

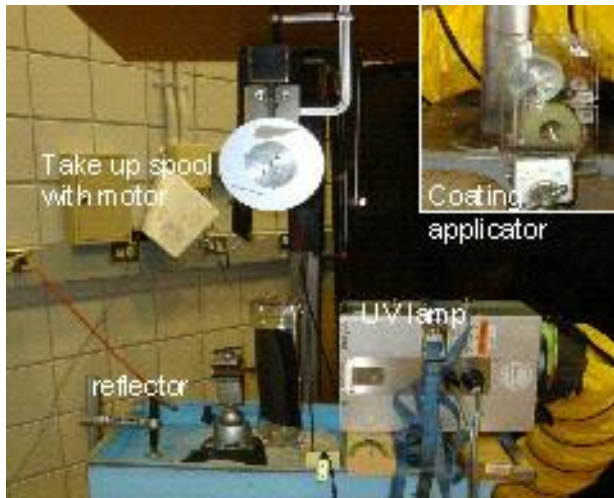


# Magnet Technology Research for Undergraduates

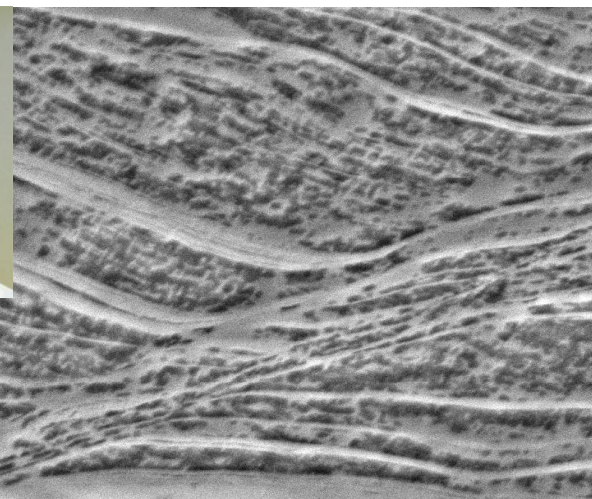
**Gregory S. Boebinger, National High Magnetic Field Laboratory**  
**DMR-Award 0654118**  
**Magnet Science and Technology Program**



Conductor materials and insulations have a wide range of applications, not just in high field magnets. Research and education in these areas can have particularly broad impact. Scientists and engineers in the NHMFL's Magnet Science and Technology Division hosted three REU students to work on various projects that benefit both the students and research programs at the Magnet Lab.



Rana K. Mohamed from Ohio Wesleyan University studied ultraviolet-cured wire insulations using the equipment shown above. Under the mentorship of Dr. Jun Lu, Ms. Mohamed developed an efficient approach to removing insulation using organic solvents for the purpose of making necessary conductor splice joints during magnet fabrication.



The high resolution scanning electron microcopy image was taken by undergraduate Michael Cole from Georgia Tech (above). It shows nanostructured Cu-Ag obtained by a special deformation approach to high-strength conductors.



Michael Cole and Justin Mincey (left) from Bethune-Cookman University in Daytona Beach, FL worked on YBCO superconductors and high strength nanostructured Cu-Ag conductors. They were mentored by Drs. Ke Han and Yan Xin respectively.



# Research Experience for K 12 Students and Teachers

**Gregory S. Boebinger, National High Magnetic Field Laboratory**

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Research on materials engineering is combined with K-12 outreach programs and the Magnet Lab's Research Experiences for Teachers (RET) program.

Twelve-year-old Joseph Portillo (right) and 13-year-old Olivia Merkhofer studied the ductility of O rings that are used both in the magnet facilities for the NHMFL activities and in the shuttle programs for NASA.

They were mentored by NHMFL researchers Bob Walsh and Vince Toplosky.

The students are funded in part by the annual Middle School Mentorship Program. This program is a partnership of the Magnet Lab and the School of Arts and Sciences (SAS) in Tallahassee.



Emily Morris is a 4th grade teacher from West Elementary School, Arcadia, FL and Steve Kufrovich is a science teacher from Maitland Middle school, Orlando, FL. Their research goal is to identify twin bands in materials using electron backscatter diffraction patterns and orientation imaging microscopy (OIM), both techniques to determine crystallographic orientation in polycrystalline materials. Working with Bob Goddard and Ke Han at the NHMFL, they were able to separate regular random distributed grains from twin bands, as shown by the green color in the image below. Using this method, nanoscale bands may even be distinguished from a regular grain boundary.

