ELECTROCHEMISTRY CONFERENCE - 2019

September 30-October 02, Istanbul
Harbiye Military Museum and Conference Center
Istanbul-Turkey

Book of Abstracts

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Electrochemical Material Science
(Electrochemical synthesis, processing, surface treatment, corrosion, passivation)

Electrochemical Synthesis of Poly(aniline-co-o-anisidine) on Steel and their Anticorrosion Properties

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For many decades, corrosion has been one of the key scientific problems, the solving of them can save enormous material and financial resources. One of the alternative corrosion inhibitors are conductive polymer films, which are distinguished by non-toxicity, high stability, ease of synthesis and environmental safety [1,2]. The main goal of this study was to create high-performance polymer coatings to protect steel from corrosion. To achieve this goal, the poly(aniline-co-o-anisidine) (PAOA) copolymer was successfully direct electrosynthesized on a steel (St3) electrode from solutions of oxalic and phosphoric acids, and their protective properties were studied using potentiodynamic polarization and electrochemical impedance spectroscopy in 3.5% NaCl. The morphology of the obtained polymer films was investigated by scanning electron microscopy (SEM), according to which they homogeneously covered the surface of steel and had a dense structure. The results of X-ray spectral analysis showed the presence of phosphate ions in the film, which play the role of an alloying anion. The results of the potentiodynamic polarization measurements showed that the PAOA coatings provided more effective corrosion protection to steel and inhibition efficiency for it was 98.8%. The Electrochemical Impedance Spectroscopy (EIS) results are in good agreement with the potentiodynamic polarization measurements. EIS measurements indicated that the coating resistance (Rcoat) and corrosion resistance (Rcorr) values for PAOA coatings was much higher than of bare steel electrode. This study reveals the poly(aniline-co-anisidine) coating has excellent corrosion protection properties and can be considered as a potential coating material to protect St3 against corrosion in chloride medium.

[1] M. Beikmohammadi; L. Fotouhi; A. Ehsani; M. Naseri, Potentiodynamic and electrochemical impedance spectroscopy study of anticorrosive properties of p-type conductive polymer/TiO2 nanoparticles. Solid State Ionics. 15, 324(2018). doi: 10.1016/j.ssi.2018.06.018
[2] E. M. Fayyad; S. H. Sanad; A. A. Ismail, Coatings of Conducting Polymers for Corrosion Protection of Mild Steel. Silicon. 6, 9(2017). doi: 10.1007/s12633-016-9518-5

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