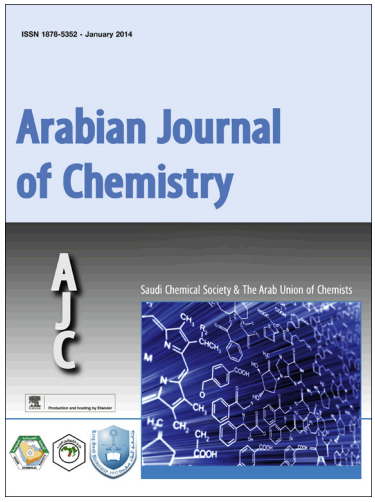


Original article

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# The electrochemical synthesis and corrosion behaviour of $TiO_2$/poly(indole-co-aniline) multilayer coating: Experimental and Theoretical Approach

Serap Toprak Döşlü[a]*, Başak Doğru Mert[b], Birgül Yazıcı[b]

aMardin Artukulu University,School of Health, Department of Nutrition and Dietetics, Mardin/Turkey

bÇukurova University, Science and Letters Faculty, Chemistry Department, 01330 Balcalı, Adana/ Turkey

## 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)

*Corresponding author. Tel.:+90 482 213 40 02 fax:+90 482 213 40 04 e-mail: seraptoprak@artuklu.edu.tr