

Title	Microstructure and Corrosion Behavior of Electrodeposited NiCo, NiZn and NiCu Nanocrystalline Coatings in Alkaline Solution
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Abstract

The present paper deals with evaluation of corrosion behavior of electrodeposited nanocrystalline (Nc) NiCo, NiZn and NiCu alloys. Nc NiCo, NiZn and NiCu coating electrodes were electroplated from sulfate electrolyte on copper foil by the galvanostatic technique and ultrasound waves. The chemical composition, surface morphology and crystalline structure of the different alloys were studied using energy dispersive spectroscopy, scanning electron microscope and X-ray diffraction methods. The electrochemical behavior of the deposited material in 1.0 M KOH solutions was investigated. The electrochemical behavior of the coating electrodes in alkaline solutions was investigated by potentiodynamic polarization techniques and electrochemical impedance spectroscopy (EIS). Results showed that the alloying of nickel with Co causes an increase in the stability of Ni-alloy in alkaline solutions in comparison to Ni-Cu and Ni-Zn alloys. The corrosion resistance values of Ni-Zn coatings were lower compared to those of the other investigated alloy coatings due to preferential dissolution of Zn from the matrix. The experimental impedance data were fitted to theoretical data according to a proposed equivalent circuit model representing the electrode/ electrolyte interface.