Synthesis and Characterization of Poly(o-ethoxyaniline)/Nano Silica Composite and Study of its Anticorrosion Performance

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The poly(o-ethoxyaniline)/nano silica (POEA/SiO₂) composite material was synthesized by in-situ polymerization method. The structure, composition and morphology were characterized by Fourier transform infrared spectroscopy (FT-IR), UV-visible adsorption spectroscopy (UV-vis), X-ray diffraction patterns (XRD) and field emission scanning electron microscopy (SEM). The thermal stability was studied by Thermogravimetric analysis (TGA). The electrochemical behaviors were performed by cyclic voltammetry (CV) technique. Epoxy coatings containing SiO₂ nanoparticles, POEA and POEA/SiO₂ powders were prepared on the surface of the treated carbon steel. The surface morphology of the coatings was observed by FESEM, the electrochemical corrosion behavior was studied by Tafel polarization curve and electrochemical impedance spectroscopy (EIS) in 3.5% NaCl solution. The results show that the POEA/SiO₂ containing coating exhibit a lower corrosion rate of 0.02 mm/year and the corrosion protection efficiency is as high as 98.9%. The EIS measurement was also demonstrate that the addition of POEA/SiO₂ could improve the anticorrosion performance of epoxy coating significantly than that of POEA and SiO₂ nanoparticles.

Keywords: POEA; SiO₂ nanoparticles; Electrochemical; Anticorrosion performance

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