Electrodeposition of Ni-Co/Nano SiC Composites from a Citrate Bath and their Characterization

M. M. Kamel^{1,*}, Q. Mohsen², Z. Abdel Hamid³, S. M. Rashwan¹, I. S. Ibrahim⁴, S. M. El-Sheikh³

¹ Department of Chemistry, Faculty of Science, Suez Canal University, Ismailia 41522, Egypt.

² Department of Chemistry, College of Sciences, Taif University, Taif, Saudi Arabia.

³ Central Metallurgical Research & Development Institute, Helwan, Cairo, Egypt.

⁴ General Organization for Exports and Imports Control, Royal International Inspection Laboratories, Sokhna Port, Suez, Egypt.

*E-mail: medhat_darwish@science.suez.edu.eg

doi: 10.20964/2021.05.47

Received: 24 November 2020 / Accepted: 13 January 2021 / Published: 31 March 2021

The electrodeposition of Ni-Co/nano SiC composites onto steel substrates from a citrate bath was carried out under different experimental conditions. The addition of SiC to the bath increased the overvoltage for the Ni-Co alloy deposition. The morphology & structure of the deposits were checked by scanning microscope (SEM) & X-ray diffraction (XRD). The obtained composites were crystalline and had a face-centered cubic structure (FCC). The thickness of electrodeposited Ni-Co/ nano SiC composites gradually increases with increment the wt. % of SiC in the deposit. The corrosion resistance of composites, containing various amounts of SiC particles in 3.5 % NaCl solution, was predestined using linear polarization & impedance spectroscopy (EIS). As the percentage of SiC particles increases in the deposits, the corrosion resistance increases. Both microhardness and scratch resistances were ameliorated with increment the quantity of embedded SiC particles in the composites.

Keywords: Electrodeposition; Citrate bath; Ni-Co alloy; SiC nanoparticles; Composites

[FULL TEXT](#)

© 2021 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/>).