Effect of SiC Concentration on Microstructure and Properties of Ni-Co/SiC Nanocomposites Fabricated by Pulse Electrodeposition

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In this article, Ni-Co/SiC nanocomposites were successfully deposited by pulse current electrodeposition using modified nickel and cobalt acid solution containing SiC nanoparticles. Effects of SiC concentration on microstructure, microhardness, and properties of Ni-Co/SiC nanocomposites were analyzed by transmission electron microscopy (TEM), scanning electron microscopy (SEM), X-ray diffraction (XRD), microhardness tests, atomic force microscopy (AFM), and electrochemical tests. The results demonstrated that SiC content in Ni-Co/SiC nanocomposites increased to 9.0 wt% when SiC concentration increased from 0 to 10 g/L. Ni-Co/SiC nanocomposites prepared at 10 g/L had the finest and most uniform microstructure compared with the others. When SiC concentration increased from 5 to 10 g/L, average grain size in Ni-Co/SiC nanocomposites decreased from 67.5 nm to 58.1 nm. AFM revealed that Ni-Co/SiC nanocomposite deposited at 10 g/L possessed a fine and uniform microstructure without any evident defects such as pores or cracks. Ni-Co/SiC nanocomposite deposited at 10 g/L with average microhardness of 894.5 Hv possessed the minimum corrosion current density of 1.6×10^{-3} mA/cm², demonstrating its outstanding corrosion resisting property.

Keywords: Ni-Co/SiC nanocomposite; SiC concentration; effect; corrosion resisting property

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