Experimental and Theoretical Calculations on Corrosion Inhibition of Bronze in 0.5 M HCl by Some Schiff Bases

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doi: 10.20964/2018.02.61

Received: 10 January 2017 / Accepted: 10 November 2017 / Published: 28 December 2017

The triazol-3-ylamine and three different kinds of Schiff base compounds are self-assembled on bronze surface. Electrochemical impedance spectroscopy and potentiodynamic polarization measurements show that the triazol-3-ylamine and Schiff base self-assembled films can protect bronze from corrosion in 0.5 M HCl solution. The corrosion efficiency increases with the self-assembly time increasing and reaches a stable value after 8 h. The highest corrosion efficiency of the bronze electrode modified with self-assembled films reaches 95.81% after immersing in 0.005 M 2,4-Dibromo-6-[(4H-[1,2,4]Triazol-3-ylimino)-methyl]-phenol Schiff base solution for 10 h. X-ray photoelectron spectroscopy and scanning electrochemical microscope are used to characterize the inhibitive ability of the self-assembled films. Quantum chemical calculations and dynamic simulations indicate that the triazol-3-ylamine and Schiff bases molecules can absorb on the copper surface via chemisorption. The adsorption energy increases with the number of aromatic rings.

Keywords: Schiff base; bronze; inhibition; molecular simulation; XPS.

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