DEPARTMENT OF MECHANICAL & AEROSPACE ENGINEERING
WILLIAM MAXWELL REED SEMINAR SERIES

"An Overview of Environmental Barrier Coatings for Gas Turbine Applications"

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Abstract:

The implementation of ceramic matrix composites (CMCs) in the hot section of gas turbine engines can lead to increased thermal and propulsive efficiency because of their high temperature capability, high strength to weight ratio, and toughness. However, the SiO2 scale responsible for oxidation resistance at high temperature for SiC-based CMCs is subject to rapid volatilization by water vapor generated as a by-product during the combustion process. Subsequently, enhanced oxidation and rapid surface recession occurs resulting in decreased structural integrity and reduced lifetime. To combat the volatilization and surface recession due to water vapor, environmental barrier coatings (EBCs) were developed to protect CMC components. EBCs are considered an enabling technology for SiC-based CMCs because they are critical for the durability and long-life requirements for CMC components. This presentation will provide an overview of the environmental degradation mechanism of SiC-based ceramics, a history of EBC development, a discussion of key EBC failure modes and environmental durability test methods, and future directions and challenges.

Speaker Bio:

Dr. Michael Presby is a Research Materials Engineer in the Environmental Effects and Coatings Branch at the NASA Glenn Research Center (GRC) in Cleveland, OH. He received his bachelor's degree and Ph.D. in Mechanical Engineering from the University of Akron. At NASA, he oversees environmental durability testing of advanced materials for both aeronautics and space propulsion systems. Dr. Presby is the principal investigator (PI) for NASA GRC's High Heat Flux Laser Test Facility and co-PI in NASA GRC's Burner Rig Facility. Dr. Presby's research expertise lies in the area of high temperature materials with a specific focus on the environmental durability of advanced ceramics and composites.

Date: Friday, April 21, 2023
Time: 3:00 PM EST
Place: Whitehall Classroom Building 110
Contact: Dr. Jesse Hoagg

Attendance open to all interested persons

College of Engineering

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