

The Department of Energy's Nanoscale Science Research Centers (NSRCs)

E. W. Plummer^{1,2}

¹*Department of Physics and Astronomy, The University of Tennessee, Knoxville, TN 37996*

²*Condensed Matter Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831*

The Department of Energy, Office of Basic Energy Sciences has undertaken a ~300 million dollar project to construct five NSRCs at the major DOE laboratories. The NSRCs will serve the nanoscience and nanotechnology community. The five NSRC are:

- Center for Nanoscale Materials (CNM) at Argonne National Laboratory (nano.anl.gov),
- Center for Functional Nanomaterials (CFM) at Brookhaven National Laboratory (www.cfn.bnl.gov),
- The Molecular Foundry at Lawrence Berkeley National Laboratory (foundry.lbl.gov),
- Center for Integrated Nanotechnologies (CINT) at Sandia National Laboratory and Los Alamos National Laboratory (cint.lanl.gov) and,
- Center for Nanophase Materials Sciences (CNMS) at Oak Ridge National Laboratory (www.cnms.ornl.gov).

The role of the NSRSs in the mission of DOE will be described, followed by a brief description of the focus areas of each of the centers. The time frame from construction to full operation for each of the NSRCs will be outlined.

I will then describe in detail the center at Oak Ridge National Laboratory, CNMS. The CNMS will be co-located on Chestnut Ridge with the Spallation Neutron Source as shown in Fig. 1. The SNS is a 1.4 billion dollar construction project that is scheduled for completion in 2006 and full operation in 2008. The CNMS building is under construction and the first wave of special equipment has been ordered or is being constructed. CNMS has begun early operation in what has been called the "jump start" mode, limiting the number of research focus areas to few, such as nanofabrication, synthetic and bio-inspired macromolecular materials, nanotubes and related materials and, theory and modeling. In 2005

CNMS will become fully operational, hosting users and long-term collaborators.

CNMS has mounted an ambitious program in advanced instrument for characterization of nanoscale materials. I will describe the instruments being purchased or constructed. The ORNL NSRC has focused on fabrication of nanostructure materials with the Nanofabrication Research Laboratory being the centerpiece. The various growth and fabrication capabilities will be described. Finally, I will illustrate the opportunities available for the scientific community to take advantage of the capabilities at the CNMS, either as a short-term user or as a long-term partner.



Fig. 1. Aerial view of the Oak Ridge National Laboratory Spallation Neutron Source Campus on Chestnut Ridge. CNMS is attached to the SNS Central Laboratory and Office (CLO) building.