer (if rad), the user's access to MaCS may be suspended. MaCS is under the ISU NRC license for radiological materials. The CAES Safety Officer determines whether a sample will be handled as rad or non-rad in MaCS.

Users are encouraged to contact MaCS Instrument Leads if they need assistance on test plans. Radiological (rad) sample analysis scheduling requests are pending until they are approved by the Authorized User and Safety Officer. The Authorized User and CAES Safety Officer ensures that radiation safety office support is available for the requested time for instrument use.

For **radiological samples**, an RPR 13F or RPR 14 form must be approved and user's samples must be ready to ship to or out of CAES, respectively. The approval process of the RPR 13F/RPR 14 forms will be completed by the MaCS Authorized User through the ISU Safety Office. In general, it takes 10 business days to approve a rad shipment to and from CAES. To obtain approval for the rad samples, it is the user's responsibility to accurately provide all of the required information 10 business days prior to estimated ship date. MaCS staff are not responsible for any delay in the approval process due to missing or incorrect information provided by users. Email the following information to MaCS Authorized User, Dr. Yaqiao Wu, yaqiaowu@boisestate.edu.

- 1.) Name of researcher
- 2.) Name and contact of the Point of Contact/NBA Custodian
- 3.) Origin of sample (indicate location where sample is shipping from) and irradiation condition
- 4.) Total number of samples
- 5.) Name of each sample
- 6.) Physical description of sample (e.g. 3mm disc)
- 7.) Chemical composition of each sample
- 8.) Mass of each sample
- 9.) Isotopes in each sample

- 10.) Isotope activities in each sample (see Note #1)
- 11.) On contact dose rate
- 12.) Dose rate at 30 cm
- 13.) Estimated date that the samples will be delivered to/shipped out of CAES
- 14.) Sample contains RCRA Metals: As, Ba, Cd, Cr, Pb, Hg, Se, Ag
- 15.) How to process the sample after the project is done: return to sender (includes POC) or dispose of at MaCS.

Note:

1. All isotopes need to be in mCi except for the following needs to show the amount of isotopes present:
 - a. DU - kg
 - b. U-233 - gm
 - c. U-235 - mg
 - d. U-238 - kg
 - e. Th-232 - kg
2. ***Proton irradiated materials*** are potentially activated. Incoming proton irradiated samples will need information from the sender verifying the samples are non-rad. Sender please provide:
 - Verification the samples are non-rad. (i.e., no radioactive material to inventory in the sample based on sample isotopes, proton beam energy, and sample isotope absorption cross-sections).
 - Material is received as a non-rad item and not marked as suspect for contamination - i.e., coming from a radiologically controlled instrument (IMCL FIB, etc.).
3. Regarding ***heavy ion irradiation*** (not proton irradiated): If the facility we are receiving the sample from states that it is physically impossible for the ion irradiation to activate the sample, then the sample can be considered non-rad. Otherwise, the sample will be considered rad and RPR 13F/RPR 14 forms are required.

Every effort should be made to send samples as clean as possible (i.e. minimize the removable contamination). The shipper must follow all applicable DOT shipping requirements and inner containers, including sample holders will be less than 7 dpm/100cm² alpha and 70 dpm/100cm² beta/gamma. If the measured activity levels of materials are not consistent with the types and levels specified in the shipping manifest and approved RPR13F, and if the sample containers are at all compromised or the quantity or labeling of samples do not match the information provided by the researcher/shipper, the materials will be immediately returned to the shipper.

The instruments are at a high demand. Please be courteous when requesting scheduling time. Users who continuously request to schedule more time than they need will result in limited tool time access. We strive to treat all researchers equally and to maximize use of the instruments.

If an instrument is not available due to repairs or maintenance, we will work closely with the INL scheduler and users to ensure the users are able to complete their work in a timely manner.

Trained users who are self-use on the tools are responsibility to send emails daily to macsscheduling@inl.gov to provide the usage information: user name, the start time, stop time and instrument.

Normal Operating Hours

Normal operating hours for sample preparation and imaging activities are Monday – Friday 8:00 am – 4:00 pm. Instrument time will be scheduled in blocks as shown below.

FIB:	8:00am-12:00pm	1:00pm-4:00pm	5:00pm-midnight
TEM:	8:30am-12:30pm	1:00pm-4:00pm	5:00pm-midnight
LEAP:	8:30am-4:00pm		5:00pm-midnight
SEM:	8:30am-12:30pm	1:00pm-4:00pm	5:00pm-midnight
XRD:	9:00am-4:00pm	(No off-hour access)	
Sample Prep: (Non-rad)	8:30am-12:00pm	1:00pm-5:00pm (Off-hour access is upon approval)	
Sample Prep: (rad)	10:00am-12:00pm	1:00pm-4:00pm (No off-hour access)	

Note: MaCS staff and Safety staff transfer rad samples among the instruments at 4pm - 5pm each work day. Users can work till 5pm on the tools if no rad sample transfer required.

Suggested Scheduling Time

Instrument	Number of Samples	Suggested Hours to Schedule
TEM	1 sample	4 hours
FIB	Preparing 1 TEM Sample	4 hours
	Preparing 8 LEAP sample tips	8 hours

Radiological samples can only be loaded into the instruments between 8:00 am - 5:00 pm during normal working days with the assistance of the Instrument Lead and Authorized User, CAES Safety Officer, or designated alternative.

Users *if given authorization* (trained or signed off users) by Instrument Lead and Lab Lead may analyze or prepare samples using the instruments off hours. However, sample movement or opening of the sample chamber (radiological) is prohibited.

Paper/Presentation Guidelines

MaCS staff are scientists, and provide essential services for the users. It is important to recognize their contributions to the projects. The existence of MaCS also depends in part on proper acknowledgment in publications, which is an important metric of the value of most facilities.

When publishing/presenting the data collected at MaCS/CAES please acknowledge the Center for Advanced Energy Studies-Microscopy and Characterization Suite (CAES-MaCS), as well as MaCS staff who assisted in the work. If any MaCS staff make substantive contributions to the project, please include the staff as a co-author in your paper/presentation. If the research was performed because of a NSUF award, please also acknowledge them in your paper/presentation.

Substantive contributions typically include one or more of below:

- Critical input, i.e., conception, design of project/experimental, or original ideas
- Acquisition of data, analysis and interpretation, beyond routine practices
- Draft the article, write a portion of the paper or revise it critically
- Intellectual contribution
- Final authority for the approval of article

Researchers using INL equipment at CAES, in the acknowledgements of your publication or presentation please include the following text:

“This work utilized equipment at the Center for Advanced Energy Studies (CAES) provided by Idaho National Laboratory under the Department of Energy (DOE) Idaho Operations Office (an agency of the U.S. Government) Contract DE-AC07-05ID145142.”

We would appreciate receiving a copy of publications that cite said use.

Taking Care of Equipment

Any damage to the equipment impacts both the user’s research and other researchers. Therefore, it is extremely important that a user takes care when using MaCS/AMCL/ASIL instruments. Responsibilities relative to the equipment include:

- Users are responsible for notifying the Instrument Lead, and/or Lab Lead, PI as soon as possible if they notice any issue with an instrument.
- Users are not responsible for any issues pertaining to normal/regular use, or due to aging instrument.
- Users will be responsible for the cost of the repair work, if the issue/damage is from abuse or misuse of the instrument. This could include the cost of the part, the cost of the services engineer’s travel and time, and the time lost to other users of the equipment.
- If you have any questions or concerns, please contact the instrument leads or lab lead.

EXPORT CONTROL INFORMATION

By mutual agreement of all CAES institutions, CAES does not perform research that is subject to export control regulations. In accordance with this agreement, no one may bring any materials that fall under the jurisdiction of the International Traffic in Arms Regulations (ITAR) to CAES facilities.

In addition, if research or testing on technology that is subject to the jurisdiction of the Export Administration Regulations (EAR) would result in the disclosure of information that is restricted for transfer under the EAR, the Department of Energy regulations (10 CFR Part 810), the Nuclear Regulatory Commission regulations (10 CFR Part 110) or other U.S. export control regulations, and is not otherwise publicly available, or would otherwise result in a deemed export of controlled technology, that research or testing may not take place at CAES.

I hereby certify that this request does not involve ITAR-controlled technology and will not result in the disclosure of non-publicly available proprietary technology or software in violation of U.S. export control laws.

Note: If you need assistance in determining the export control status of your items or materials, please contact your organization's export control officer or legal counsel for advice.

MaCS contacts:

- Yaqiao Wu, MaCS Director, MaCS/AMCL/ASIL Lab Lead, TEM and LEAP Instrument Lead, Authorized User (yaqiaowu@boisestate.edu)
- Kristi Moser-Mcintire, CAES Safety Officer (mosekri3@isu.edu)
- Yu Lu, FIB/LEAP/Nanoindenter Instrument Lead (yulu@boisestate.edu)
- Ching-Heng Shiau, TEM/SEM and Sample Prep. Lead (chinghengshiau@boisestate.edu)
- Jana Howard, FIB, SEM, Nanoindenter and XRD Instrument Lead (janahoward@boisestate.edu)
- Sid Nair, Sample Prep. Lead (sidharthsukumara@boisestate.edu)