

ENVIRONMENTAL BARRIER COATINGS DEPOSITED BY SUSPENSION PLASMA SPRAYING

Dapeng Zhou, Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research, Materials Synthesis and Processing (IEK-1), Germany
d.zhou@fz-juelich.de

Robert Vaßen, Forschungszentrum Jülich GmbH, Institute of Energy and Climate Research, Materials Synthesis and Processing (IEK-1), Germany

Key Words: Environmental barrier coating; Suspension plasma spraying; $\text{Yb}_2\text{Si}_2\text{O}_7$; Microstructure;

Fully crystalline, cracks free and dense environment barrier coatings (EBCs) are required for Si based ceramic matrix composites which are promising structural materials for hot section components of gas turbine engines. In this work, suspension plasma spraying was utilized to deposit EBCs on SiC substrates using ethanol based suspension which can gain additional process enthalpy. An extremely high deposition temperature (above 1200 °C) which is hard to be maintained by APS was employed. At such high deposition temperature, fully crystalline coatings were obtained. In addition, the thermal quenching stresses which are the driving force of vertical cracks could be reduced. Finally, fully crystalline, crack free EBCs coatings with different porosity level were successfully achieved via SPS. However, a large amount of YbSiO_5 (YMS) phase was detected in the as sprayed coating. The formation mechanism of the YMS phase is analyzed.

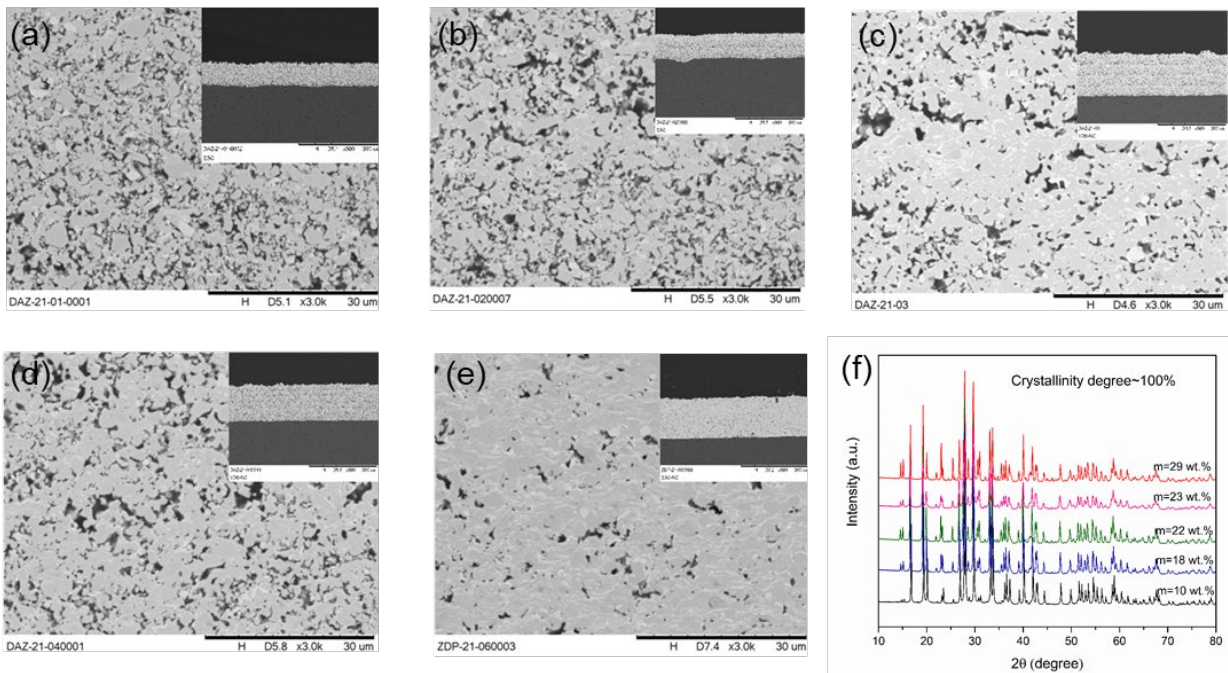


Figure 1 Cross sectional microstructure ((a)-(e)) and XRD patterns ((f)) of the environmental barrier coatings deposited by suspension plasma spraying