Argonne NATIONAL LABORATORY

Center for Nanoscale Materials

New research center fuels the nanorevolution

The Center for Nanoscale Materials at Argonne National Laboratory is a national resource for the United States to foster new research capabilities in nanoscale synthesis and processing and plays a key role in the U.S. Department of Energy's participation in the interagency National Nanotechnology Initiative.

The center's mission includes supporting basic research and advanced instrumentation development for the creation of novel materials, using both top-down and bottom-up self-assembly, that provides new insights at the nanoscale level. The facility also supports a user program through peer-reviewed proposals that is open to academic, industrial, government, and international potential users.

The Center for Nanoscale Materials is a joint partnership between the U.S. Department of Energy and the State of Illinois. It is one of five centers built across the nation as part of DOE's Nanoscale Science Research Center program under the Office of Basic Energy Sciences.

Areas of expertise

- **Electronic & magnetic materials & devices**
  Discovers, understands, and uses new electron- and spin-based materials and phenomena in constrained geometries for critical applications such as improved efficiency of data storage by spin current and electrical field-assisted writing, and enhanced energy conversion in photovoltaic devices.

- **Nanobio interfaces**
  The integration of "soft" biological and organic molecular assemblies with "hard" inorganic nano-architectures can be applied to chemical catalysis, sensors, information storage, artificial vision, and biological intervention, for example.

- **Nanofabrication**
  Fabricates new nanostructured materials, nanodevices, and nanosystems by advancing state-of-the-art techniques in nanopatterning to incorporate both top-down and bottom-up approaches.

- **Nanophotonics**
  Controls optical energy and its conversion on the nanoscale by combining metal, organic, semi-conducting, and dielectric materials properties to create strongly coupled states of light and matter for chemical and catalytic reactivity, photonic circuits, sensors, and optical non-linearities.

- **Theory & modeling**
  Develops the theory, modeling, and computational capabilities to establish a Virtual Fab Lab for nanoscience, with the goal of designing novel nanoscale materials with user-defined properties.

- **X-ray microscopy**
  Creates images of new materials and novel phenomena at the nanoscale, both static and dynamic, in real and reciprocal space with an emphasis on implementation of a hard X-ray nanoprobe beamline at the Advanced Photon Source.

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