Friday 30th November 2018,
3.30-4.30 pm
113 McBryde Hall

"X-RAY COMPUTED TOMOGRAPHY FOR MATERIALS SCIENCE APPLICATIONS"

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Abstract

X-ray computed tomography (CT) is a non-destructive, three-dimensional imaging technique that has become a powerful tool for materials science characterization in recent years. Advancements in x-ray sources, detectors, reconstruction algorithms, and artifact corrections have enabled high resolution scans within a laboratory setting. This talk will feature several case studies where CT has been utilized to further the understanding of the material microstructure, including examples of ultra-high molecular weight polyethylene, boron carbide, carbon fiber composites, and dimensional metrology and porosity quantification of additively manufactured components. Advanced scanning techniques such as dual-energy scanning, phase contrast enhancement, and in-situ mechanical testing will also be presented. Lastly, practical limitations of the CT technique and best practices to overcome common problematic artifacts will be discussed. This presetnation will demonstrate a variety of CT efforts at the Army Research Laboratory, which is furthering our fundamental understanding of materials and helping transition better performing materials to our Soldiers.

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Bio-sketch

Dr. Jennifer Sietins is a materials engineer at the U. S. Army Research Laboratory (ARL) in the Manufacturing Science and Technology Branch at the Aberdeen Proving Ground in Maryland. She started at ARL in February 2014 as a post-doc upon the completion of her Ph.D. at the University of Delaware and transitioned to federal employment in July 2015. She completed her BS and MS degrees in Materials Science & Engineering at Virginia Tech in 2007 and 2008. Her primary research interests at ARL have focused on the development of fundamental material relationships through the utilization of x-ray computed tomography (CT) for a wide variety of material classes, including metals, ceramics, composites, and polymers. She serves as the laboratory lead for the micro-CT scanners within ARL's Materials and Manufacturing Science Division and has developed and independently validated techniques to quantify microstructural features from CT datasets, including porosity analysis (shape, size, and quantity), phase percentages, fiber orientations for composites, and tolerance deviations for additively manufactured parts.