Hot corrosion behavior of plasma sprayed powder-solution precursor hybrid thermal barrier coatings

G. Sivakumar, S. Banerjee, V.S. Raja, S.V. Joshi

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G.Sivakumar[a] S.Banerjee[b], V.S.Raja[b,*], S.V.Joshi[c]

[a]Center for Engineered Coatings, International Advanced Research Center for Powder Metallurgy and New Materials, Hyderabad - 500005, India

[b]Department of Metallurgical Engineering and Materials Science, Indian Institute of Technology Bombay, Mumbai - 400076, India

[c]Department of Engineering Science, University West, Trollhättan - 46186, Sweden

[*]Corresponding author. Tel.: +91 22 2576 7892; fax: +91 22 2572 3480. *E-mail address*: vsraja@iitb.ac.in (V.S. Raja).

Abstract

In recent times, plasma sprayed powder-solution precursor hybrid composite thermal barrier coatings have been developed to harness the dual benefits of both conventional atmospheric plasma spraying (APS) and solution precursor plasma spraying (SPPS) processes. In this study, hot corrosion behavior of plasma sprayed powder-solution precursor composite (PSP-SPC) YSZ TBCs in molten salt mixtures of 90wt.% Na_2SO_4 + 5wt.% V_2O_5 + 5wt.% NaCl and 50wt.% Na_2SO_4 + 50wt.% V_2O_5 at 900 °C was investigated. The employed coating showed a bimodal microstructure comprising coarse splats derived from the powder feedstock as in the APS process and fine splats resulting from the solution precursor as typical of SPPS process. The PSP-SPC coatings showed a significantly higher resistance to spallation than APS, SPPS and EB-PVD coatings in both the salt environments. These coatings showed shorter life in vanadate