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**The electrochemical synthesis and corrosion behaviour of TiO₂/poly(indole-co-aniline)
multilayer coating: Experimental and Theoretical Approach**

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Abstract

The aim of this study is to protect stainless steel against corrosion via poly (indole-co-aniline) with the help of titanium dioxide pre-coating. Different monomer ratios (1:1 and 1:9) were applied in order to determine the suitable chain composition to synthesize the copolymer in lithium perchlorate containing acetonitrile. The structures, morphologies, electrochemical properties and corrosion resistances of the mono and multi-layer coatings were investigated by Fourier-transform infrared spectra, scanning electron microscope, energy dispersive X-ray spectrometer, electrochemical impedance spectroscopy and anodic polarisation. Furthermore the geometric structure and electronic properties of indole, aniline, indole-co-aniline (dimmer) molecules have been investigated by quantum calculations. The results indicated that corrosion protection of copolymers was increased via titanium dioxide pre-coating. The 1:1 copolymer coating showed better corrosion prevention than 1:9 coating. The correlation was determined between experimental and theoretical parameters.

Keywords: stainless steel; polymer; electrochemical impedance spectroscopy (EIS)

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