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Eco-friendly benzimidazolium based ionic liquid as a corrosion inhibitor for aluminum alloy composite in acidic media

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Abstract

A novel, relatively inexpensive ionic liquid, 1,3-bis[2-(4-methoxyphenyl)-2-oxoethyl]-1*H*-benzimidazol-3-ium bromide (MOBB), was synthesized and characterized using FTIR, NMR, LC-MS and single crystal XRD (SCXRD) techniques. MOBB was evaluated for its corrosion inhibition properties on 6061 Al-15 vol. pct. SiC_(P) composite in 0.1 M HCl and 0.1 M H₂SO₄ media at different temperatures (30-50 °C) by electrochemical impedance spectroscopy and potentiodynamic polarization methods. The adsorption of MOBB on the composite was predominantly through chemisorption, obeying Langmuir adsorption isotherm. Inhibition efficiencies of 98.7% in HCl and 98.8% in H₂SO₄ were obtained, MOBB acting as a mixed type of inhibitor with predominant cathodic control.

Key words: A. Acid solutions, A. Metal matrix composites, B. XRD, B. EIS, B. Polarization, C. Acid inhibition.

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