Acoustic emission during electrochemical corrosion of aluminium alloy in a 0.6 M NaCl aqueous solution

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Abstract
Acoustic emission (AE) behaviour during simultaneous electrochemical corrosion testing of non-treated and Laser Shock Peened (LSP) aluminium alloy was studied. LSP was performed by the method of closed ablation to ensure higher shock-wave pressure and therefore higher degree of strain hardening. Corrosion experiments were executed in a 0.6 M NaCl naturally aerated aqueous solution by means of rest potential and cyclic polarization measurements. In order to characterize, more precisely dissolution parameters in both, forward (anodic) and reverse (cathodic) scan AE activity was thoroughly analyzed. Moreover, correlation among AE and passive film breakdown, i.e. pitting potential $E_{pit}$, repassivation/protection $E_{prot}$, and pit transition potential $E_{ptp}$ were investigated. Furthermore, active dissolution parameters including the values of corrosion current, corrosion rate and protective efficiency showed an obvious beneficial effect of preliminary LSP testament. At the end the occurrence of pitting corrosion of both non-treated and LSP treated specimens was checked by metallographic observations.

Keywords: Electrochemical corrosion, laser shock peened aluminium alloy, acoustic emission