ENVIRONMENTAL BARRIER COATINGS FOR SiC/SiC AND OX/OX CMCs

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Environmental barrier coatings (EBCs) are being developed for next-generation gas turbine engines to protect hot-section SiC/SiC or Ox/Ox (alumina-based) ceramic matrix composite (CMC) components in the harsh operating environments. In this paper, high-velocity water vapor recession (v=100m/s, P_{O2}=0.15atm T=1200°C) and thermal gradient cycling behavior ($T_{surface}$=1250°C) of thermally sprayed $Yb_2Si_2O_7$/Si EBCs on SiC using different processing conditions will be presented. Phase composition and microstructural changes in the coatings prior and after the tests will be examined.

Furthermore, the potential of different (Yb, Sc)-zirconate and hafnate compositions with high melting points as EBC materials will be discussed based on their investigated bulk properties. Characteristics of the solid-state synthesized materials, which were high energy ball milled into submicron particle sizes and subsequently densified with field assisted sintering technology (FAST), such as phase stability (HT-XRD), thermophysical (dilatometry, thermal diffusivity) and mechanical properties (hardness, indentation fracture toughness) will be demonstrated.