



**MARYLAND
NANOCENTER**
Shared User Facilities

Maryland NanoCenter. The Maryland NanoCenter (nanocenter.umd.edu) was established in 2004 at the University of Maryland to advance nano and micro scale research by providing state-of-the-art facilities to the campus and the region.



The NanoCenter supports three major shared user facilities for design, fabrication, manipulation and discovery of nanomaterials: the FabLab and NispLab in the University of Maryland's Jeong H. Kim Engineering Building and the NanoOptics Lab in UMD's IREAP Building.

These labs are open not only to on-campus research groups, but to users from industry, government, and other universities.

FabLab nanocenter.umd.edu/labs/FabLab/ The NanoCenter's FabLab is a 10,000 ft² clean room micro- and nano-fabrication complex. It features four bays (deposition, thin films/CVD, etch, and lithography), a spacious teaching lab and an Exploratory Materials laboratory.

Designed as a class 1000 environment, the main research areas routinely operate at class 100 or better. The FabLab is run by a highly-skilled staff of five people, all with many years of industrial clean room and R&D experience.

Open to All

Since 2004, the NanoCenter has been used by:

- 60+ UM professors
- 7 government labs
- 10 universities
- 54 businesses



Several key tools for nanofabrication have been acquired in the past few years, including a Raith eLine 150 electron beam lithography system, an Atomate nanowire growth system, and a Beneq atomic layer deposition system.

Microfabrication tools include: PVD (evaporation & sputtering), CVD, thermal oxide growth, PECVD, dry etching, deep RIE, wet etching, photolithography, wafer alignment and bonding and rapid thermal annealing. Inspection and metrology tools are included: a SEM, surface profiling, electrical test, Hall measurement, thin film stress measurement, and more.

NispLab nanocenter.umd.edu/labs/NISP/ The NanoCenter's NispLab is home to electron microscopy instruments, including two new JEOL 200kV transmission electron microscopes (a LaB6 with EDS, and a FE-TEM with EDS and EELS), a Hitachi FE-SEM with EDS and a JEOL wavelength dispersive electron microprobe.

The NispLab has a highly experienced staff of four. It is well known for cutting-edge research performed on its TEMs, particularly in-situ experiments.



NanoOptics Lab nanocenter.umd.edu/nanoopticslab/ The NanoOptics Lab hosts advanced nano and optical capability. An NT-MDT electrochemical scanning probe microscopy system provides a wide variety of scanning nanoprobe modes plus coupling to microRaman, tip-enhanced Raman, and near-field scanning optical microscopy. UV-Vis and FTIR systems complement the optical capability.

The FEI dual-beam FIB system enables nanoscale milling, deposition and TEM cross-section preparation. Multiple nanoprobes position samples in the FIB.