

Electrochemical behavior, characterization and corrosion protection properties of poly(bithiophene + 2-methylfuran) copolymer coatings on A304 stainless steel

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Abstract: Polybithiophene (PBTh), poly(2-methylfuran) (PMeFu) and poly(bithiophene + 2-methylfuran) noted poly(BTh + MeFu) copolymer films were synthesized by electrochemical deposition on 304-stainless steel, from an acetonitrile (ACN) solution containing 10^{-2} M bithiophene, 10^{-2} M 2-methylfuran and 10^{-1} M lithium perchlorate (LiClO_4), by cyclic voltammetry (CV) between 0 V and 2 V vs. SCE, with a scan rate of $50 \text{ mV} \cdot \text{s}^{-1}$. The copolymers coated were studied in a corrosive sulfuric acid medium (H_2SO_4 1 N) using the potentiodynamic polarization method and the electrochemical impedance spectroscopy (EIS). Copolymers coated characterization was performed using scanning electron microscopy (SEM) and Fourier transform infrared (FTIR) spectroscopy. The polarization curves show that the copolymer film formed on A304, shifts the corrosion potential towards more positive potentials. The presence of the poly(BTh + MeFu) improves the corrosion resistance of the metal in a corrosive medium, H_2SO_4 . This protection against corrosion is caused by the barrier effect of the layer of copolymer, which covers the surface of the A304 stainless steel against the aggressive ions of the corrosive medium.

Keywords : 2-methylfuran, bithiophene, copolymers, protection against corrosion, stainless steel.