The Center for Emergent Materials: an NSF MRSEC (CEM), is one of a national network of 23 MRSECs that foster active collaboration between universities and industry. CEM researchers work in teams to tackle nanoscale materials science problems too complex for researchers to solve alone. CEM was founded in 2008 and received renewed support totaling $17.9M from the National Science Foundation in 2014 to support it through 2020.

**OUR GOAL**

“CEM puts Ohio State squarely in the top echelon of research universities with significant materials research programs. Our goal is to facilitate integrated research on emergent materials and phenomena in magneto-electronics to lay the practical foundation for creating new models for computing and information storage. This includes building both future oxide-based electronic devices that can perform multiple functions, and energy-efficient, fast computers that have integrated memory and logic.”

(Christopher Hammel, Director, CEM)

**Building tomorrow’s faster, better, energy-efficient devices today.**
SHARED EXPERIMENTAL FACILITIES

- Atomic and Magnetic Force Microscopy down to 4K in 14 Tesla
- Crystal Growth
- Crystallography
- Chemical Vapor Deposition
- Clean Room & Organic Clean Room
- Electron Microscopy & Focused Ion Beam Milling
- Magnetic Characterization and Microscopy
- Materials Processing / Preparation
- Microfabrication / Microelectronics
- Optical Microscopy
- Optical & e-beam Lithography
- Magnetic Resonance Spectroscopy
- Surface Preparation / Characterization
- Thin Film Fabrication and Characterization
- X-ray Diffraction

PARTNERSHIPS

CEM has robust national and international collaborations with organizations like IFW-Dresden in Germany, Iowa State, University of Tennessee, Case Western, UCLA and UC Berkeley, to name a few. Industrial and commercial collaborations with companies such as HGST, a Western Digital company; IBM Research-Almaden; Lake Shore Cryotronics; Traycer Systems, Inc. and Entrotech Inc. improve both partners’ ability to translate technologies from the lab to the commercial sector. The next generation of researchers, through CEM undergraduate, graduate and postdoc educational programs, will translate innovative technologies into commercial successes.

EDUCATION/OUTREACH

Education is an important component of CEM research activities. This includes enhancing graduate and advanced undergraduate condensed matter physics courses, active engagement with the physics Masters-to-PhD Bridge program, providing research opportunities to undergraduates, a high-school teacher professional development program, and K-12 outreach. A fulltime education/outreach coordinator works to build community-school partnerships and initiatives to enhance classroom education. The new Columbus State Community College Academic Year Research Internship is one such promising initiative. CEM participates in the annual Breakfast of Science Champions (BOSC), which brings middle-school students to campus to get a taste of real science that is real fun.

To fully engage students, especially those from underrepresented groups, a college-level Research Experiences for Undergraduates (REU) program has been developed, and CEM faculty were instrumental in the development of the Physics Masters-to-PhD Bridge Program. Additionally, education outreach is integrated within the CEM research activities, widening the Science Technology Engineering Math (STEM) “pipeline” and enhancing diversity in STEM.