

TRIBOCORROSION BEHAVIOUR OF ZrN_xO_y THIN FILMS FOR DECORATIVE APPLICATIONS

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Abstract

The main aim of this work is the investigation of the tribocorrosion behaviour of single layered zirconium oxynitride, ZrN_xO_y , thin films in alternative linear regime of sliding and immersed in an artificial sweat solution at room temperature. The films were produced by rf reactive magnetron sputtering, using a pure Zr target at a constant temperature of 300° C. Two different sets of samples were produced. In the first set of films the substrate bias voltage was the main variable, whereas in the second set, the flow rate of reactive gases (oxygen/nitrogen ratio) was varied. The control of the amount of oxygen allowed the film properties to be tailored from those of covalent zirconium nitride to those of the correspondent ionic oxide. During the wear test both the open circuit potential and the corrosion current were monitored. Also, Electrochemical Impedance Spectroscopy (EIS) tests were performed before and after sliding in order to evaluate, in detail, the modification of the protective character of the coating introduced by the joint action of wear and corrosion. The modifications of the coating microstructure and/or chemical composition induced by the variation of the deposition parameters was also evaluated and correlated with the corrosion mechanisms occurring in each system.