

## TGO GROWTH BEHAVIOR OF MODIFIED ENVIRONMENTAL BARRIER COATING SYSTEMS

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Environmental Barrier Coatings are needed to protect silicon carbide ceramic matrix composites (SiC/SiC CMCs) from water vapor attack during operation in intended service environments of turbine engines. Rare earth silicate-based EBC top coat with silicon bond coat systems have been identified as the state-of-the-art EBCs chemistries due to their excellent thermal expansion coefficient match with CMC substrates. One key failure mechanism associated with EBC spallation is the formation of thermal grown oxides (TGO) resulting from steam oxidation. EBCs fail at the TGO interface when the TGO reaches a critical thickness. Controlling TGO growth rates will be critical to improve the durability of EBC systems. In this work, Yb<sub>2</sub>Si<sub>2</sub>O<sub>7</sub>/Si based EBCs with modified chemistries for both top and bond coats were prepared using the air plasma spray (APS) process. The TGO growth behavior and cycling life of the modified EBCs were evaluated at 1316°C in a 90vol% water vapor environment. Significantly improved EBC lives were achieved for the modified EBC systems compared to the baseline Yb<sub>2</sub>Si<sub>2</sub>O<sub>7</sub>/Si coatings.