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Int. J. Electrochem. Sci., 12 **(2017)** 4384 – 4391

International Journal of
ELECTROCHEMICAL
SCIENCE
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Short Communication

Corrosion Behavior of Electrodeposited Ni-B Coatings Modified with SiO_2 Particles

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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 (Al_2O_3, TiO_2) 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 SiO_2 particles on corrosion performance of Ni-B coated surfaces which has not been reported so far. Coatings of Ni-B and Ni-B-SiO_2 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-SiO_2. Surface examination (AFM) discloses that the addition of SiO_2 increases surface smoothness. Electrochemical characterization of the synthesized coatings indicates that Ni-B-SiO_2 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 SiO_2 particles.

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

FULL TEXT

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