

**Development of Environmental Barrier Coatings on Ceramic Matrix Composites assisted by LASAT
(Laser Shock Adhesion Test)**

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Silicon carbide (SiC) fiber reinforced SiC ceramic matrix composites (CMCs) are envisaged as structural material for high-temperature parts in next generation aero-engines. A lower density and a higher thermal stability make such composite very attractive for industrial applications but there is a need for a protective coating to prevent the chemical degradation under service conditions. Therefore, Environmental Barrier Coating (EBC) systems consisting of a silicon bond coat and a rare-earth silicate top coat layer deposited by thermal spraying are envisaged and already successfully tested in gas turbine engines. In this work, two different Si/Yb₂Si₂O₇ EBC samples were prepared by plasma spraying involving APS and High-Velocity APS respectively, each exhibiting a different deposition temperature. The non-contacting LASAT method (Laser Shock Adhesion Test) was implemented in order to estimate the potential of this laser shock method and its capability to support the development of optimized spraying parameters leading to enhanced interfacial properties. The LASAT method was previously developed on metal/ceramic systems for thermal barrier coatings (EB-PVD, APS) and also for hydroxyapatite coatings for biomedical applications. This first attempt on SiC/SiC composite substrate coated with an EBC by plasma spray was successful and revealed that the weakest region was located in the silicon layer near the ceramic top-coat. Further observation of damaged regions after laser shock confirmed that the debonding threshold that corresponding to the minimum of laser energy needed to create an interfacial crack was much higher for the APS coating deposited at a higher temperature. Further work is on progress to confirm the role of the deposition temperature on the resulting interface strength and also to address the influence of the composite thickness on the shockwave propagation.

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