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Abstract

This paper reports the development of Ni_3Ti and Ni_3Ti+(Cr_3C_2+20NiCr) coatings on AISI 420 stainless steel (MDN-420) and titanium alloy ASTM B3265 (Ti-15) by HVOF technique. Microstructure, microhardness and high temperature oxidation behaviour of coatings were investigated. Microstructure of coatings was dense and displayed layers depicting lamellar structure. The microhardness of coatings was significantly higher than that of substrate owing to higher density and cohesive strength between individual splats of coating materials. Cyclic oxidation studies conducted on Ni_3Ti and Ni_3Ti+(Cr_3C_2+20NiCr) coatings showed oxide scale was composed of various oxides like NiO, $NiCr_2O_4$ and Cr_2O_3 phases. The formation of compact and protective NiO phase in case of Ni_3Ti coatings; NiO and Cr_2O_3 phases in Ni_3Ti+(Cr_3C_2+20NiCr) coatings stabilised the weight gain exhibited slow oxidation rate at higher temperatures.

Keywords: High velocity oxy-fuel process; X-ray diffraction; Hardness; Oxidation; Electron microscopy.

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