Ultra High Temperature Ceramic (UHTC) ZrB2- 10, 20, 30wt%SiC composites are of high interest for hypersonic air-breathing vehicles. In this work ZrB2- 10, 20, 30wt SiC UHTC composites were produced by Spark Plasma Sintering (SPS) technique. After sintering, almost dense ceramics with ~ 5-8% porosity were produced. Their mechanical properties, such as Young's, shear, and bulk moduli, along with Possion's ratio, 4-point bending strength, and SEVNB fracture toughness were measured. In addition, in-situ bending experiments under Raman microscope were performed to determine the piezo-spectroscopic coefficients of SiC Raman active peaks for calculation of thermal residual stresses. The results show that these materials are a possible candidate for hypersonic air-breathing vehicles with its high Young's modulus, ability to withstand high temperatures, and a relatively low density.

Major: Aerospace Engineering

Educational Career:
Bachelor's of Aerospace Engineering, BS, 2011, University of Central Florida

Committee in Charge:
Dr. Nina Orlovskaya, Chair, Department of Mechanical and Aerospace Engineering
Ranganathan Kumar, Department of Mechanical and Aerospace Engineering
Seetha Raghavan, Department of Mechanical and Aerospace Engineering

Approved for distribution by Dr. Nina Orlovskaya, Committee Chair, on April 16, 2013.

The public is welcome to attend.