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Electrochemical behavior of pure aluminum and aluminum alloy sacrificial anodes in seawater solution

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Abstract : In this paper, electrochemical dissolution processes of pure aluminum and aluminum alloy, which act as an anode for the cathodic protection of steel structures in seawater medium, were compared. In this object, the electrochemical characters of these anodes were studied in artificial seawater electrolyte by: (1) Open Circuit Potential (OCP), (2) Potentiodynamic Polarization (LP), and (3) by Electrochemical Impedance Spectroscopy (EIS) measurements. Microstructures of anodes both before and after measurements were analyzed by optical microscopy. Results indicate that Al alloy showed a considerable activation compared to pure aluminum by shifting the OCP values toward more anodic direction and by increasing the corrosion current densities.

Keywords : Aluminum alloy, corrosion, electrochemical activation, sacrificial anode