

The Department of Mechanical Engineering
Presents

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Winston Chung Hall 205/206



Fighting Entropy: Strategies for Retention of Nanostructured Material Performance

Abstract:

Nanostructured and nanocomposite materials have garnered tremendous interest over the past two decades due to their impressive increases in physical and functional properties over their course-grained counterparts. Laboratory-scale properties have forecast revolutionary performance in a wide breath of technological applications, however advancement has largely been limited by the relative instability of the nanostructured features and phases at the elevated temperatures and pressures needed for manufacturing and fabrication. In this lecture, strategies that incorporate new predictive theoretical and computational approaches, state-of-the-science processing and 3D/4D characterization tools for “top-down” and “bottom-up” processing of ultrahigh strength nanostructured/nanocomposite Mg-alloys will be presented. From this “model” case, we will target and distill some key emerging areas of scientific and technological opportunity for overcoming the daunting challenges that thermodynamic equilibrium presents us with, and that will enable the creation of bulk engineered structural and magnetic materials with stable, tailored nanostructured features and revolutionary functionalities.

About the Speaker:

Mathaudhu serves as an Assistant Professor in the Mechanical Engineering Department and Materials Science and Engineering Program, where he studies the underpinning mechanisms that will make metallic materials and composites lighter and stronger. He received his Ph.D. in Mechanical Engineering from Texas A&M University in 2006. There, he studied processing methods to produce bulk nanocrystalline and metastable metals for structural and defense applications. He subsequently served as an ORISE post-doctoral Fellow and then a Staff Scientist at the U.S. Army Research Laboratory from 2006-2010. From 2010 - 2014, he was the Program Manager for the Synthesis and Processing of Materials at the U.S. Army Research Office, and also, an Adjunct Assistant Professor in the Materials Science and Engineering Department at North Carolina State University. He is active in several technical societies, and frequently speaks and writes on science of superheroes as a broad STEM outreach tool.