

Electrochemical Noise of Aluminum Alloys in Chloride Solutions

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This work attempts to assign potential and current electrochemical noise patterns to corrosion processes occurring on 7075 and 2024 aluminum alloy electrodes in chloride containing media. The approach taken was to correlate electrochemical noise data with the posttest conditions of the electrodes. A three-electrode arrangement with a silver/silver chloride reference electrode was used in artificial rain water and in sodium chloride solutions of different concentrations. After several days of exposure, the noise data were assessed at three levels of detail.

Long-term monitoring of the electrochemical noise of a corroding system indicates if there is a change in corrosion characteristics, such as that from localized to overall corrosion. Electrochemical noise data in Figure 1 show such a change as a potential drop to more negative values followed by a decrease in the amplitude of current fluctuations. The presence of white corrosion products

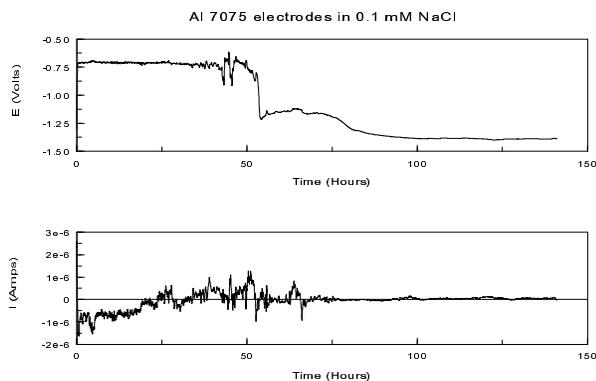


Figure 1:

on the posttest sample confirms that the whole exposed surface corroded (Figure 2, magnification 40x).

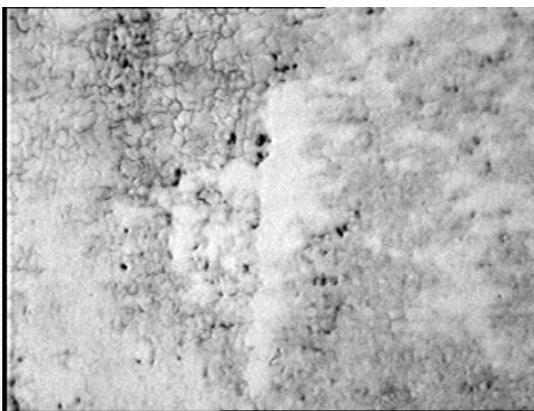


Figure 2:

Figure 3 shows synchronous current and potential fluctuations, indicating that in this time period the localized corrosion occurred only on one electrode.

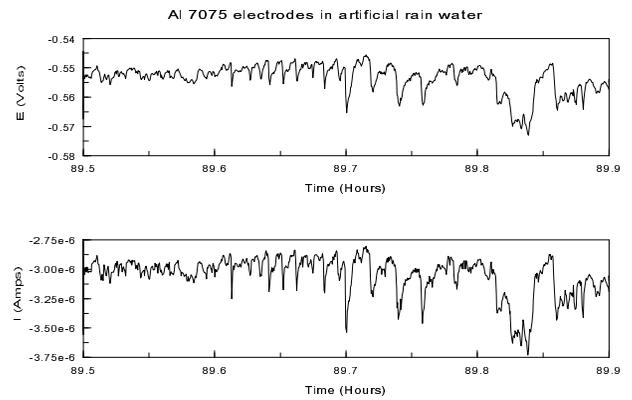


Figure 3:

On the time scale of seconds it is possible to distinguish separate metastable pitting events (see Figure 4).

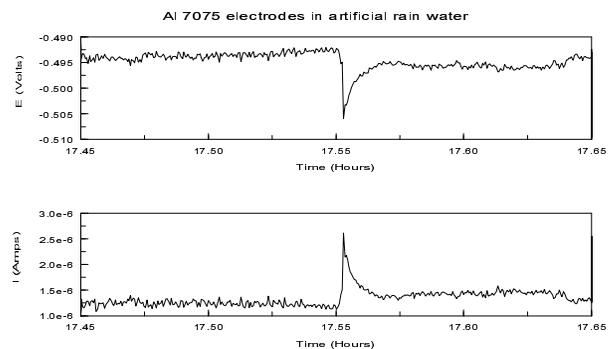


Figure 4:

It can be concluded that examination of electrochemical noise data on different time scales provides a more complete picture of corrosion processes occurring on the electrode.