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# Synergistic Effect of Clay Nanoparticles and Cerium Component on the Corrosion Behavior of Eco-Friendly Silane Sol-Gel Layer Applied on Pure Aluminum

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## Abstract

The synergistic effect of incorporation of nano-clay along with cerium nitrate as a corrosion inhibitor into an eco-friendly silane layer consisting of glycidyl–oxypropyl–trimethoxysilane (GPS), tetraethoxysilane (TEOS) and methyltriethoxysilane (MTES) applied on pure Al was studied in the present work. At first, the most effective concentration of cerium nitrate and the mechanism in which the cerium component could improve performance of silane layer were determined through a combination of electrochemical techniques and surface analysis methods as well. Based on the impedance spectra as well as polarization curves the superiority of silane film in the presence of cerium could be linked to deposition of a film on the cathodic zones, restricting access of the aggressive species to the surface. Moreover, FTIR spectra revealed impact of the inhibitor on the film structure. Furthermore, EIS data revealed that the nanoparticles enriched silane coating in the

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