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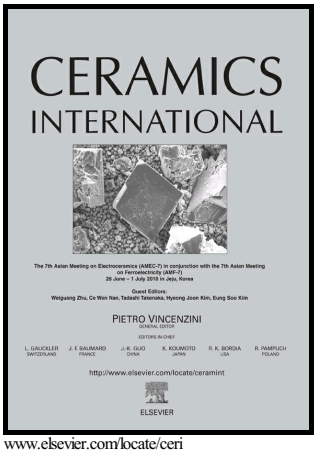

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Cyclic oxidation in burner rig of TiAlN coating deposited on Ti-48Al-2Cr-2Nb by reactive HiPIMS

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Abstract

The Ti-48Al-2Cr-2Nb intermetallic alloy was coated by using a mixed titanium-aluminum nitride with the aim of improving its oxidation resistance. The protective TiAlN coatings were obtained by reactive High Power Impulse Magnetron Sputtering (HiPIMS) technique. The surface of the Ti-Al alloy was prepared for HiPIMS according to different methods; the deposition of an intermediate Ti-Al interlayer was also investigated. A cyclic oxidation test (100 and 200 cycles) was performed up to 950°C in burner rig apparatus adopting severe heating and cooling rates. The microstructure and composition of samples before and after oxidation were investigated by several techniques: microscopy (optical and SEM-EDS), X-ray photoelectron spectrometry (XPS) and X-ray diffraction (XRD). The oxide layers formed on the sample surface showed different thickness and composition depending on the presence of the protective coating and the processing path adopted for its deposition. The nitride coatings appreciably enhanced the oxidation resistance and sustained repeated thermal shocks without showing damage or spallation.

Keywords

A. Films; B. Interfaces; C. Thermal shock resistance; D. Nitrides

1. Introduction