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ABSTRACT

Synthesis of Ti/TiN hard coatings on different substrates has been the subject of several researchers in the last decades; however, a more compressive perspective is required for the investigation of the influence of deposition parameters depending on the substrate. This paper focus on evaluating tribological and electrochemical properties of Ti/TiN bilayered coatings deposited by r.f. magnetron sputtering on AISI 316L stainless steel substrates in 3.5 wt% NaCl solutions. Numerous factors can influence the electrochemical performance and tribological properties of the coatings; for this reason, the surface modifications through thickness, texturing and morphology were realized varying the sputtering parameters (substrate temperature, T, Power, P, target-to-substrate distance t-s, and Ar/N_2 gas ratio). Ti/TiN films were composed of Ti, N, which are correlated with to Ti-N, Ti-O-N and O-Ti-O phases. The friction coefficient varies from 0.12 to 1.3 by the influence of the deposition parameters; the adhesion strength shows a cohesive failure indicating that in all samples coating adhesion to steel was high enough. The corrosion resistance of Ti/TiN bilayered coatings was correlated to both the Ti/TiN film densification and formation of O-Ti-O compounds.

Keywords: Ti/TiN Thin films, XPS, Microstructure, Electrochemical Performance, Hardness.