An Instantaneous Corrosion Monitoring Technique based on Combining Modified Electrochemical Noise and Artificial Neural Network for Determination of Corrosion Type and 2014 Aluminium Alloy Corrosion Rate in NaCl and Ce(NO₃)₃ solutions

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Electrochemical emission spectroscopy (EES), an improved electrochemical noise measurement, was applied for monitoring corrosion rate of 2014 aluminium alloy in NaCl and Ce(NO₃)₃, and corrosion type was analysed by wavelet transform and artificial neural network. Reliability of EES was verified by monitoring corrosion of 2014 aluminium alloy in the passivation, pitting and inhibition systems, because the results from EES, linear polarization resistance technique and morphology observation were in good agreement. In order to process data obtained by EES, artificial neural network was introduced to build the relationship between wavelet results and corrosion types, and results of confusion matrix and receiver operating characteristic curve demonstrated that artificial neural network is an excellent method for intelligent recognition for corrosion type.

Keywords: electrochemical noise; corrosion monitoring; corrosion rate; corrosion type; artificial neural network

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