Effect of Electrodeposition Mechanism and α-Si_3N_4/$ZrBr_2$ Doped Composite Particle on the Physicochemical and Structural Properties of Processed NiPZn Coatings on Mild Steel for Advance Application

Ojo Sunday Issac Fayomi*, Sode Adedamola Ayodeji , Benedict Uche Anyanwu, Mojisola Olubunmi Nkiko, Khadijah Tolulope Dauda

Abstract:

Ni-P-Zn nanocomposite coatings were plated on mild steel surface from sulphamate rich bath containing (α-Si_3N_4 and α-$ZrBr_2$) nanoparticle produced via electrodeposition process. The compositions of the particulate were varied from 0 to 10 wt% with time variation between 10 to 25 min after ascertaining other optimum parameters. The crystal evolution and morphological quantification were examined using scanning electron microscope supported with energy dispersive spectroscopy. The corrosion degradation in an acidic and alkaline environment was considered and compared to establish the suitability and extents of the corrosion vulnerability of deposited coatings. The surface flake crystal identified on the microstructural properties show the presence of compositional constituent and disperse particle of α-Si_3N_4 and α-$ZrBr_2$. Finally, corrosion properties show a resilient crystal surface stability in the presence of chloride and sulphate ion with a remarkable surface film still retained at the bulk interface. This study has confirmed that α-Si_3N_4 and α-$ZrBr_2$ composite coating can be used for structural development and corrosion improvement in the presence of active ions. *Keywords:* Nanomaterials, Structure, Corrosion, Prevention, Coatings

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