Biography

Samantha Daly is an Associate Professor in the Department of Mechanical Engineering at the University of California at Santa Barbara. She received her Ph.D. from the Division of Engineering and Applied Science at Caltech in 2007 and subsequently joined the faculty at the University of Michigan, where she was on the faculty until 2016 prior to her move to UCSB. Her interests lie at the intersection of experimental mechanics and materials science, with an emphasis on using novel methods of experimentation coupled closely with theoretical and computational modeling. Group research focuses on the statistical quantification of microstructural features of materials and their effect on meso- and macro-scale properties. Currently, the group is engaged in the development of novel methods of multi-scale material characterization, with application to structural metallic alloys, active materials, advanced composites, very high cycle and low cycle fatigue mechanisms, plasticity, fracture, and material behavior at the microscale. Her recognitions include the NSF CAREER Award, the ASME Eshelby Mechanics Award, the Journal of Strain Analysis Young Investigator Award, the *Experimental Mechanics* Best Paper of the Year Award, the *IJSS* Best Paper of the Year Award, the DOE Early Career Award, the AFOSR-YIP Award, the ASME Orr Award, and the Caddell Award.

Abstract

Linking Length Scales: Investigating the Effect of Microscale Strain Localization on Macroscopic Response

The accurate measurement of deformation in response to thermo-mechanical loads is a fundamental requirement in the characterization of materials and structures. Of particular interest is the connection between the macroscopic and microscopic length scales, where strain localization at the grain or constituent level can play critical roles in overall material deformation and ultimate failure of the material. The identification of specific microstructural characteristics that lead to local damage accumulation and accelerated failure, and their mitigation, is key for the informed development and optimization of materials. This talk will present our recent work on exploring these connections using a combination of distortion-corrected digital image correlation and scanning electron microscopy to measure deformation fields at small length scales, including a new use of functionalized nanoparticles for deformation tracking. These approaches enable us to glean critical insights into material behavior, including the impact of microstructure on damage accumulation in aerospace composites and the relationship between processing and performance in metallic alloys. Recent studies on metallic alloys will be discussed as an illustrative example of these emerging experimental approaches and the meaningful analysis of their application.