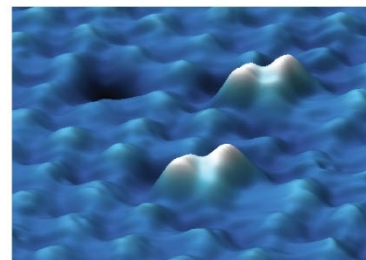
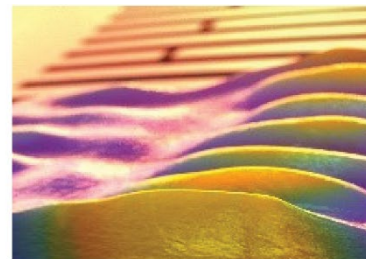
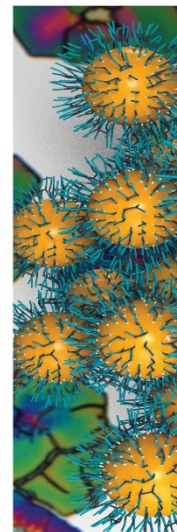
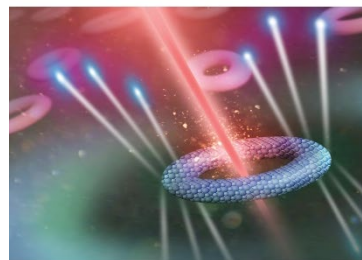
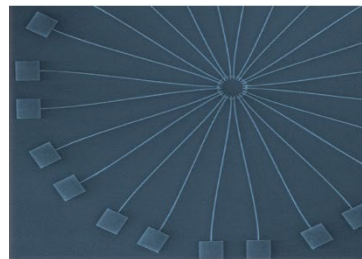


Center for Nanoscale Materials



Ilke Arslan
Director, Center for Nanoscale Materials
and Nanoscience and Technology Division

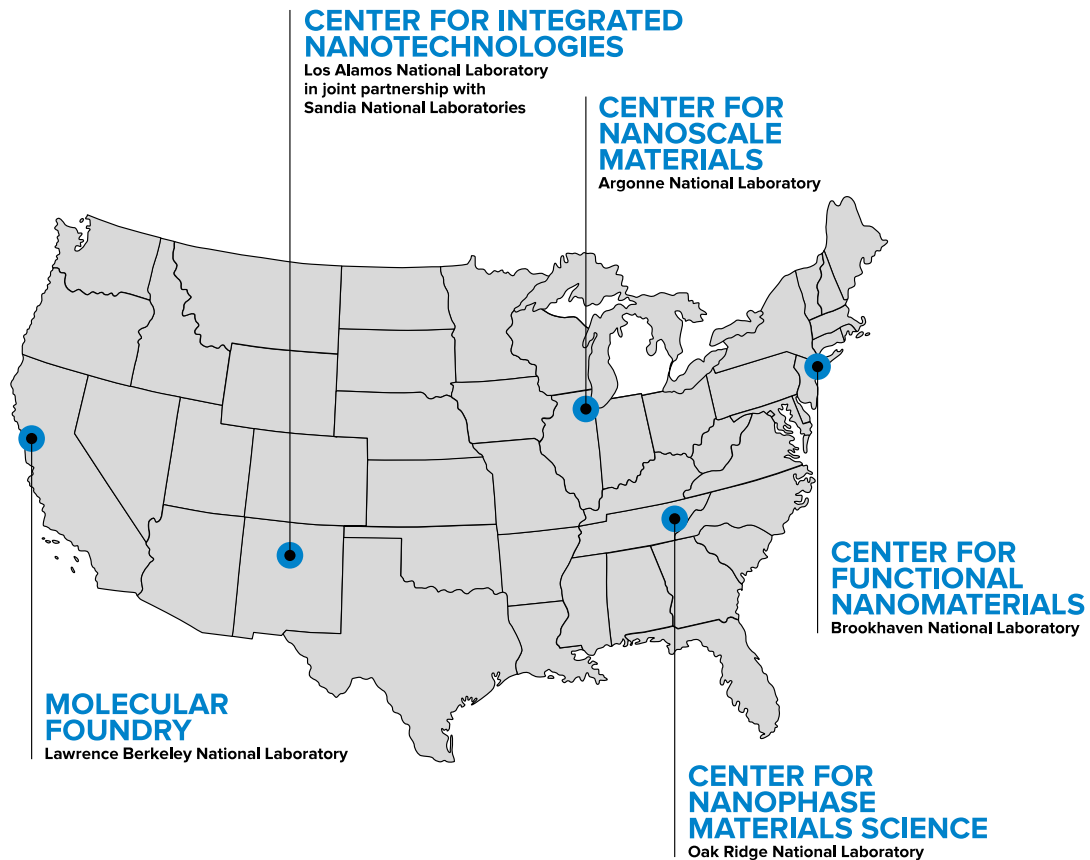
UChicago
Argonne, LLC



U.S. DEPARTMENT OF
ENERGY

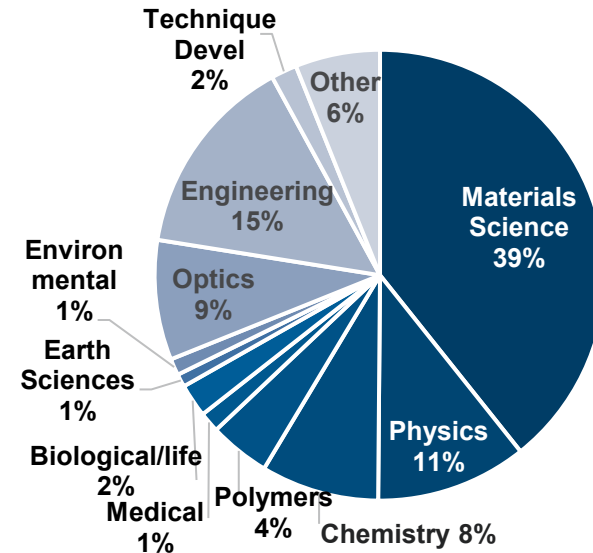
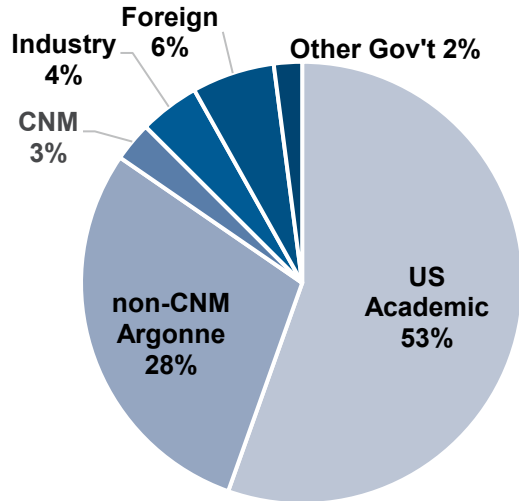
Argonne National Laboratory is a
U.S. Department of Energy laboratory
managed by UChicago Argonne, LLC.

Nanoscale Science Research Centers



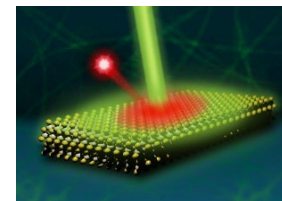
CNM User Community

- Total Users FY22: 756
- Onsite Users: 401
- Remote Users: 355

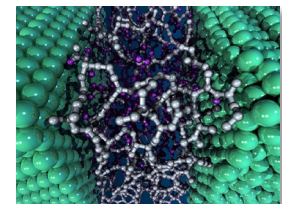


CNM Strategic Themes

- Quantum coherence by design
- AI/ML-accelerated analytics and automation
- Ultrafast dynamics and non-equilibrium processes
- Interfaces, assembly, and fabrication for emergent properties
- Nanoscale discovery for a sustainable energy future

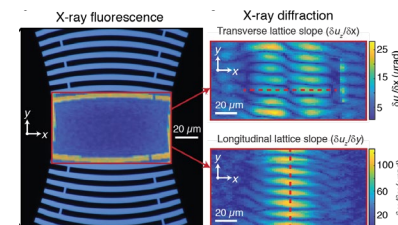


Quantum Emitters



Anti-wear diamond-like carbon films

All themes utilize expertise in synthesis, fabrication, characterization and theory



Lattice dynamics in excited materials

CNM Capabilities Overview

Advanced Microscopy and Dynamics

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

Synthesis and Nanofabrication

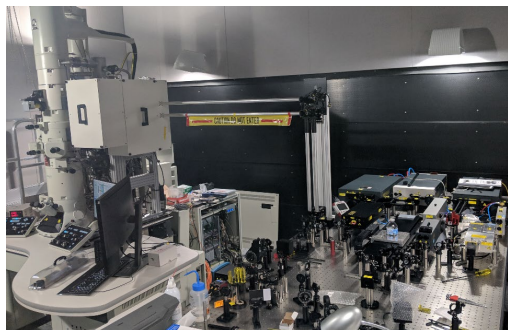
- Wafer-scale and cleanroom-based nanofabrication
- Synthesis and engineering of defects, 2D materials, NPs
- Nano-bio hybrid synthesis and synthetic biology
- Autonomous and automated synthesis and processing

Theory & Modeling with AI/ML

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

Quantum Information Science/Quantum Materials

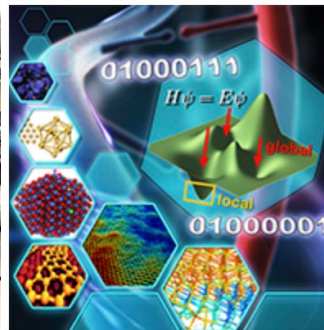
- Quantum optics/time-correlated single photon counting microscopy
- Quantum materials characterization at ultralow temps – includes a dilution refrigerator and an adiabatic demagnetization refrigerator



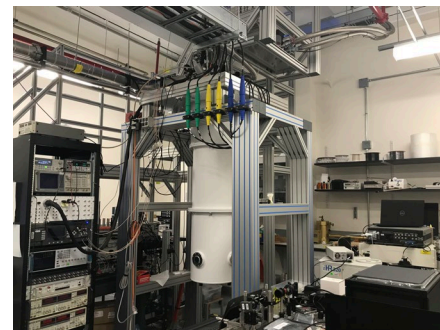
Ultrafast electron microscope



Autonomous synthesis and processing

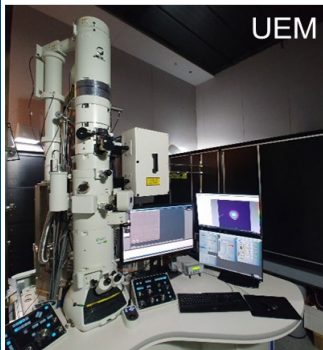


User software tools



Dilution refrigerator

Electron Microscopy Facilities at the CNM



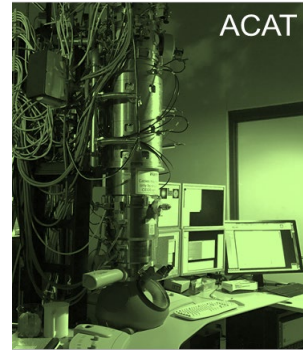
UEM



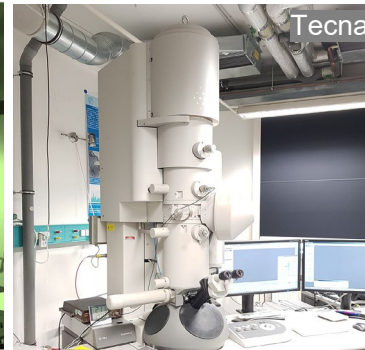
Talos



JEOL-2100F



ACAT



Tecnai

The **UEM** is a modified JEOL 2100 enables pump-probe experiments with variable wavelength and ~ 1 ps, ~ 1 nm and ~ 1 eV resolutions

Argonne Chromatic Aberration-corrected TEM (**ACAT**) is an FEI Titan with a spherical and chromatic image corrector, enabling 0.07 nm high-resolution electron microscopy (HREM) and ultra-low-dose HREM.

FEI **Talos** is a scanning/transmission electron microscope with an X-FEG and a X-EDS detector allowing fast and precise EDS mapping

FEI **Tecnai** is a scanning/transmission electron microscope with an FEG and specializing general analytical TEM characterization.

JEOL 2100F is a TEM specializing in in-situ TEM experiments. Multiple liquid, in-situ gas holders, electrical biasing, heating holders are available.

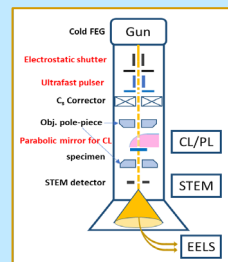
Three new TEMs in Three Years!

Spectra 200 AC-STEM
(07/2022)



- X-CFEG
- C_s probe corrector
- EMPAD
- Bi-Prism

Spectra 300 Queen-M
AC-STEM+CL (04/2023)



- Ultrafast Pulser (<100ps)
- Beam Blanker (10 ns)
- C_s probe corrector
- CL/PL system

MIE, DAC-S/TEM (2024)
High-speed imaging

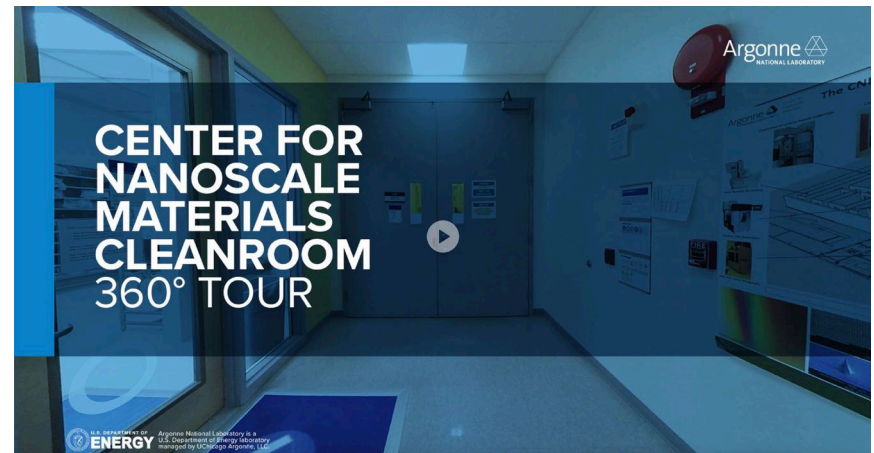


- Beam Blanker (10 ns)
- Double C_s correctors
- High speed imaging (11 μ s)
- Relativity system

OUTREACH & ENGAGEMENT

- CNM newsletters three issues per year
- CNM Cleanroom 360 tour
- CNM virtual tour
- CNM Promotional Video
- Hosted students to support the STEM pipeline:
 - DOE Graduate Education for Minorities program: 2 fellows
 - DOE Science Undergraduate Laboratory Internship program: 5 interns
 - DOE Office of Science Graduate Student Research Program: 3 fellows
 - Argonne Exemplary Student Research Program: 5 groups of students

<https://www.anl.gov/cnm>



BECOME A USER!

- New User Quick Start Guide
- Proposal Tips for Writing a Successful Proposal

Argonne NATIONAL LABORATORY

RESEARCH WORK WITH US COMMUNITY ABOUT US

CNM User Proposal Samples and Tips for Writing a Successful Proposal

Tips for Writing a Successful Proposal

Contact CNM Staff Prior to Proposal Submission

- Use the **CNM Scientific Contacts List** or contact the **User Office** to find staff suitable for your proposed experiments
- Get feedback on the scope and feasibility of your project
- Make sure you have reasonable estimates/requests for tool usage questions
- Ensure you have requested the **correct tools** for your experiments or obtain suggestions for other experiments/tools that could aid in the proposed research

CNM User Facility

- About CNM >
- Capabilities >
- Research >
- Groups >
- User Information >

Calls for 2022 user proposals open:

2022 proposals due:

February 4, 2022

March 11, 2022

June 3, 2022

July 1, 2022

October 3, 2022

October 28, 2022

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

AFTER YOUR PROPOSAL IS ACCEPTED

- 5 Test your Argonne Domain Account*
- 6 Submit safety documentation (LWS) See allocation email for link
- 7 Establish a user account for proprietary proposals
- 8 Touch base with your Scientific Contact
- 9 Complete CNM core user training and Pre-Job Brief
- 10 Plan for chemical usage, shipping, storage, disposal
- 11 Submit Visit Request (VMS) and reserve tool(s) concurrently

VMS External Link (no VPN or Onsite Access Required) | VMS Internal Link (VPN or Onsite Access required) | Tool Reservations

Groups >

User Information >

CNM User Quick Start Guide

- Become a User
- Prepare for Your Arrival
- Your Work at CNM
- Complete Your Work at CNM
- User Executive Committee
- Code of Conduct

News >

Events and Calendar >

Publications >

SHARE

CONTACT US

Center for Nanoscale Materials
General Inquiries
cnm_useroffice@anl.gov

<https://www.anl.gov/cnm>



Ilke Arslan
arslan@anl.gov

Connie Pfeiffer
cpfeiffer@anl.gov

THANK YOU