PennState Research

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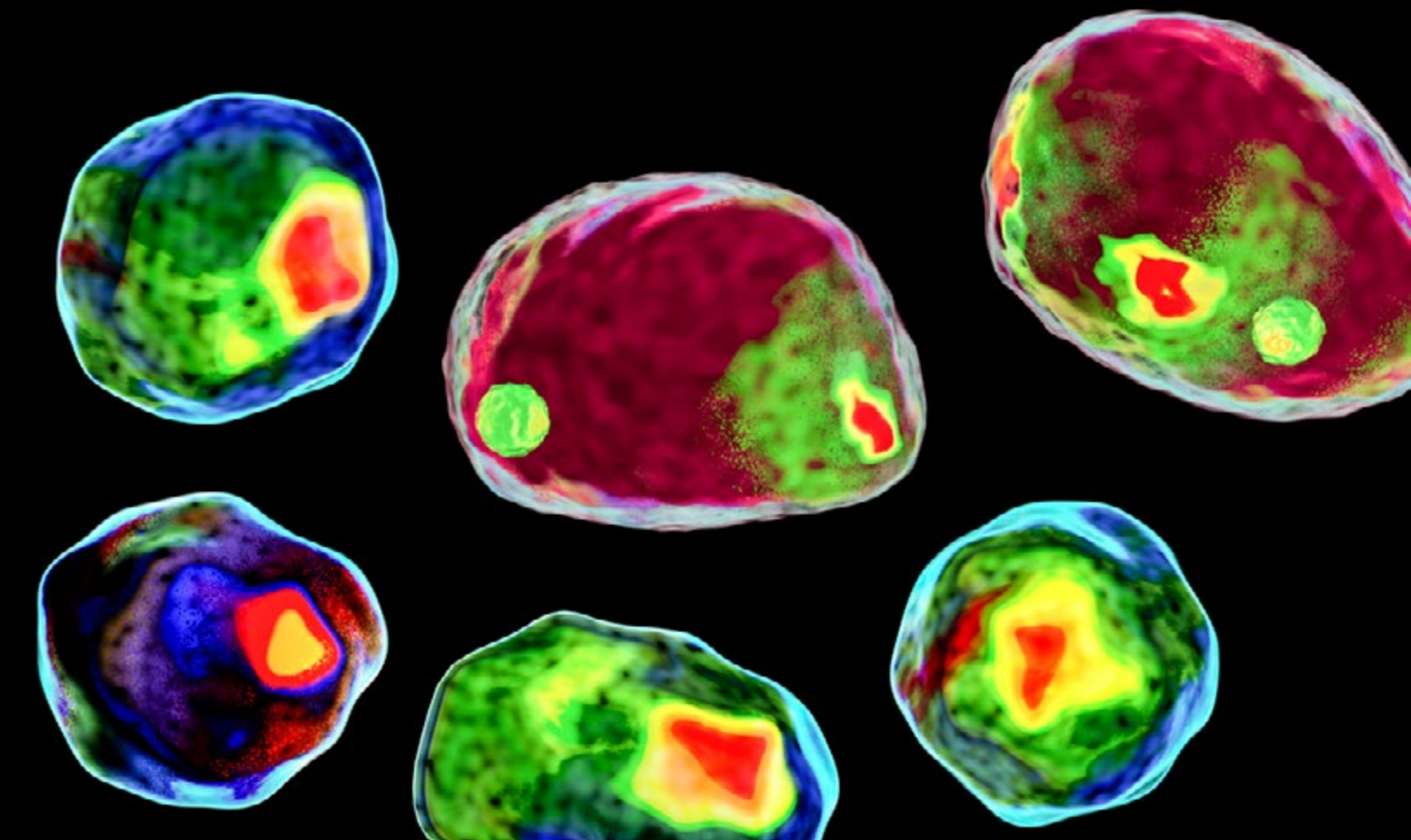
PENN STATE RESEARCH SERVICES

Research Facilities & Advanced Technology, Instrumentation, and Scientific Expertise available to the Public

Penn State's Research Facilities provide industry partners with access to advanced instrumentation, specialized services, and expert scientific guidance that would be costly and complex to build in-house.

Spanning disciplines from life sciences and materials to energy and data science, these shared resources enable companies to accelerate R&D, validate technologies, and solve complex technical challenges alongside world-class researchers.

These are just some of the many facilities and services offered by Penn State.



BIOLOGY FACILITIES

Penn State's biological facilities form a tightly integrated ecosystem for modern life science and biomedical research. Together, they cover the full pipeline from cells and tissues, through omics, imaging, model organisms, and translational infrastructure. This means that a single campus can support projects spanning basic discovery, preclinical validation, and clinical translation.

OMICS AND MOLECULAR PROFILING

At the foundation of Penn State's biological ecosystem are genomics, proteomics, and metabolomics facilities. Next-generation sequencing facilities support whole-genome, exome, and transcriptomic studies. Metabolomics and proteomics labs use advanced mass spectrometry to profile hundreds to thousands of molecules within a single sample.

STRUCTURAL & IMAGING SCIENCES

Cryo-electron microscopy, X-ray crystallography, high-field MRI, and NMR facilities provide atomic-to-tissue-scale insights. Complementary light and electron microscopy facilities, along with whole-slide digital pathology imaging, allow investigators to visualize disease processes and cellular dynamics in real time.

WHAT OUR BIOLOGY FACILITIES OFFER

- Multi-omic datasets spanning human, animal, plant, and microbial systems
- High-resolution structural biology and advanced microscopy across scales
- Model-organism, agricultural, and clinical infrastructures linking lab studies to real-world impact
- Support for NIH, USDA, NSF, and industry-funded projects

KEY BIOLOGY FACILITIES

- **Genomics Facility & Genome Sciences –** End-to-end NGS, exome/whole-genome, RNA-seq, and epigenomics.
- **Metabolomics & Proteomics Facilities –** Mass-spec-based profiling for biomarker discovery and pathway mapping.
- **Cryo-EM (Huck & COM) –** 3D visualization of macromolecular complexes.
- **Biomarker Lab –** High-throughput ELISA/ multiplex assays for clinical studies.

EXPLORE BIOLOGY FACILITIES HERE

BUSINESS FACILITIES

Organizations today operate in data-rich, uncertainty-heavy environments. Penn State's business-focused facilities transform data, behavior, and policy into actionable insight. From behavioral experiments and market simulations to survey research and health-economics modeling, these facilities help partners test ideas, evaluate programs, and make confident, evidence-based decisions—before scaling them in the real world.

TESTING IDEAS BEFORE THEY SCALE

Behavioral and experimental economics facilities provide controlled environments to study decision-making, incentives, and market dynamics. Partners can simulate auctions, pricing strategies, negotiations, and organizational changes while observing real human behavior under varied conditions. These experiments help organizations identify which strategies are most likely to succeed—reducing risk and improving outcomes before committing significant resources.

EVIDENCE THAT INFORMS STRATEGY

Beyond controlled experiments, Penn State's survey, data, and health-economics facilities generate evidence in real-world settings. By integrating survey results, administrative data, and cost-effectiveness analysis, partners gain clarity on what works, for whom, and at what cost. This evidence supports strategic investments, policy decisions, and innovation in regulated and impact-driven sectors—ensuring decisions are grounded in data, not intuition.

KEY BUSINESS-FACING FACILITIES

- **Behavioral Lab:** Human-subject experiments in marketing, decision-making, and organizational behavior.
- **Laboratory for Economics, Management, and Auctions (LEMA):** Experimental economics lab simulating markets, negotiations, and auctions; a hub for pricing and market-design trials.
- **Survey Research Center:** Full-service survey design and fielding for testing markets, messaging, and program impact.
- **Center for Applied Studies in Health Economics (CASHE):** Health-economics and cost-effectiveness analysis using large-scale claims and outcomes data.
- **Evidence-to-Impact Collaborative (EIC):** Program evaluation and evidence-use expertise supporting policy and social-impact initiatives.
- **Data Resources Hub:** Secure data acquisition, governance, and analytical support for business and policy research.

WHAT OUR BUSINESS FACILITIES OFFER

- Controlled experimental platforms for testing markets and behavior
- Survey research and data infrastructure for real-world insight
- Health-economics and policy analysis for complex, regulated sectors
- Evaluation connecting evidence to action

EXPLORE BUSINESS FACILITIES HERE

CHEMISTRY FACILITIES

Chemistry underlies advances in medicine, energy, materials, and manufacturing. Penn State's chemistry facilities provide the structural and analytical tools researchers need to design, understand, and refine molecules and materials with precision. Integrated nuclear magnetic resonance (NMR), X-ray crystallography, and mass spectrometry—supported by specialized technical shops—enable chemists across campus to pursue ambitious ideas from discovery through application.

SEEING AND UNDERSTANDING MOLECULES

Penn State's NMR and crystallography facilities allow researchers to resolve chemical structure at atomic resolution. High-field NMR instruments support analysis of complex mixtures, polymers, and biomolecules, while X-ray crystallography enables both small-molecule and macromolecular structure determination. These platforms help validate synthetic pathways, understand reactivity, and guide the rational design of drugs, catalysts, and materials.

ANALYTICAL POWER ACROSS SCALES

Mass spectrometry and proteomics facilities complement structural tools by providing high-sensitivity analysis across chemical systems—from small metabolites to intact proteins. By integrating NMR, MS, and crystallographic data, researchers build multi-dimensional views of molecular systems, accelerating discovery, optimization, and quality assessment in chemistry, biology, and more.

KEY MATERIALS FACILITIES

- **Nuclear Magnetic Resonance Facility –** Campus-wide NMR housing Bruker instruments from 300–850 MHz.
- **Biomolecular NMR (COM) –** Small-molecule structure, metabolomics, and tissue analysis.
- **X-Ray Crystallography (Chem + Huck) –** Single-crystal and macromolecular structure determination.

WHAT OUR MATERIALS FACILITIES OFFER

- High-field NMR, X-ray crystallography, and advanced mass spectrometry
- Integrated proteomics and metabolomics for systems-level insight
- Custom glassware, cryogens, and instrumentation support
- Support for hundreds of projects in pharma, catalysis, and materials

EXPLORE CHEMISTRY FACILITIES HERE

ENGINEERING FACILITIES

From nanoscale devices to full-scale bridges, Penn State's engineering facilities provide the environments where ideas become prototypes and prototypes become tested solutions. These facilities support design, fabrication, and evaluation across electrical, mechanical, civil, and manufacturing disciplines.

NANOSCALE TO DEVICE

The Nanofabrication Lab, 2D Crystal Consortium, and Materials Characterization Lab form a complete pipeline for creating and testing advanced materials and devices. Researchers can deposit thin films, pattern nanoscale structures, and perform comprehensive structural and functional characterization. These facilities underpin advances in semiconductors, sensors, energy devices, and beyond.

MANUFACTURING & CIVIL INFRASTRUCTURE AT SCALE

At larger scales, manufacturing and civil-infrastructure facilities support process development and real-world testing. Industrial-scale plastics processing labs and advanced manufacturing centers give researchers and partners access to equipment that mirrors modern production lines. The Civil Infrastructure Testing and Evaluation Lab and the Larson Transportation Institute offer test tracks, structural bays, and instrumentation to evaluate pavements, bridges, and transportation systems. Together, they enable realistic testing before deployment in the field.

WHAT OUR ENGINEERING FACILITIES OFFER

- Nanoscale device fabrication and world-class materials characterization.
- Industrial-scale manufacturing labs for polymers, metals, and composites.
- Full-scale civil and transportation infrastructure testing environments.

KEY ENGINEERING FACILITIES

- **Nanofabrication Lab; 2D Crystal Consortium; Materials Characterization Lab (MCL) –** Together, these form a full stack for developing and characterizing advanced materials, devices, and 2D electronics.
- **Advanced Manufacturing and Innovation Center (AMIC); Plastics Processing Lab; Burke Center Labs; OBS Labs –** Regional hubs for manufacturing process development, polymer processing, and mechanical/chemical characterization.
- **Civil Infrastructure Testing and Evaluation Lab (CITEL); Larson Transportation Institute –** Large-scale structural, pavement, and transportation systems testing, with direct applications to DOTs, contractors, and OEMs.
- **Research Instrumentation Facility; IEE Shared Equipment –** Support for designing, building, and sharing specialized engineering instruments.

EXPLORE ENGINEERING FACILITIES HERE

IMAGING FACILITIES

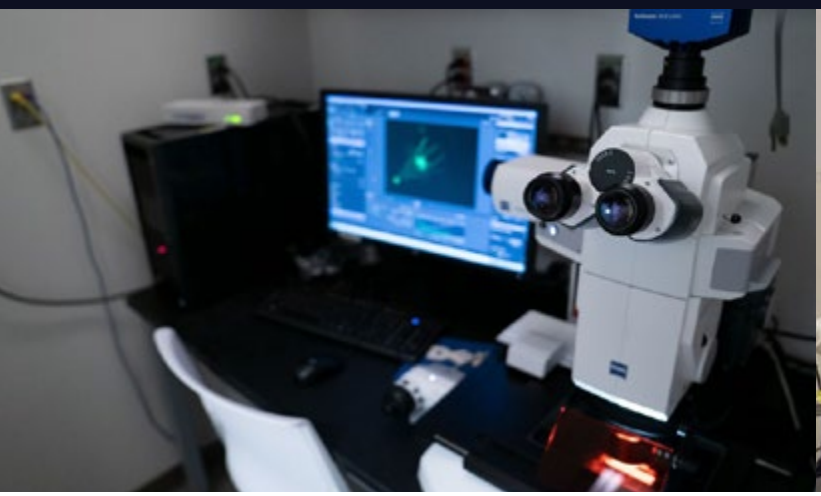
Penn State's imaging facilities provide an unparalleled window into structures and processes across every scale of biological and physical inquiry — from nanometer-scale molecular complexes to whole human brains. With capabilities spanning cryo-electron microscopy, advanced light and electron microscopy, high-field MRI, digital pathology, and behavioral neuroscience imaging, these facilities serve investigators across biology, medicine, materials science, engineering, and the social sciences. For partners and donors, this ecosystem represents a high-leverage opportunity to advance rapidly evolving imaging technologies and the translational discoveries they make possible.

MICROSCOPY & STRUCTURAL IMAGING

Advanced light and electron microscopy facilities enable high-resolution imaging of cells, tissues, and materials in two and three dimensions. Cryo-electron microscopy reveals the architecture of macromolecular complexes, while digital pathology scanners convert histological slides into shareable, analyzable datasets.

PRECLINICAL TO HUMAN STUDIES

Preclinical imaging facilities offer bio-luminescent, fluorescent, and MRI-based modalities for small-animal models, enabling longitudinal tracking of disease and treatment response. Clinical imaging facilities, including high-field MRI and quantitative radiology labs, support methods development and human-subject research across Penn State Health.



WHAT OUR MATERIALS FACILITIES OFFER

- Multi-scale imaging from nanometer-scale EM to whole-body MRI
- Preclinical and clinical imaging platforms for translational research
- Specialized imaging for social, behavioral, and cognitive neuroscience
- Whole-slide digital pathology and AI-ready image analysis workflows

EXPLORE IMAGING FACILITIES HERE

KEY IMAGING FACILITIES

- **Cryo-EM Facility (Huck & COM) –** 3D visualization of macromolecular complexes and cellular ultrastructure.
- **Advanced Light Microscopy (COM) –** Fluorescence imaging, consultation, training, and image analysis software.
- **Microscopy Facility (Huck) –** Optical and electron microscopy with expert staff assistance.
- **APERIO Slide Scanner –** High-throughput whole-slide digital histology imaging up to 400 slides at 20x/40x.

MATERIALS FACILITIES

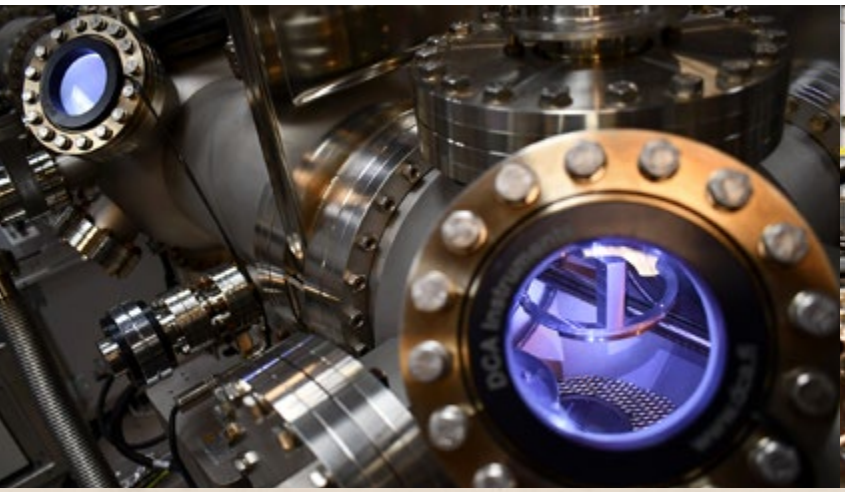
Materials science is a signature strength at Penn State, and our advanced materials laboratories provide end-to-end support for designing, fabricating, and characterizing materials for tomorrow's technologies. From 2D materials and semiconductors to polymers and composites, these labs connect fundamental discovery to real-world applications.

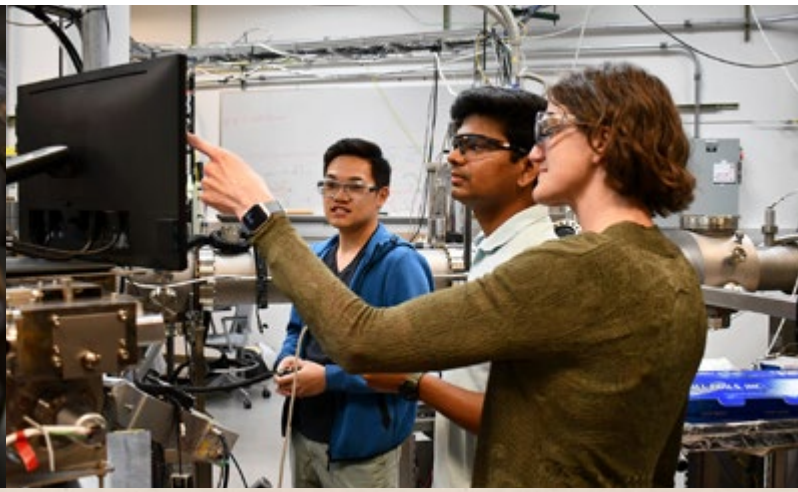
2D MATERIALS AND NANOFABRICATION

The 2D Crystal Consortium, Nanofabrication Lab, and Materials Characterization Lab operate as a tightly integrated platform for advanced materials. Investigators can grow high-quality 2D crystals, pattern nanoscale structures, and measure electrical, optical, and mechanical properties using state-of-the-art instruments. This infrastructure supports work in low-power electronics, quantum devices, flexible systems, and more.

POLYMERS, COMPOSITES & INDUSTRIAL MATERIALS

Plastics processing labs, Burke Center facilities, and additional characterization resources at regional campuses support research in polymers, composites, and multifunctional materials. Industrial-scale equipment mirrors conditions found in manufacturing environments, allowing for realistic testing of new formulations, processing strategies, and product designs.





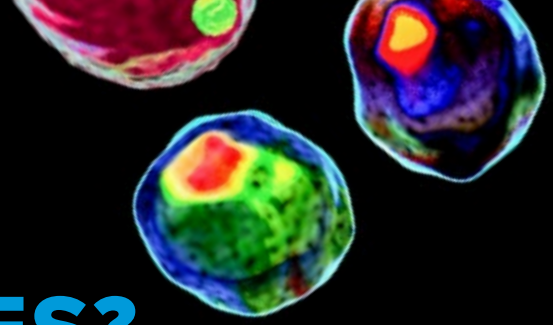
KEY MATERIALS FACILITIES

- 2D Crystal Consortium (2DCC-MIP) – NSF-supported national user facility for single-crystal 2D chalcogenides.
- Nanofabrication Lab (MRI) – Nanoscale device fabrication with deposition, lithography, and etch.
- Materials Characterization Lab (MCL) – Comprehensive materials instruments and training for engineers and scientists.
- Center for Quantitative Imaging – Non-destructive 3D microCT imaging of natural and synthetic systems.

WHAT OUR MATERIALS FACILITIES OFFER

- National-scale platforms for 2D materials, nanofabrication, and advanced characterization.
- Comprehensive polymer and composite processing labs aligned with industrial needs.
- Cross-disciplinary expertise linking materials science, physics, chemistry, and engineering.

EXPLORE MATERIALS FACILITIES HERE



WHY PENN STATE RESEARCH SERVICES?

Penn State operates one of the most comprehensive shared research infrastructure ecosystems in the nation — spanning genomics, imaging, materials, engineering, behavioral science, and beyond. Whether you're an industry partner accelerating R&D or an investigator pushing the boundaries of your field, our facilities give you access to capabilities that would be impossible to replicate on your own.

EXPERT STAFF, NOT JUST EQUIPMENT

Every facility is supported by dedicated scientists and technical staff who are invested in your success. You're not renting a room — you're gaining a collaborator who knows the instrumentation, understands the science, and helps you get better data faster.

A PARTNER FROM DAY ONE

From initial consultation and study design through data collection and analysis, Penn State's facilities are structured to support the full arc of a research project — not just a single step in the process.

MAXIMUM VALUE, SHARED INVESTMENT

Shared facilities dramatically reduce the cost of cutting-edge research. Instead of investing in equipment acquisition, maintenance, and staffing independently, you tap into infrastructure that is already operational, optimized, and ready to use.

BUILT FOR CROSS-DISCIPLINARY WORK

Our facilities don't operate in silos. Facilities across biology, chemistry, engineering, materials, and imaging are designed to work together, so projects that span disciplines have a seamless home at Penn State.

FACILITY FINDER

FIND THE RIGHT FACILITY FOR YOUR RESEARCH.

Browse dozens of specialized facilities across Penn State — from genomics and imaging to materials science and beyond. **Visit cores.psu.edu/core-facility-finder**

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