Effect of Current Density on the Performance of Ni–Fe–P–CeO₂ Composite Coating Prepared by Jet Electrodeposition

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To fabricate metal matrix composites with excellent performance, Ni–Fe–P–CeO₂ composite coating were prepared using jet electrodeposition technology at different processing current densities. The surface morphology, microstructure, and composition of the composite coatings were tested using scanning electron microscopy, energy dispersive X-ray spectroscopy, and X-ray diffractometry, respectively. The coatings were subjected to friction, wear, and corrosion tests to explore the effect of current density on the coating performance. The results showed that with the increase in the current density, the microhardness, wear resistance, and corrosion resistance of the amorphous composite coatings first increased and then decreased. When the current density was 30 A/dm², the surface smoothness of the composite coating was the best, the surface compactness was good, the microhardness was maximum (614.24 HV_{0.1}), and the coating surface exhibited excellent wear and corrosion resistances.

Keywords: Jet electrodeposition; Current density; Ni–Fe–P–CeO₂ composite coating; Wear resistance; Corrosion resistance

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