

Production and Characterization of Sol-Enhanced Zn-Ni-Al₂O₃ Nano Composite Coating

Authors : Soroor Ghaziof, Wei Gao

Abstract : Sol-enhanced Zn-Ni-Al₂O₃ nano-composite coatings were electroplated on mild steel by our newly developed sol-enhanced electroplating method. In this method, transparent Al₂O₃ sol was added into the acidic Zn-Ni bath to produced Zn-Ni-Al₂O₃ nano-composite coatings. The chemical composition, microstructure and mechanical properties of the composite and alloy coatings deposited at two different agitation speed were investigated. The structure of all coatings was single γ -Ni₅Zn₂₁ phase. The composite coatings possess refined crystals with higher microhardness compared to Zn-Ni alloy coatings. The wear resistance of Zn-Ni coatings was improved significantly by incorporation of alumina nano particles into the coatings. Higher agitation speed provided more uniform coatings with smaller grain sized and slightly higher microhardness. Considering composite coatings, high agitation speeds may facilitate co-deposition of alumina in the coatings.

Keywords : microhardness, sol-enhanced electroplating, wear resistance, Zn-Ni-Al₂O₃ composite coatings

Conference Title : ICNME 2015 : International Conference on Nano and Materials Engineering

Conference Location : San Francisco, United States

Conference Dates : June 07-08, 2015