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### ***TBC Compositions for CMAS Protection using SPS for Rapid Coating Development***

#### **Abstract:**

Airborne dust is a challenge for the operation of aero turbines running at higher and higher temperatures to increase efficiency. Once the combustion temperature exceeds the melting temperature of these dust particles, mainly comprising of Calcium-magnesium-alumino-silicates (CMAS), they can penetrate the ceramic thermal barrier coatings (TBCs) made of yttria stabilized zirconia (YSZ) and can lead to irreversible damage and in worst case coating spallation.

In this study, 10+ compositions were selected from literature produced as suspension feedstock for plasma spraying (SPS). With the help of high-enthalpy plasma spraying, columnar coatings were deposited on test coupons after optimizing the deposition parameters to achieve coatings with similar microstructures across the different compositions. On these coupons isothermal CMAS infiltration was investigated and a selected group of sample coatings was further exposed to thermal cycling.

Overall, the approach of using SPS as a rapid and cost-effective way to produce columnar TBCs was successful. However, it appears that the ability of a TBC material to form apatite phases has much lower influence on the coating lifetime compared to the mechanical stability of a certain coating material. Therefore, doping YSZ and other conventional TBCs materials to increase fracture toughness is proposed as a viable approach regarding alternative materials.

#### **Biography:**

Richard Trache has nearly 20 years of experience in the field of thermal spray technology. He began his career as a researcher at the Fraunhofer Institute and at Dresden University of Technology, where he focused on APS and HVOF processes as well as cemented carbides and ceramic materials. Since 2017, he has been with Treibacher Industrie AG in Austria, specializing in the development of ceramic spray powders and suspensions. He is currently an R&D Manager, leading a team of material development engineers.