

Investigation of the Effect of ZnO/TiO₂ Phase Composition on Corrosion of Stainless Steel 304

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Abstract

Corrosion impact on stainless steel (SS) causes its deterioration. Advances in the improvement of SS properties, in particular corrosion protection have been made by coated metals and more protective finishing. Different inhibitors have been proposed to protect SS. The use of inhibitors is favored in closed systems where the necessary concentration of inhibitor is more readily maintained but the disadvantages are the toxicity, expensive and impossible to be used in open systems. In the literature, the deposition of nanostructured metal oxide (ZnO, TiO₂, SiO₂, Al₂O₃, ...) coating layers as potential corrosion protection.

The objective of this research work consists on the deposition of thin layer (100-400) nm of ZnO/TiO₂ at different ratios onto stainless steel 304 by a simple cost-effective sol-gel dip-coating method. In-depth analyses by Rietveld method of XRD data, absorbance, SEM/EDS and AFM will be presented. Corrosion tests will be carried out, especially potentiostatic (EIS) and potentiodynamic (Tafel plots).

Keywords: Corrosion; Stainless Steel; Sol-gel dip-coating; ZnO; TiO₂; thin film.