

Nanoscale Science Research Centers (NSRCs):

User facilities for nanoscience and nanotechnology.

Stefano Cabrini

Molecular Foundry LBNL One Cyclotron road Berkeley CA USA

The Nanoscale Science Research Centers (NSRCs) are DOE's premier user centers for interdisciplinary research at the nanoscale, serving as the basis for a national program that encompasses new science, new tools, and new computing capabilities. Each center has particular expertise and capabilities in selected theme areas, such as synthesis and characterization of nanomaterials; catalysis; theory, modeling and simulation; electronic materials; nanoscale photonics; soft and biological materials; imaging and spectroscopy; and nanoscale integration. The centers are housed in custom designed laboratory buildings near one or more other major BES facilities for x-ray, neutron, or electron scattering, which complement and leverage the capabilities of the NSRCs. These laboratories contain clean rooms, nanofabrication resources, one-of-a-kind signature instruments, and other instruments not generally available or co-located except at major user facilities. These facilities are routinely made available on a scientific merit basis to the broad research community. There are five NSRCs:

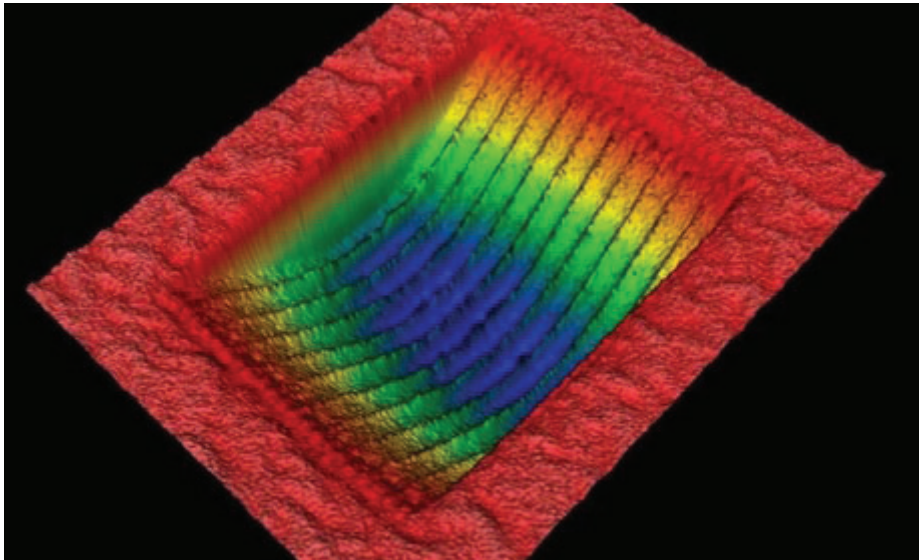
- Center for Functional Nanomaterials (CFN) at Brookhaven National Laboratory
- Center for Integrated Nanotechnologies (CINT) at Los Alamos National Laboratory and Sandia National Laboratories
- Center for Nanophase Materials Sciences (CNMS) at Oak Ridge National Laboratory
- Center for Nanoscale Materials (CNM) at Argonne National Laboratory
- The Molecular Foundry (TMF) at Lawrence Berkeley National Laboratory

Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers (one billionth of a meter), where unique phenomena enable new applications. At these size scales, small numbers of atoms, molecules, and supramolecular structures exhibit new phenomena which produce novel electronic, optical, chemical and structural macroscopic properties. To discover, understand and synthesize nanostructures, NSRCs make available sophisticated research tools for nanoscience and nanotechnology to the broad scientific community, and facilitate access to other collocated major facilities including synchrotron radiation light sources, neutron scattering centers, and electron beam microcharacterization facilities. The NSRCs are the DOE signature activity in nanoscale research and constitute the nation's largest scientific infrastructure investment under the National Nanotechnology Initiative.

The mission of the NSRCs is twofold: to enable the external scientific community to carry out high-impact nanoscience projects through an open, peer-reviewed user program, and to conduct in-house research to discover, understand, and exploit functional nanomaterials for society's benefit.



One of the laboratories available for the users at Molecular Foundry



Nano-mechanical plasmonic phase modulator with potential for electronics at CNM