EB-PVD TiN coatings in titanium alloys produced by powder metallurgy

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Abstract

TiN is a typical coating used to improve the wear properties of Ti alloys in aerospace, machining and implant applications. Electron Beam Physical Vapor Deposition (EB-PVD) is a form of deposition in which a target anode is bombarded with an electron beam given off by a charged tungsten filament under high vacuum, producing a thin film in a substrate. In this work, microstructural results of the TiN films, deposited over Ti (C.P.), Ti-13Nb-13Zr and Ti-35Nb-7Zr-5Ta substrates produced by powder metallurgy were obtained. Substrates were produced by mixing of initial metallic powders followed by uniaxial and cold isostatic pressing with subsequent densification by sintering between 1200 up to 1500 °C, in vacuum. TiN layers were characterized for phase composition, microstructure and microhardness by X-ray diffraction, scanning electron microscopy and Vickers indentation, respectively. TiN films produced presented a continuous and columnar structure, large thickness, with high adhesion properties.