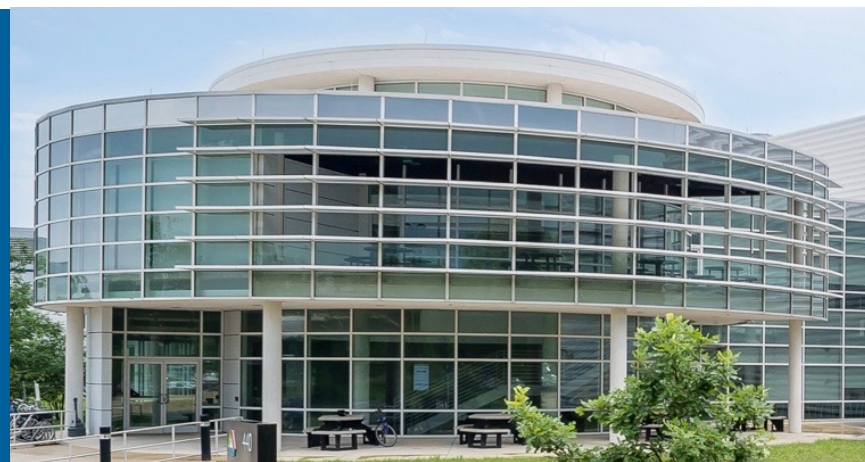


OVERVIEW OF THE CENTER FOR NANOSCALE MATERIALS

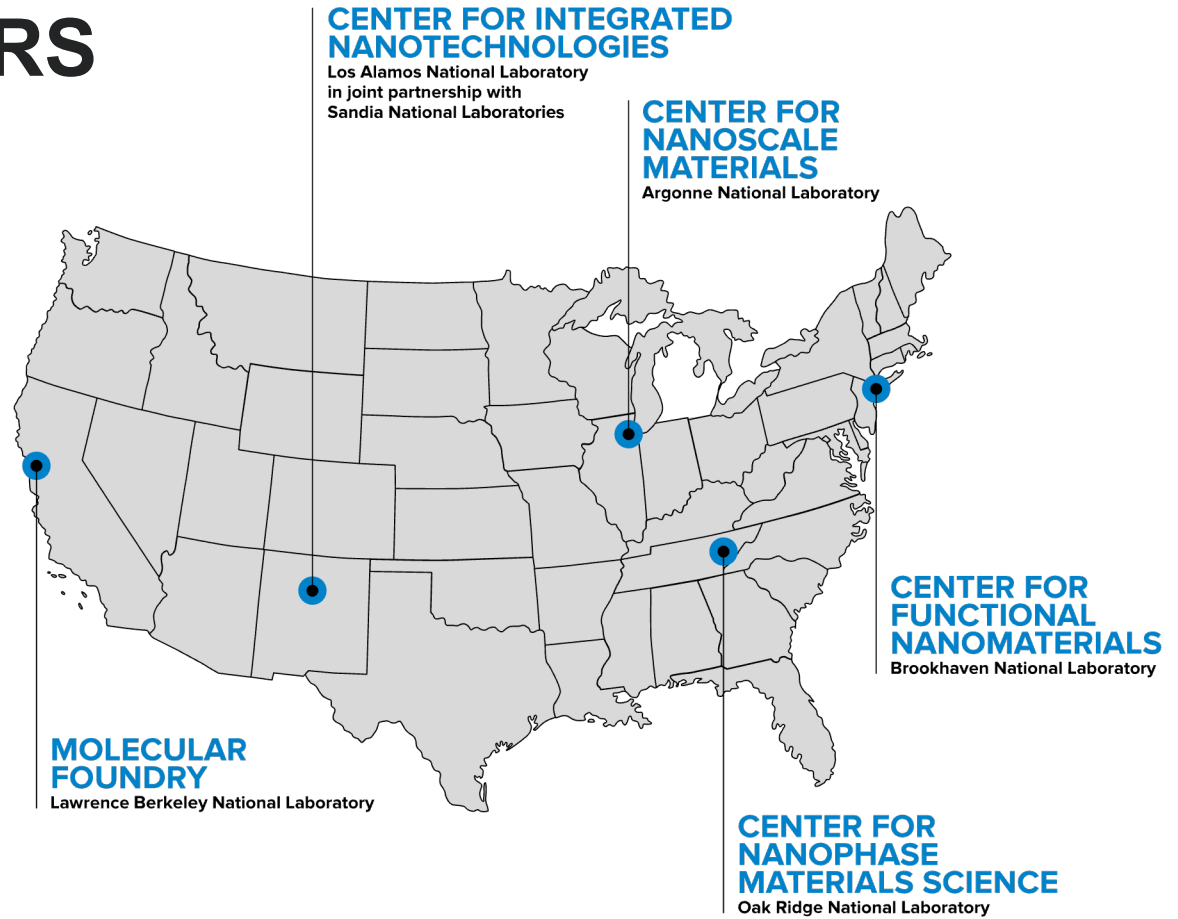


GARY WIEDERRECHT

Interim Director
Center for Nanoscale Materials
Nanoscience and Technology Division
Argonne National Laboratory

**George Crabtree Institute for
Discovery and Sustainability**
March 7, 2025

NANOSCALE SCIENCE RESEARCH CENTERS



MISSION OF THE CENTER FOR NANOSCALE MATERIALS

The mission of the CNM is to

- Enable an international scientific community to carry out high-impact research projects through an open, peer-reviewed user program
- Conduct in-house research to discover, understand, and exploit functional materials that benefit our nation and the world



CNM: A BRIEF HISTORY

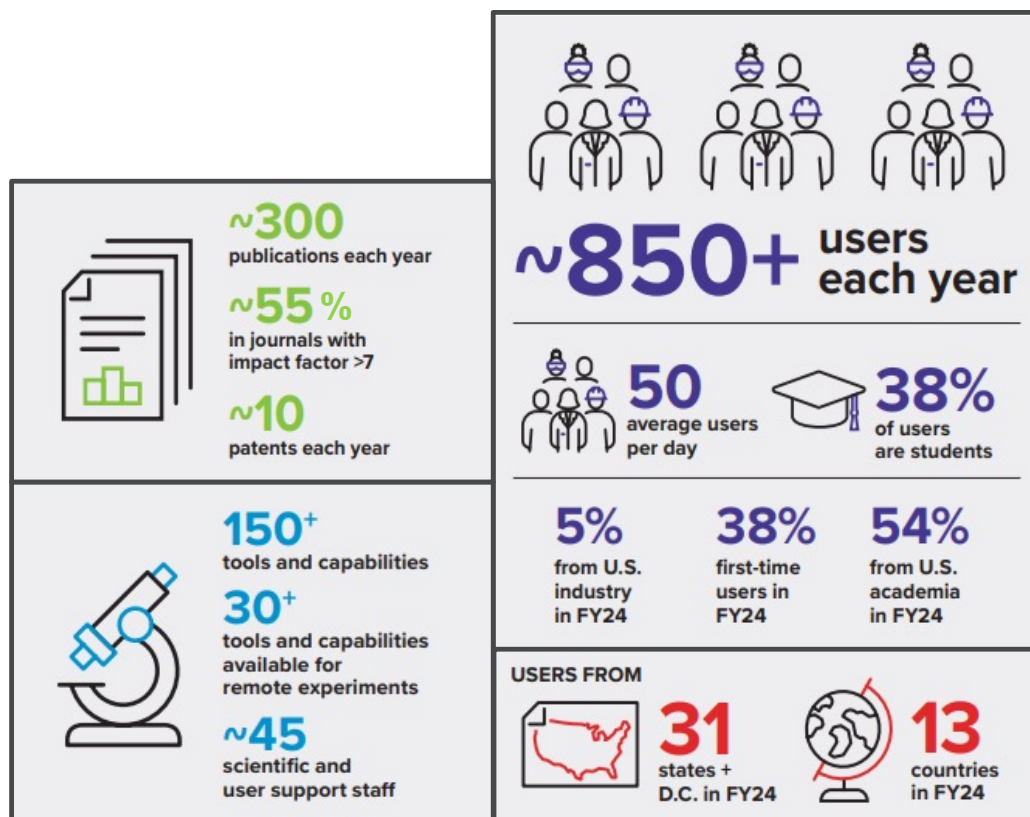
A dynamic user facility for creating, characterizing and understanding nanomaterials



- FY2007: CNM opens for operations
- FY2010: Addition of scanning tunneling microscopy high bay building
- FY2015: Incorporation of Electron Microscopy Center into CNM
- FY2018: Argonne cleanroom – adds 6,000 sq. ft. of cleanroom space
- FY2022-25: Upgrade of APS/CNM Hard X-ray Nanoprobe

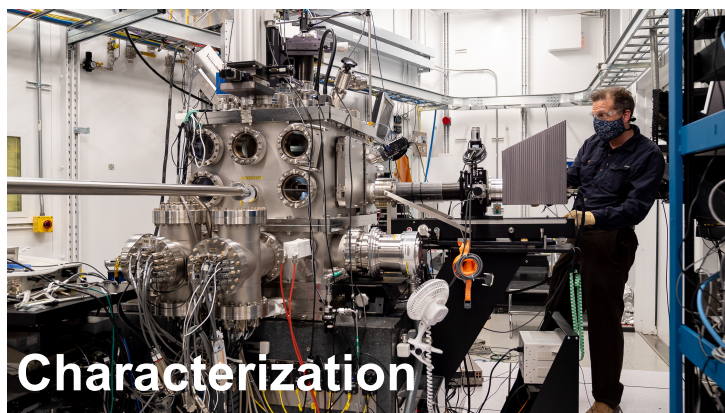
WHO ARE WE?

- Department of Energy Office of Science user facility
- Designed to give free access to state-of-the-art equipment and expertise
 - Cost-recovery basis for proprietary research not intended for the public domain



CNM: A COMPLETE NANOSCIENCE RESEARCH CENTER

Broad suite of capabilities that evolve to address national priorities



CNM CAPABILITIES OVERVIEW

Advanced Microscopy and Dynamics

- Hard X-ray Nanoprobe: X-ray ptychography/microscopy
- Variable-temperature scanning tunneling microscopy
- Terahertz-to-ultraviolet ultrafast spectroscopy
- Aberration-corrected and in-situ electron microscopy
- Ultrafast electron microscopy

Synthesis and Nanofabrication

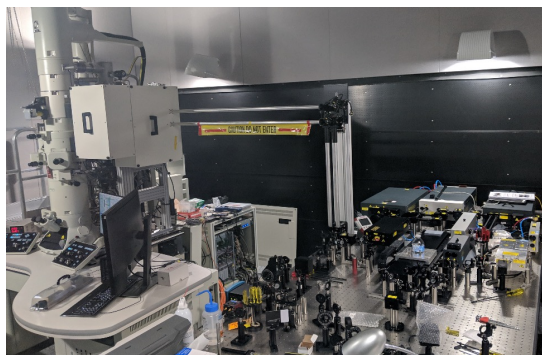
- Wafer-scale and cleanroom-based nanofabrication
- Synthesis and engineering of defects, 2D materials, NPs
- Nano-bio hybrid synthesis and synthetic biology
- Autonomous and automated synthesis and processing

Theory & Modeling with AI/ML

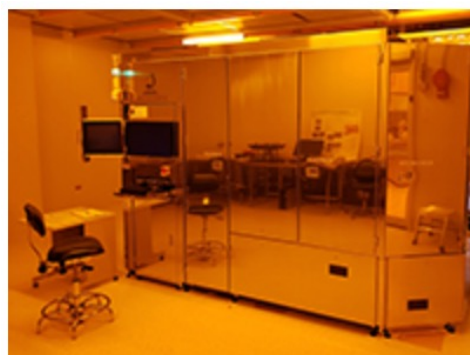
- High performance Carbon computing cluster
- Development of software: BLAST, FANTASTX, Ingrained, QuaC, etc.

Quantum Information Science/Quantum Materials

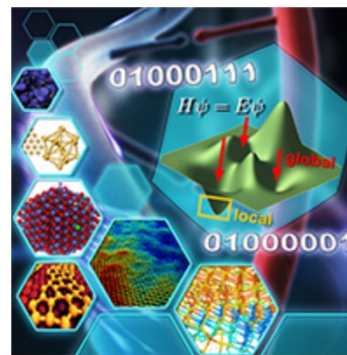
- Quantum optics/time-correlated single photon counting microscopy
- Quantum materials characterization at ultralow temps – includes a dilution refrigerator and an adiabatic demagnetization refrigerator



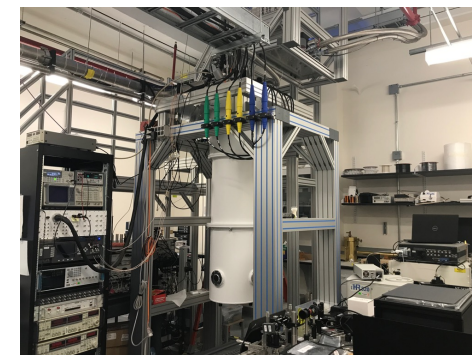
Ultrafast electron microscope



Electron beam lithography



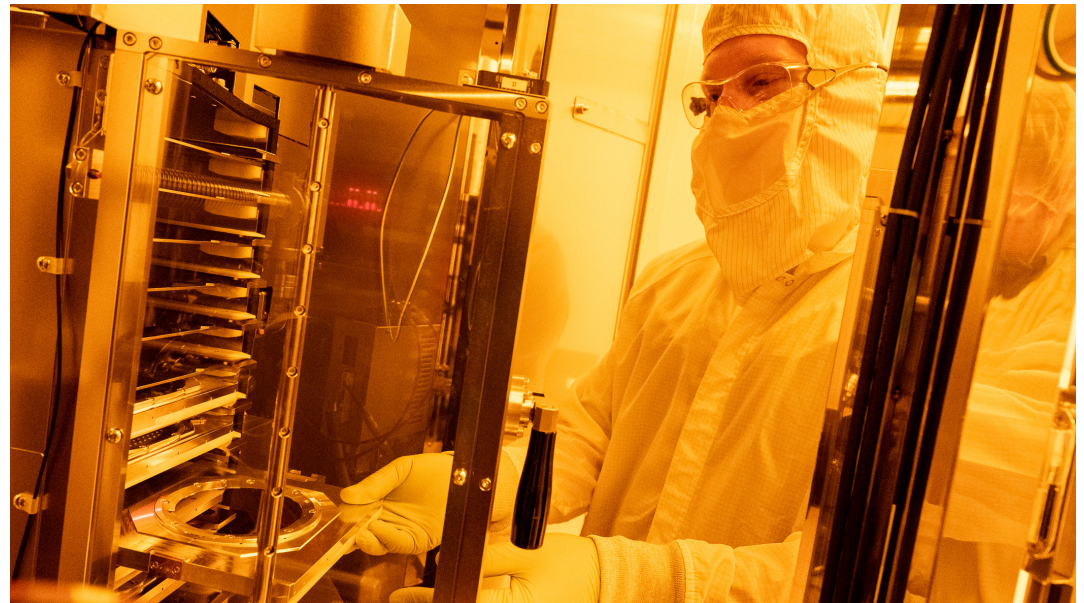
User software tools



Dilution refrigerator

CNM USER PROPOSALS

- 3 Calls for Proposals each year; synched with the APS (February, June, October)
 - Multi-facility user proposals are available
- General proposals are active for 1 year
- Scientific staff are available to collaborate or train on instrumentation




HOW TO BECOME A USER

- Use our interactive CNM Quick Start Guide to walk you through the steps
 - <https://www.anl.gov/cnm/user-quick-start-guide>
- Utilize the additional resources
 - Tools and capabilities list
 - Scientific staff list
 - Sample proposals
 - Proposal writing tips

CENTER FOR NANOSCALE MATERIALS

CNM User Quick Start Guide

New to the CNM? Unsure what the next step is in proposal submission or what steps to take once your proposal is accepted? Use this User Quick Start Guide to direct you through the processes of becoming a user, submitting a proposal, preparing for your arrival, and finishing your experiments at the CNM.

 **SUBMITTING YOUR PROPOSAL**

1 Register as a new or returning user > 2 Verify or establish a user agreement

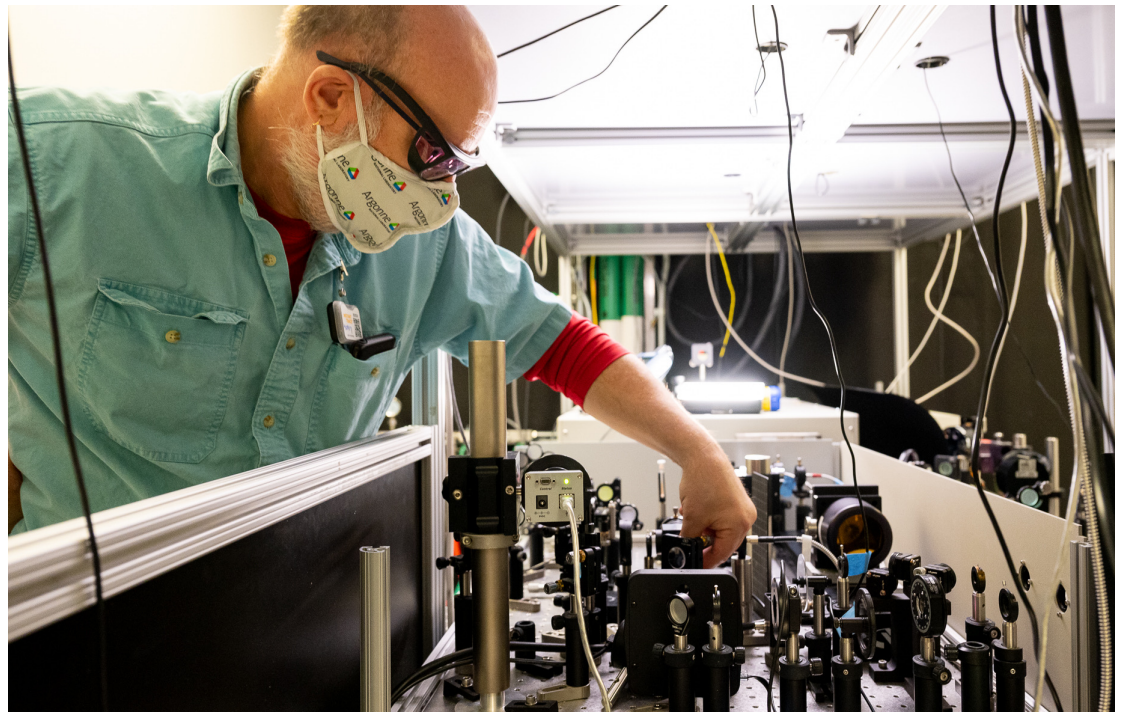
3 Discuss feasibility with Scientific Staff > 4 Submit a proposal

Additional Resources

- Proposal Form Worksheet
- Research Groups
- Tools and Capabilities List
- Sample Proposal and Tips for a Successful Proposal Submission

PROPOSAL REVIEW PROCESS

- Internal feasibility report
- Proposal Evaluation Board
 - ~ 135 external peer reviewers
 - Review Panel ranks proposals
 - Score on a scale of 1-40
- Evaluation Criteria
 - Scientific merit/impact
 - Justification for CNM resources
 - Experimental Detail
 - Feasibility



TIPS FOR WRITING A SUCCESSFUL PROPOSAL

- Specifically define work that can be completed in a one-year proposal timeframe
- Provide justification for the tools requested (why the CNM facilities are required)
- Supply background information on the importance of the proposed work and the impact on nanoscience
- Explain how the proposed work will generate impactful results and advance the scientific/technological field



THANK YOU!



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