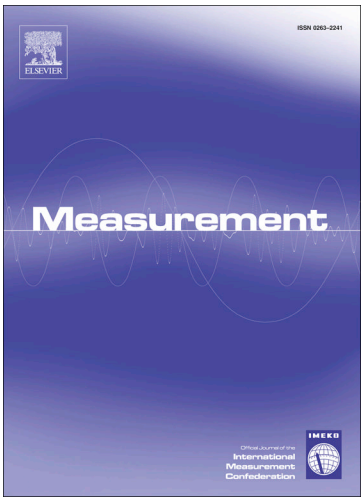

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An evaluation of the anticorrosion effect of ethylene glycol for AA7075-T6 alloy in 3.5% NaCl solution

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Abstract

The corrosion behaviour of AA7075-T6 aluminum alloy in 3.5% NaCl devoid of and containing various amounts of ethylene glycol (EG) has been examined by DEIS (dynamic electrochemical spectroscopy), PDP (Potentiodynamic polarization), SEM (scanning electron microscope), EDAX (energy dispersive X-ray spectroscopy), and AFM (atomic force microscope). AA7075-T6 alloy specimen corroded significantly in 3.5% NaCl solution. In 3.5% NaCl containing EG, the alloy is protected but the extent of protection is a function of immersion duration and concentration of EG. EG affects both the anodic and cathodic corrosion reactions according to PDP results. The adsorption of EG molecules onto AA7075-T6 surface follow Langmuir adsorption isotherm model. The ΔG_{ads}^{0} value calculated for the adsorption process reveals that physisorption is the prevailing mechanism. SEM and AFM pictures support the experimental results and EDAX results confirm the presence of EG molecules on AA7075-T6 surface.

Keywords: AA7075-T6 alloy; NaCl solution; Corrosion; Ethylene glycol; Corrosion inhibition; DEIS

1. Introduction

AA7075 is an alloy of aluminum with Zn, Mg, and Cu as the alloying elements. Notable characteristics of this alloy include high strength, excellent ductility, toughness, and high fatigue. Depending on the heat treatment, AA7075 is differentiated into 7075-0, 7075-T6, 7075-T651, 7075-T7, 7075-T73, and 7075-RRA. Compared with other grades, the AA7075-