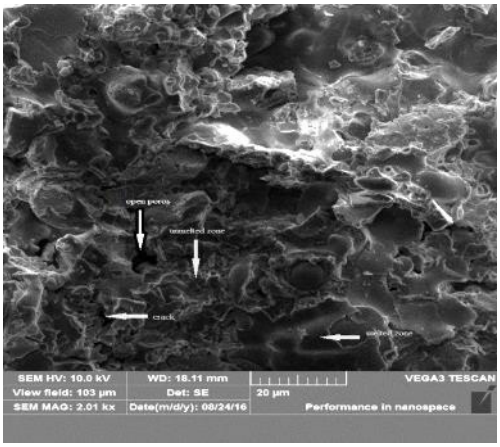
Ali Mezher Resen et al., J Material Sci Eng 2017, 6:5(Suppl)
DOI: 10.4172/2169-0022-C1-074

Hot corrosion of plasma sprayed and laser sealed coatings of yttria partially stabilized zirconia thermal barrier coatings with molten eutectic vanadate-sulfate salt

Ali Mezher Resen, Mohammed Jasim Kadhim and **Sami Aboalnoon Ajeel**
University of Technology, Iraq

Yttria partially stabilized zirconia thermal barrier coatings are frequently promising ceramic coatings used in many hot sections of turbine engines and isolation unit of fuel in oil refineries. Many surface sealing treatments have been employed to improve service lifetimes of these coatings by improving chemical and thermo-mechanical resistance. This work aimed to study the effect of hot corrosion molten salt of eutectic V_2O_5 + 45 wt% Na_2SO_4 on the performance of as-sprayed and as-sealed zirconia 8 wt% yttria coatings. Hot corrosion was done by exposing the samples to an isothermal air furnace testing at 900°C for different exposure times of 1, 40, and 80 hours. Upper surface plan views of the coatings were examined using scanning electron microscopy to observe the morphological and microstructural changes. Element analysis and phases identification of the corrosion products were determined using energy dispersive spectroscopy (EDS), electron probe microanalysis (EPMA) and X-ray diffraction (XRD). The results indicate the higher resistance of as-sealed coatings compared with as-sprayed coatings to the hot corrosion. Degradation due to the presence of eutectic harsh salt attack was occurred by destabilization of yttria from the zirconia yttria coatings. This will lead to disrupt transformation from metastable tetragonal phase (t') to monoclinic phase (m). The formation of m phase having lower yttria content is taken place due to the formation of YVO_4 by leaching process. This introduces additional stresses which may lead to final degradation of coatings. The low leaching rate of yttria for the sealed coatings is related to the absence of pockets of open porosity eliminated after laser sealing of porous plasma sprayed coating.



Biography

Ali M Resen is a PhD student in Production Engineering and Metallurgy, University of Technology, Baghdad, Iraq. He is working as a Lecturer at the same school where he is studying. He obtained his Bachelor's in Metallurgy Engineering in 2004, and he got his MSc in Metallurgy Engineering in 2008. He had studied Surface Engineering for PhD and the thesis subject was laser processing and thermal barrier coating material. He has contributed greatly to the understanding of surface engineering of materials and coating material. Also he is a member in many scientific societies and has published many research articles in his field.

alimizhir@yahoo.com

Notes: