البحث السادس

Anticorrosion and surface evaluation of Ni–Co–TiO_2 coatings in 3.5 wt.% NaCl solutions

Abstract

Herein, the authors are interested to provide the synthetic methodologies, chemical properties and the corrosion performance of some Ni–xCo–yTiO2 nanocomposite electroplated on copper (Cu) using a gluconate–cysteine bath, pointing at the classification of these materials corresponding to their stability in that simulated marine solution, and recommend using these materials in such aggressive media. Electrochemical and spectroscopic measurements were carried out in 3.5 wt.% sodium chloride (NaCl) electrolytes at 25°C. The electrochemical properties of the applicable nanocomposite material were studied to enhance manufacturing technology and forecast the stability of structures made from it. The produced nanocomposite coatings were demonstrated to have high corrosion resistance in the investigated electrolyte, which is commonly utilized in hydrogen evolution reaction applications and orrosion investigations of other novel materials. By characterizing the corrosion performance of the examined Ni–xCo–yTiO2 nanocomposite coatings in 3.5 wt.% sodium chloride solution, Ni–48Co–3.8TiO2 is regarded as the most stable electrode. The results showed that the inclusion of cobalt (Co) in Ni–xCo–yTiO2 significantly lowered the corrosion rate of the investigated composites. The surface examination revealed the presence of several material constituents in the passive layer. Density functional theory and Monte Carlo simulation approaches were used to investigate and analyze the relationship between molecular structure and inhibitory effect.

Publishing Date: 18/4/2022