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Title: "Manufacture and testing of advanced environmental barrier coatings"

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Abstract:
The paper will describe recent results on the APS deposition and characterization of advanced EBCs based mainly on YbDS. Here the impact of processing conditions on crack formation will be discussed. Results of thermogravimetric measurements of SiC samples coated with silicon bond coat and dense ytterbium disilicate topcoat will give insight in the protection of the silicon bond coat from oxidation by the top layer. The comparison with samples only coated with a silicon bond coat showed a reduced oxidation rate of the sample revealing the low permeation rate of the top coat. In addition, the effect of the heat treatment of the topcoat on the oxidation rate of the bond coat will be shown.
Finally, advanced characterization tools for investigating water vapor recession will be shown. In addition to furnace tests performed under slow flowing water vapor, the gas burner test rigs already allow testing with higher gas velocities (above 10m/s). The highest gas velocities are available with our high velocity oxygen fuel (HVOF) torch. The impact of the different test conditions on the recession rates will be discussed.

Biography:
Robert Vaßen made a diploma in physics and received a PhD at RWTH Aachen University (1990). In 2004 he finished his habilitation on the "development of new oxide thermal barrier coatings for applications in stationary gas turbines". In 2009 he received an appointment as professor at the Ruhr University Bochum, from 2010 on he is also a guest professorship at University West in Trollhättan, Sweden. He is the head of the section "materials for high temperature technologies" and deputy head of IEK-1, Forschungszentrum Jülich GmbH. His major research topics are thermal spray and powder technology, protective high-temperature coatings especially thermal and environmental barrier coatings, membranes, repair technologies, and ceramics in general. His work is mainly focused on materials development for energy conversion systems including gas turbines, solid oxide fuel cells, hydrogen systems, and concentrated solar power. He published more than 300 papers, about 200 in peer-reviewed journals having an H-index of 77 and more than 20000 citations (google scholar). In 2017 he was introduced into the ASM/TSS Hall of Fame of Thermal Spray and since 2019 he is fellow of both ASM International and the American Ceramic Society. He was elected in 2019 into the evaluation board of the German science foundation (DFG) and reelected 2023. In 2022 he received the SOFT innovation award for the development of graded tungsten/steal coatings for fusion reactor applications and will receive in 2024 the ASM International Albert Sauveur award.