

Corrosion Behaviour and Characterization of a 2014 Al-Cu-Mg-Si Alloy of Different Tempers Studied by polarisation and EIS



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Abstract:

AA2014 Al-Cu-Mg-Si alloy is subjected to precipitation treatment and hardness measurement of the alloy showed typical age hardening behaviour. Transmission electron microscopy (TEM) and X-ray diffraction (XRD) studies revealed the presence characteristic phases. Differential scanning calorimetry (DSC) study displayed the solid state precipitation and dissolution sequence reactions in the alloy. Electrochemical behaviour were assessed by measurement of open circuit potential (OCP) variation with time, potentiodynamic polarization and cyclic polarisation of the alloy of various tempers in 3.5 wt.% NaCl solution at near neural (pH ~ 7) and at alkaline (pH 12) conditions as well. Potentiodynamic polarisation studies showed that the corrosion potential (E_{corr}) value has shifted toward more negative (active) direction with increasing ageing time in the NaCl solution at pH7. The cyclic polarisation displayed active-passive behaviour in 3.5 wt.% NaCl solution at pH 12 and also showed a large hysteresis loop indicating high pit growth damage. Further, electrochemical impedance spectroscopy (EIS) study in 3.5 wt.% NaCl solution with small amount of lanthanum chloride ($LaCl_3 \cdot 7H_2O$) exhibiting much low depressed semi-circle indicated lanthanum chloride is a very good corrosion inhibitor of Al-alloys. The observed corroded surfaces of the alloy showed pitting, an individual and clusters as well, and the pits mouths covered with corrosion products.

Biography:

Prof. K. S. Ghosh has completed his PhD from Indian Institute of Technology, Kharagpur. He is the Professor of Department of Metallurgical and Materials Engineering, National Institute of Technology, Durgapur, India. He has published more than 48 papers in reputed journals and has served as executive member of publication of Transaction, Indian Institute of Metal, Kolkata for five years and Editor of Metal News in one year.

Speaker Publications:

1. Devising Carbon Nanotube, Green Tea, and Polyaniline Based Nanocomposite plus Investigating Its Rheological together with Bactericidal Efficacies
2. Biogenic synthesis of a green tea stabilized PPy/SWCNT/CdS nanocomposite and its substantial applications, photocatalytic degradation and rheological behavior
3. Emerging Materials and Nanotechnology

[World Congress on Nanotechnology and Advanced Materials, July 09-10, 2020](#)

Abstract Citation:

K. S. Ghosh, Corrosion Behaviour and Characterization of a 2014 Al-Cu-Mg-Si Alloy of Different Tempers Studied by polarisation and EIS, Nanotech expo 2020, World Congress on Nanotechnology and Advanced Materials, July 09-10, 2020

<https://nano.nanotechconferences.org/abstract/2020/corrosion-behaviour-and-characterization-of-a-2014-al-cu-mg-si-alloy-of-different-tempers-studied-by-polarisation-and-eis>

