Influence of silica nanoparticles on corrosion resistance of sol-gel based coatings on mild steel

Laura Vivar Mora, Sanjeev Naik, Shiladitya Paul, Richard Dawson, Anne Neville, Richard Barker

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Influence of silica nanoparticles on corrosion resistance of sol-gel based coatings on mild steel

Laura VIVAR MORA[1, 4], Sanjeev NAIK[2], Shiladitya PAUL[2], Richard DAWSON[3], Anne NEVILLE[4], Richard BARKER[4]

[1]National Structural Integrity Research Centre (NSIRC), United Kingdom

mnlvm@leeds.ac.uk

[2]TWI Ltd., United Kingdom

[3] Lloyd's Register EMEA, Southampton Technical Support Office, Marine & Offshore, United Kingdom

[4] Institute of Functional Surfaces, School of Mechanical Engineering, University of Leeds, United Kingdom

Abstract:

For this study, unfunctionalised and functionalised nanoparticles of silica (SiO_2) were incorporated into a sol-gel based matrix in an effort to provide more effective corrosion protection on a mild steel substrate. Tests such as atomic force microscopy (AFM) and white light interferometry (WLI) were carried out to characterise coating microstructure and properties. Corrosion protection and coating durability was investigated using different methods which included electrochemical impedance spectroscopy (EIS) and accelerated salt spray testing to simulate a marine environment. Electrochemical test results as well as results after exposure in the neutral salt spray test indicated that the addition of silica nanoparticles led to an improvement in corrosion resistance of the coating matrix. The most effective