Join the Department of Mechanical Engineering in Welcoming

Dr. Josh Sugar
from Sandia National Labs, Livermore, CA
on January 8, 2020 from 4:00-5:00 p.m. in Bergin 116

The Thermal History of Materials: 
The Origin of Earth, Civilization, and Advanced Manufacturing

Abstract:
The slow cooling of Earth over hundreds of millions of years ultimately defined the form and location of all of the raw materials we still mine and process today. This original thermal history of Earth was critical to determining the abundance and distribution of raw materials on the surface of the planet. In the earliest civilizations of the Stone Age, humans’ technology and culture was limited by the ability to shape the rocks that could be pulled out of the ground. However, once humans discovered how to erase the original thermal history of Earth’s formation through smelting and forging, they could create new materials that improved the quality and longevity of structures, tools, ornaments, and decorations. Currently, new additive manufacturing technologies are being developed that deposit and shape material simultaneously, which limits our ability to use techniques like forging or drawing to enhance and homogenize properties. I will discuss the importance of thermal history to the development of microstructure and properties in materials, and our current knowledge of how to control thermal history in these new manufacturing technologies in order to make materials that can perform like their conventional counterparts in high-risk environments.

Biographical Sketch:
Josh Sugar is a Principal Member of the Technical Staff at Sandia National Labs in Livermore, CA. Josh graduated from the Materials Science and Engineering Department at UC Berkeley in 2007, was a postdoctoral appointee at Sandia from 2007-2010, and then was converted to technical staff. While at Sandia, Josh has worked on several projects including nanostructured thermoelectric materials, aging of electrical contacts, materials for hydrogen/hydrogen isotope generation and storage, conductive coatings, and additive manufacturing. Josh is passionate about advanced electron microscopy and using it as the ultimate authority for measurement of materials microstructure at all length scales. Whether measuring microstructure and thermal history for national security, renewable energy, or manufacturing quality control and reliability, electron microscopy allows us to “see” the physical mechanisms that govern the behavior of materials in nature.