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FOR IMMEDIATE RELEASE

Argonne dedicates new Center for Nanoscale Materials

ARGONNE, Ill. (Sept. 18, 2006) – The U.S. Department of Energy’s Argonne National Laboratory is moving to the forefront of the materials science revolution today with the opening of its Center for Nanoscale Materials.

Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications. A nanometer is one-billionth of a meter, about 70,000 times smaller than the width of a human hair.

“Argonne’s new Center for Nanoscale Materials is one of five DOE facilities that our Office of Science is building to provide the nation’s research community with state-of-the-art resources,” Secretary of Energy Samuel W. Bodman said. “The fundamental research conducted at the center is expected to accelerate the revolution that has already begun in nanotechnology and lead to a better understanding of the behavior of nanomaterials.”

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Argonne National Laboratory
is managed by the
University of Chicago for the
U.S. Department of Energy.

CNM Dedication – add one

Illinois Gov. Rod Blagojevich said, “Nanotechnology is the most significant technological frontier being explored today. Materials and devices at the nanoscale level hold vast promise to help us cure the sick, protect our environment and make us more secure. But that is only the beginning. By investing in cutting edge research projects like this one at Argonne with the Department of Energy, we’re proving why Illinois continues to be a national leader in scientific innovation that is changing our world and creating better jobs for more people.”

At the nanoscale, the physical, chemical and biological properties of materials differ in fundamental and valuable ways from the properties of individual atoms and molecules or bulk matter. “It’s hard to imagine a technology that won’t be impacted by nanoscience, including biotechnology, computation, materials development and energy technology,” said Eric Isaacs, center director. “The list is endless.”

The Center for Nanoscale Materials at Argonne will integrate nanoscale research with Argonne’s existing capabilities in synchrotron X-ray studies, neutron-based materials research and electron microscopy with new capabilities in nanosynthesis, nanofabrication, nanomaterials characterization, and theory and simulation. The center is one of five being built at national laboratories across the country as part of the U.S. Department of Energy’s Nanoscale Science Research Center program under the Office of Basic Energy Sciences.

Nanoparticles are dominated by surfaces and interfaces with other materials, therefore it’s important to understand how they relate to a material’s atomic structure and surface chemistry. This is where a number of disciplines come into play, including materials physics, surface chemistry and organic chemistry. For example, it has been recently demonstrated that the color of the emission from a semiconductor nanoparticle can be controlled not only by size, but by binding a single or a few organic molecules to the surface.

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CNM Dedication – add two

Researchers hope this facility will lead to the creation of new materials that transcend the performance-limiting present-day materials and processes. These materials, incorporated into new devices and applications — such as ultra strong permanent magnet nanocomposites, magnetic electronics and sensors, solar energy conversion and storage systems, and molecular conductors — offer specific functionality for diverse energy-related applications.

Work at the CNM will also look at integrating novel materials, specifically bio-organic and inorganic materials. This research will lead to the creation of entirely new classes of materials with tailored functionalities coupled with individual components.

The center will also have the multidisciplinary ability to mix and combine materials with patterning. “We want to go beyond making materials and create novel devices,” Isaacs said.

The center’s mission also includes the development of state-of-the-art tools, which includes a joint project with the Advanced Photon Source at Argonne to develop the world’s best X-ray microscope to study these novel materials. “If you’re making little things,” Isaacs notes, “you need a tool to look at them. The resolving power of this instrument will be 1,000 times better than an optical microscope,” said Isaacs. “Since X-rays can penetrate materials non-destructively, researchers will be able to determine the three-dimensional structure of nanoparticles embedded in host materials or under growth conditions. Using this tool to characterize extremely small structures will help build, atom by atom, new materials with desired properties.”

Another part of the facility unique to the Midwest and crucial to the development of nanomaterials is an 11,000-square-foot clean room with state-of-the-art nanofabrication capabilities. “When you’re trying to make small materials, the smallest speck of dust is huge and can easily spoil the material,” said Isaacs.

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CNM Dedication – add three

The center is now in the early phase of accepting users. Over the next year and a half it will fill with people and tools until it is fully operational in October 2008. The center was built as a joint partnership between the Department of Energy and the State of Illinois. The State of Illinois provided \$36 million for the 85,000-square-foot building. The Department of Energy is providing \$36 million to develop and build the facility's advanced instrumentation and will provide the necessary funds for its operation as a user facility.

“We expect the CNM to attract hundreds of researchers to Argonne each year,” said Isaacs. “What they accomplish here will forever change how we view materials and how we put them to work to improve our world.”

The nation's first national laboratory, Argonne National Laboratory conducts basic and applied scientific research across a wide spectrum of disciplines, ranging from high-energy physics to climatology and biotechnology. Since 1990, Argonne has worked with more than 600 companies and numerous federal agencies and other organizations to help advance America's scientific leadership and prepare the nation for the future. Argonne is managed by the University of Chicago for the U.S. Department of Energy's Office of Science.