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## Ceramics International

Volume 44, Issue 2, 1 February 2018, Pages 2123-2131

# Synthesis and corrosion resistance of SiO<sub>2</sub>-TiO<sub>2</sub>-ZrO<sub>2</sub>-Bi<sub>2</sub>O<sub>3</sub> coatings spin-coated on Ti6Al4V alloy

Fabio Leonardo Alférez Vega <sup>a</sup> , J.J. Olaya <sup>a</sup> , Jorge Bautista Ruiz <sup>b</sup> [Show more](#)  Outline |  Share  Cite<https://doi.org/10.1016/j.ceramint.2017.10.161>[Get rights and content](#)

## Abstract

This report shows the synthesis and corrosion resistance of SiO<sub>2</sub>-TiO<sub>2</sub>-ZrO<sub>2</sub>-Bi<sub>2</sub>O<sub>3</sub> coatings deposited by means of spin-coating on Ti6Al4V alloy. The sols were prepared from a mixture of organic precursors, tetraethoxysilane (TEOS) 98%, titanium tetrabutoxide (TBT) 97%, Zirconium (IV) butoxide (TBZ) 80% in 1-butanol solution, and bismuth nitrate pentahydrate Bi (NO<sub>3</sub>)<sub>3</sub> \* 5H<sub>2</sub>O. The coatings were evaluated via potentiodynamic polarization and electrochemical impedance spectroscopy (EIS) tests in an electrolytic solution of 3.5% wt NaCl + 0.5 M H<sub>2</sub>SO<sub>4</sub>. The rheology and pH of the prepared sols were studied through rheology, pH as a function of time, Fourier transform infrared spectroscopy (FTIR), and differential scanning calorimetry (DSC) analysis. The coatings were characterized via X-ray diffraction (XRD), scanning electron microscopy equipped with dispersive energy spectroscopy (SEMEDX), X-ray fluorescence (XRF), and adhesion measurements. The results showed that the films add good corrosion resistance to the metal substrate, decreasing current densities up to one order of magnitude.

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## Keywords

Sol-gel; Ti6Al4V; Coating; (SiO<sub>2</sub>-TiO<sub>2</sub>-ZrO<sub>2</sub>-Bi<sub>2</sub>O<sub>3</sub>) composite; Corrosión; Adherence

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