



Carolinas Central Chapter

February 2011 Meeting

**Thursday Feb 20th
Centennial Campus
EB1 Rm 3035
6:00 pm**

New Faculty

Dr. James LeBeau

Materials Science and Engineering, NC State University



Sustaining Members



Accident
Reconstruction

To aid in the understanding of nanoscale devices, the LeBeau group develops electron microscopy techniques to investigate electronic and structural changes occur when two dissimilar materials are brought together. For example, spintronic devices, where both the electron current and spin are manipulated to transfer information, rely on the interface between a ferromagnet, such as iron, and a semiconductor, such as gallium arsenide. With electron microscopy, the position of all the atoms can be resolved at the interface between these materials as shown in the figure at the top right. Observations of these interfaces at the atomic scale enable us to build a three-dimensional model of the structure to, providing a deep understanding of how to improve properties. Studying materials and devices at this scale will help lead to technological revolutions that will ultimately change the way electronic devices operate.

Present projects include developing new techniques to extract more information from electron microscopy images than ever before. These techniques will enable a new vantage point from which to understand and explain observed material properties in a wide range of applications ranging from thermoelectric to (devices that convert heat into power). Furthermore, the group will explore nanostructured materials to help enable new breakthroughs and new technology. Beyond the utility of electron microscopy, it is also produces some remarkable patterns as shown in the image at the bottom right. It is this beauty that ultimately allows the electron microscope to transporting us to the scale of the atom, enhancing the communication of scientific advancements.

James began his education at Rensselaer Polytechnic Institute. While earning his bachelor's degree in materials science & engineering, he was engaged in academic research that ranged from metals to environmentally friendly alternatives for materials processing. Then in 2006, he moved to the University of California at Santa Barbara to pursue a Ph. D. in Materials Science. His thesis focused on scanning transmission electron microscopy, a technique that uses a very small probe of electrons to explore of materials at the atomic scale.

With the capability to explore structure and bonding with atomic resolution, electron microscopy stands as one the most important characterization techniques in materials science. This is of particular importance as electronic devices scale to ever vanishingly small dimensions where the detailed arrangement of atoms critically influences properties.

2009 – 2010 Officers

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Members \$15

Retired Members \$7

6:00 – 6:45 pm Dinner

6:45 – 7:30 pm Speaker Presentation

If you plan to attend, please RSVP by no later than Feb 19 by registering at the chapter website or contacting one of the officers listed at left or email Fred Stevie at fred_stevie@ncsu.edu.