

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Advanced Materials and Structures for High Temperature Applications (4)

Author: Mr. meng xiangli

The 4th Academy, China Aerospace Science and Technology Corporation (CASC), China, sx_mxl@163.com

ABLATION BEHAVIORS OF C/C-ZrC-ZrB₂-SiC COMPOSITES BY MEANS OF ARC HEATED
WIND TUNNEL UP TO 2000?

Abstract

The Quasi three dimension carbon/carbon-zirconium carbide-zirconium diboride-silicon carbide (3D C/C-ZrC-ZrB₂-SiC) composites were prepared through chemical vapor infiltration (CVI) and precursor infiltration and pyrolysis (PIP) process. The microstructures and ablation behaviors of the prepared composites were studied. The ablation resistances of the samples were investigated by means of arc heated wind tunnel up to 2000. And the components and microstructures of the ablated samples were characterized by using scanning electron microscopy (SEM), energy dispersive spectroscopy (EDS) and X-ray diffraction (XRD) analysis. The results show that the components of matrix of prepared composites disperse at nanometer scale and the mass ablation rate and linear ablation rate of the composites generally decrease with the increasing of ZrC and ZrB₂ contents. After ablation at mach six for 600 seconds under arc heated wind tunnel, the mass loss and linear recession of the composites is as low as 2.310-6/cm²•s and 1.010-4mm/s. It is found that during ultra-high temperature stage, some of the products of oxidation of composites, ZrO₂ and SiO₂, which form a kind of viscous binary glassy mixture. The mixture could effectively cover the ablation surface and therefore promote its anti-ablation property.