CALCIUM–MAGNESIUM–ALUMINA–SILICATE (CMAS) RESISTANCE OF $LaPO_4$ THERMAL BARRIER COATINGS

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Nanostructured $LaPO_4$ thermal barrier coatings (TBCs) were prepared by air plasma spraying, and their resistance to calcium–magnesium–alumina–silicate (CMAS) attack at 1250 °C, 1300 °C and 1350 °C was investigated. The reaction products were characterized by X-ray diffraction, scanning electron microscopy, energy dispersive spectroscopy and transmission electron microscopy. Exposed to CMAS attack for 0.5 h, a continuous dense reaction layer formed, which was mainly composed of P–Si apatite based on $Ca_{2+x}La_{8-x}(PO_4)_x(SiO_4)_{6-x}O_2$, anorthite and spinel phases. Beneath the reaction layer, little evidence of CMAS trace could be found. With the increase in temperature and heat treatment duration, the reaction layer became thick, while penetration depth of the molten CMAS changed slightly. Due to the formation of a reaction layer suppressing CMAS further infiltration, $LaPO_4$ TBCs are highly resistant to CMAS attack.