

Short Communication

Corrosion Behavior of Electrodeposited Ni-B Coatings Modified with SiO₂ Particles

R. A. Shakoor^{1,*}, Umesh S. Waware¹, Ramazan Kahraman^{2,*}, Anton Popelka¹,
Moinuddin M. Yusuf¹

¹ Center for Advanced Materials, Qatar University, P. O. Box 2713, Doha, Qatar

² Department of Chemical Engineering, College of Engineering, Qatar University, P. O. Box 2713, Doha, Qatar

*E-mail: shakoor@qu.edu.qa, ramazank@qu.edu.qa

doi: 10.20964/2017.05.56

Received: 2 February 2017 / Accepted: 25 March 2017 / Published: 12 April 2017

The need for coatings with improved operation is vital to insure safety and high output of industrial plants. Electrodeposition is a valuable surface modification technology that can be used to develop various kinds of coatings. Although, Ni-B coatings have good mechanical properties (hardness and wear) but are suffering from inferior corrosion resistance. The development of Ni-B composite coatings by incorporating insoluble hard particles such as metal oxides (Al₂O₃, TiO₂) through electrodeposition process has generated a great interest among the research community because of auspicious improvement in properties. The main purpose of this research work was to study the influence of addition of SiO₂ particles on corrosion performance of Ni-B coated surfaces which has not been reported so far. Coatings of Ni-B and Ni-B-SiO₂ were deposited on steel through electrodeposition process. The microstructural (SEM) analysis confirms the formation of uniform, dense nodular structure in coatings of Ni-B and Ni-B-SiO₂. Surface examination (AFM) discloses that the addition of SiO₂ increases surface smoothness. Electrochemical characterization of the synthesized coatings indicates that Ni-B-SiO₂ composite coatings demonstrate better anticorrosion properties when compared to Ni-B. Enhanced corrosion performance may be ascribed to reduction in the active surface area and grain size refinement which reduces the porosity by the addition of inactive SiO₂ particles.

Keywords: Coating, composite, electrodeposition, crystal structure, corrosion

[FULL TEXT](#)

© 2017 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).