



UNIVERSITY OF CALIFORNIA, IRVINE

Department of Chemical Engineering and Materials Science

Materials Challenges in Gas Turbine Engines

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Rolls Royce High Temperature Composite

Huntington Beach, CA

3:00 – 4:00 p.m., Friday, February 14, 2014

Location: McDonnell Douglas Engineering Auditorium

Airlines and government agencies are creating more aggressive requirements for future gas turbine engines. These requirements include: reduced specific fuel consumption, reduced weight, reduced emissions, and increased performance. Achieving these targets requires increased engine operating temperatures, reduced cooling air usage, and higher overall pressure ratios. This combination has pushed single crystal nickel alloys and high efficiency cooling schemes to operational limits. This limitation has resulted in the increased demand for the development of advanced protective coating systems and SiC-based ceramic matrix composites (CMCs). SiC-based CMCs systems have the potential to provide component operating temperatures approaching 1650°C with minimal or no cooling air, which will enable the achievement of future customer requirements. The successful insertion of CMCs into turbine engine requires significant development in various areas in order to achieve full benefit. These areas include: high temperature materials, environmental coatings, lifing, joining, and ceramic – metallic interface.

In this talk, business sectors served by Rolls-Royce will be introduced and advanced gas turbine coatings and CMC technologies will be reviewed.

Biography:

Dr. Shim has more than 10 years experience with development and implementation of advanced high temperature materials and processes. He received his Ph.D. in chemical engineering and did post doctoral research at University of California Irvine. His graduate research was on Solid Oxide Fuel Cell materials development. He recently joined Rolls Royce High Temperature Composite and started to work on manufacturing technology development of SiC/SiC Ceramic Matrix Composites (CMCs).

Host: Prof. Martha Mecartney