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APPLICATION OF EQ BOND COAT TO EB-PVD TBC SYSTEMS

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To prevent the formation of SRZ in the log-time high-temperature exposure of the turbine blades, thermodynamically equilibrium phase such as gamma-prime phase of the substrate is use as an oxidation-resistant bond coat. The previous study clarified that this EQ coating shows excellent interface stability and it does not degrade mechanical strength due to the SRZ formation.

In this study, TBC life test of EB-PVD ceramics coated EQ coating is investigated with other conventional MCrAlY coatings. The 4^{th} and 5^{th} generation superalloys are used for substrates. About 150 μm thick of EQ coating, conventional NiCoCrAlY and CoNiCrAlY coating are deposited by LPPS and HVOF on the substrates. After polishing the surface of deposited bond coat, specimens are pre-oxidized in the EB-PVD chamber in 0.2 Pa of oxygen partial pressure. 150 μm thick of YSZ is deposited by EB-PVD on the pre-oxidized bond coat, following the pre-oxidation. Samples are heat treated cyclically in an electric furnace at 1135 °C with 1 h cycles. Fast cooling rate is obtained by air blow with each cooling cycle. As a result, it is found that TBC life of LPPS EQ-coated TMS-138A showed over twice of other conventional bond coats. Interrupted and failed samples are observed by SEM and EPMA. The differences of bond coats and its deposition processes in the microstructure, TGO growth and TBC life are discussed. On the other hand, oxidation characteristics of YSZ-TBC and EQ bond coated substrate using burner rig developed by NIMS are discussed. And also the recycling of TBC with EQ bond coat is discussed.