Studies on Corrosion Behaviors of Q235 Steel Coated by the Polypyrrole Films Doped with different dopants

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In this paper, polypyrrole (PPy) with different dopants was prepared on the surface of Q235 steel by a potentiostatic electrochemical deposition. The doping agents were using oxalic acid (OA), p-toluene sulfonic acid (p-TSA), sulfamic acid (SA), phytic acid (PA), and sodium dodecyl benzene sulfonate (SDBS). The FT-IR analysis of the products confirmed that the above dopants were incorporated into the PPy molecular chain. SEM observation and calculation results of the void ratio for the series of products indicated that the thickness of the PPy film with different dopants was equivalent, but the SDBS-PPy film layer had the smallest aggregate particle size and the highest film density. On this basis, the research results of the dynamic potential polarization curves and electrochemical impedance spectra for the bare Q235 and the prepared series of PPy/Q235 samples (OA-PPy/Q235, p-TSA-PPy/Q235, SA-PPy/Q235, PA-PPy/Q235 and SDBS-PPy/Q235) showed that the corrosion resistance of the series of PPy/Q235 samples had been significantly improved compared with the bare Q235. Furthermore, SDBS-PPy/Q235 showed the best anti-corrosion performance (with the maximum E_{corr} , the minimum I_{corr} and CR, as well as the maximum R_{ct} , R_{po} and R_{ox} and the minimum C_{dl} , Q_{po} and C_{ox}).

Keywords: potentiostatic; dopant; Q235; PPy; anti-corrosion performance

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