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Characterization and anticorrosion studies of spray coated nickel oxide (NiO) thin films

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Abstract

In the present work, nanostructured thin films of NiO were synthesized using spray coating technique. The morphology and composition of the film were analyzed. The UV Visible absorption, micro Raman, and Photoluminescence spectrum of the NiO thin films were recorded and analyzed. The electrochemical behaviour of the nickel oxide thin film was examined by means of Electrochemical Impedance Spectroscopy (EIS) analysis, Tafel analysis and Open Circuit Potential (OCP) measurements. Salt spray corrosion test was applied to assess the stability of the NiO thin film over the steel substrate in the corrosive salt environment. The electrochemical impedance spectroscopy (EIS) analysis, Open Circuit Potential measurements (OCP), Tafel analysis revealed the enhanced protection of the substrate by nickel oxide thin film. The salt spray test carried out for 390 h, the thin film exposed to salt spray confirmed that the NiO films provides effective protection against corrosion of the stainless steel SS 304L compared with the substrate without nanoparticle deposition. Electrochemical Impedance Spectroscopy (EIS) analysis, Tafel analysis, Open Circuit Potential measurements (OCP) were repeated after the salt spray corrosion test and the result were again recorded, analyzed and compared with previous results which infers the effective protection of the nickel oxide thin film against corrosion in a corrosive environment..

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