Electrodeposition of Ni–Co / nano Al₂O₃ composite coating on low carbon steel and its characterization

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Ni–Co / nano-Al₂O₃ composite coat was electrodeposited from environmentally friendly citrate tub. The electrodeposition was established from agitated solutions, containing disparate amounts of nano-Al₂O₃ particles. The addition of nano - Al₂O₃ to the plating solution decreases the polarization for Ni–Co alloy plating. The quantity of Al₂O₃ in the composite rises with concentration of Al₂O₃ in the coating solution, current density and decreasing temperature. Composites were examined by scanning electron microscopy (SEM), X-ray diffraction (XRD) and energy dispersive X – ray (EDX) techniques. The obtained composites were crystalline and had face-centered cubic (FCC) structure. The thickness of composite diminishes with increasing the amount of Al₂O₃ in the composite however, the microhardness increases. The resistance of Ni–Co / nano-Al₂O₃ composite against corrosion in 3.5 % salt water was tested by potentiodynamic polarization and electrochemical impedance spectroscopy (EIS). Ni–Co / nano-Al₂O₃ composites had a good corrosion resistance.

Keywords: electrodeposition; citrate bath; Ni–Co / nano-Al₂O₃; microhardness

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