THE UNIVERSITY OF ALABAMA® | Alabama Materials Institute

Doctoral Studies in Advanced Materials

Professor Gregory Thompson at the University of Alabama invites applicants to fill two National Science Foundation (NSF) Graduate Research Assistantships in the following programs:

- **Short range ordering in high entropy alloys**: A new and emerging class of metals called high-entropy alloys are finding potential applications in aerospace, nuclear power, and energy storage to name a few because of their exceptional properties. This research involves understanding how chemically distinct atoms in these types of alloys develop local bonding affinity, termed short range ordering, which help control properties. The candidate will have the opportunity to develop cutting edge skills in materials processing as well as atomic scale characterization using atom probe tomography and aberration-corrected transmission electron microscopy.
- **Developing resilient ultrahigh temperature ceramics**: Extreme environments, such as those in aerospace and nuclear energy, require materials with high melting points and high strength. While ceramics often meet those needs, they are also notoriously brittle and prone to sudden failure once cracking initiates. This project leverages a multi-disciplinary team to develop ceramic materials that are resilient through control of the crystal structure and grain morphology. The candidate student will perform cross-cutting research in ceramic fabrication, characterization, and mechanical testing to produce these unique crystal structures that result in exceptional fracture toughness.

The University of Alabama offers Metallurgical & Materials Engineering (MTE) and Interdisciplinary Materials Science (MS) doctorate degrees. Successful applicants will be offered competitive research assistant stipends, tuition, and health coverage.

The Alabama Materials Institute, as a part of the University of Alabama, has made significant recapitalization investments to create state-of-the-art analytical microscopy facilities which include instruments specializing in sub-nanometer compositional and spatial resolution. These facilities support an aberration-corrected TEM, multiple SEMs, and three Focus Ion Beam (FIB) platforms, one of which is a multi-gas Plasma FIB. It is the only university in the southeast with the Local Electrode Atom Probe. **These instruments offer students truly unique opportunities to quantify the chemical and physical structure of materials by characterizing them over a million orders of magnitude in length scales.** In addition, the Institute and affiliated centers offer gas atomization for custom powder production, large-scale high-energy ball milling, direct current / field assisted sintering, and various additive manufacturing tools to make new and novel materials in support of these programs.

Prior students of Professor Thompson have found rewarding careers in academia, national laboratories such as ORNL and NASA, and within industry including Blue Origin and Apple. Interested students should apply to the UA Graduate School and contact Professor Thompson (gthomps@ua.edu) for more details.