Electrochemical Analysis of 4-methyl-2-phenyl-imidazole Adsorbed on Cu

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Herein, for the first time a detailed electrochemical analysis of Cu immersed in 3 wt.% NaCl containing 4-methyl-2-phenyl-imidazole (MePhI) as a corrosion inhibitor was performed. This analysis was carried out by means of cyclic voltammetry, chronopotentiometry, and electrochemical impedance spectroscopy (EIS). There was a special focus on EIS measurements. It was shown that MePhI significantly inhibits copper oxidation to Cu(I) and Cu(II). The system becomes more noble when Cu is immersed in MePhI-containing solution compared to non-inhibited solution. EIS measurements revealed that Cu in inhibited solution undergoes mixed kinetic-controlled and diffusion-controlled processes. A high corrosion inhibition effect was also proven after 180 days of immersion. Moreover, contact angle analysis showed that MePhI increases the hydrophobic character of the Cu surface.

Keywords: Copper, Corrosion Inhibitor, 4-methyl-2-phenyl-imidazole, Cyclic Voltammetry, Electrochemical Impedance Spectroscopy

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