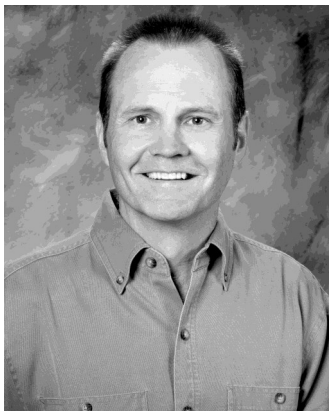
Joint Colloquium
Mechanical Engineering
Materials Science & Engineering

The Department of Mechanical Engineering and MS&E Program present:

Frank W. Zok, Ph.D.

Professor
Materials Department
University of California, Santa Barbara



Friday, January 17, 2014
11:10AM-12:00PM
Winston Chung Hall 205/206

Probing Ceramic Composites Under Extreme Environments

Abstract:

C/SiC and SiC/SiC composites represent critical enabling materials for future turbine-based power generation and aerospace propulsion systems as well as hypersonic flight vehicles. The challenges in manufacturing, performance and lifing are numerous. Among them are methods for probing composites under conditions that emulate those in service while extracting rich information about the material response. The problem is exacerbated by the multitude of degradation and failure phenomena that can be operative in these materials.

The present talk will focus on recent developments in laboratory-scale test methods that yield in-situ measurements and observations under severe test conditions. The centerpiece is a test system capable of high heat flux loading, optical imaging and strain measurement on composite surfaces to 1500°C. Their use in informing and assessing material models will be described.

Biography: Frank Zok is Professor of Materials, Director of the Pratt & Whitney Center of Excellence in Composites at the University of California, Santa Barbara, and Task Order Leader of the Cellular Structural Materials thrust in the UCSB Institute of Collaborative Biotechnologies. His research over the past twenty years has addressed issues in mechanical properties of multiphase materials and structures. His current activities focus on hierarchical lightweight cellular materials and high-temperature ceramic composites.

Dr. Zok recently served as a member of a National Academies study on Application of Lightweighting Technology to Military Vehicles, Vessels, and Aircraft. He has been Associate Editor of the Journal of the American Ceramic Society since 1993. He has served on the editorial board for Current Opinion in Solid State and Materials Science (1998-2008); the Scientific Advisory Board for the AFRL Materials and Manufacturing Directorate (2005); the National Academies Technical Assessment Board for the ARL Panels on Air and Ground Vehicle Technology (2000–04) and on Armor and Armaments (2005–08); the National Science Foundation Panel on Nanomechanics (2006); and the Expert Review Committee on Materials Science, Canada Foundation for Innovation (2008). He was also Chair of the AFOSR Workshop on Ceramic Matrix Composite Lifetime Management (2009). He is presently Chair of the Scientific Advisory Board for the Canadian Magnesium Network (2009–). Dr. Zok has contributed to five book chapters and over 140 scientific publications. Dr. Zok also led the UCSB team that won the 2010 DARPA-sponsored $50,000 challenge on Digital Manufacturing Analysis, Correlation and Estimation (among over 50 teams from 13 countries worldwide).