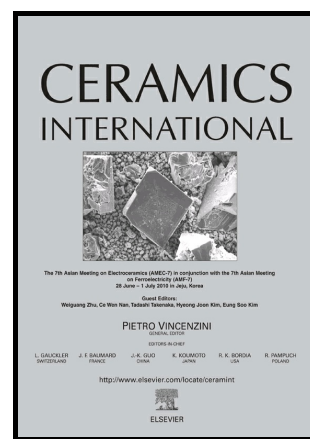


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Abstract

The sintering behavior of plasma-sprayed yttria-stabilized zirconia (YSZ) coating over the delamination crack and its influence on YSZ cracking were investigated via gradient thermal cycling test and finite element model (FEM). The gradient thermal cycling test was performed at a peak surface temperature of 1150°C with a duration of 240 s for each cycle. A three-dimensional model including delamination cracks with different lengths was employed to elaborate the temperature evolution characteristics in YSZ coating over the delamination cracks. The temperature over the delamination crack increases linearly with the crack propagation, which continuously promotes the sintering of YSZ coating in the region. As a result, the YSZ coating over the delamination crack sinters dramatically despite of the low temperature exposure. Meanwhile, the temperature distribution difference in YSZ coating induces a nonuniform sintering along both free surface and thickness of YSZ coating. Correspondingly, the maximum vertical crack driving force locates at the YSZ free surface over the delamination crack center, which makes the vertical cracks generate in this region and propagate to the interface of YSZ /bond coat with YSZ further sintering. The vertical crack promotes the delamination crack propagation via accelerating the oxidation velocity of

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