Suppression of General and Localized Corrosion by Air-Dried TiO₂ Nanostructured Coatings on AISI 304 Stainless Steel

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In the present study, TiO₂ dispersions were deposited on AISI 304 stainless steel and air dried. The morphology and structure of the coatings were analysed using FTIR, XRD and SEM. Open circuit potential and polarization measurements were done in the dark and under UV illumination, in 3,5% NaCl. TiO₂ nanostructured coatings on stainless steel act by forming a protective layer on the metal surface. Both, general and localized corrosion are suppressed, as the current in the passive range decreases, the corrosion and the pitting potential become more noble and the passive range broadens. The UV illumination pushes the potential of stainless steel to more negative values within the passive range, away from the pitting potential as a result of photogenerated cathodic protection current effect. The coatings have been shown to decrease the current in the passive range by up to 85% and to broaden the passive range by up to 350 mV.

Keywords: Stainless steel, Corrosion, TiO₂ coating, Photogenerated cathodic protection

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