

Investigation of the Cathodic Behavior of AA2024-T3 in Neutral Medium

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Abstract : 2XXX series of aluminum alloys are widely employed in several applications, such as beverages, automotive, and aerospace industries. However, they are particularly prone to localized corrosion, such as pitting, often induced by a difference in corrosion potential measured for intermetallic phases and pure metal. The galvanic cells comprising Al-Cu- Mn-Fe intermetallic phases control cathodically the dissolution rate as oxygen reduction reaction kinetics are privileged on Al-Cu-Mn-Fe particles. Hence, understanding the properties of cathode sites and the processes involved must be carried out. Our interest is to outline the cathodic behavior of AA2024-T3 in sodium sulfate solution using electrochemical techniques. Oxygen reduction reaction (ORR) was investigated in the mixed charge transfer and mass transport regime using the Koutecky-Levich approach. An environmentally benign inhibitor was considered to slow the ORR on the Cu-rich cathodic phases. The surface morphology of the electrodes was investigated with SEM/EDS and AFM. The obtained results were discussed accordingly.

Keywords : AA2024-T3, neutral medium, ORR kinetics, Koutecky-Levich, DFT

Conference Title : ICEEE 2024 : International Conference on Electrochemistry and Electrochemical Engineering

Conference Location : New York, United States

Conference Dates : June 03-04, 2024