

Peter Hosemann
University of California, Berkeley

Title: Material Science in the context of the NSSC

Abstract:

Materials and structures are an intrinsic component of the Nuclear Science and Security Consortium. The life cycle from manufacturing to use and pre-detonation characterization and post detonation properties of condensed materials is tied to the nuclear security and science mission. In this center we focus on several aspects of the materials life cycle, materials structure, and materials properties. Additive manufacturing is an innovative way of fabricating complicated materials even from the most unusual alloys opening up even 4D materials processing. We will introduce the challenges and needs in this area associated with the NSSC mission and how additive manufacturing can create novel designs but also new issues. Further we will investigate how the radiation effects, materials are exposed to, in service may change materials properties and how novel materials characterization tools and techniques can help us understand these issues. Of course, this is tied to nuclear forensics since the history of a material can be found in its microstructure. Finally, we focus on post detonation characterization of debris in order to obtain more insight into the condition during the fireball and learn how the environment and device plays a role in the debris formation. Laser/materials interactions can serve as a surrogate for some of the phenomena taking place.