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An ecofriendly approach for corrosion control of 6061 Al-15%$_{(v)}$ SiC$_{(P)}$ composite and its base alloy

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ABSTRACT

Corrosion inhibition characteristics of bio polymer dextran was studied for the corrosion control of 6061 Al-15%$_{(v)}$ SiC$_{(p)}$ composite and its base alloy in 1M HCl. Standard electrochemical techniques such as potentiodynamic polarization (PDP) measurements and electrochemical impedance spectroscopy (EIS) method were adopted for corrosion rate measurement. Surface morphology was studied by scanning electron microscopy (SEM) and elemental mapping was done by Energy Dispersive X─Ray (EDX) analysis. Suitable mechanism was proposed for corrosion and inhibition process. Results indicated dextran acts as an excellent anticorrosive agent for the corrosion control of 6061 Al-15%$_{(v)}$ SiC$_{(p)}$ composite, with maximum inhibition efficiency of 91% for the concentration of $0.4gL^{-1}$ at 303K. Dextran acted as a mixed type of inhibitor, and got physically adsorbed both on composite and base alloy by obeying Langmuir adsorption isotherm. Dextran is proved to be a green inhibitor with environmental and economic benefits.

Keywords: 6061 Al-15%$_{(v)}$ SiC$_{(p)}$ composite; Green inhibitor; Biopolymer; Electrochemical studies; SEM-EDX.

1. Introduction

Aluminum and aluminum alloys have large number of industrial and domestic applications mainly due to the presence of highly protective passivating oxide film [1, 2]. However, due to lower strength and stiffness their applications are limited. Reinforcing 6061 Al alloy with SiC particles results in better performance, by enhancement of strength and stiffness [3]. Reinforced aluminum metal matrix composites (AMCs) find large number of applications in