High temperature localized corrosion is one of the most hazardous corrosion forms producing fast and unanticipated destruction into a small section of a metal structure. Electrochemical Noise (EN) is an electrochemical technique providing rate and corrosion mechanism of corrosion in-situ process. Amplitude fluctuations intensities are associated to corrosion process that can be observed in electrochemical noise measurements (ENMs) and their shape related with the type of corrosion process. For corrosion the electrochemical noise signals (ENS) consist on a high overlapped transient therefore they need appropriated mathematical treatment. Since 1990 the wavelet analysis proposed as a mathematical tool for signal processing alternative to Fourier transform when a precise time-scale analysis is required or to study transients into a signal. For the present study the EN technique was used to monitor the corrosion of a NiAl+Cu Intermetallic HVOF protective coating of Inconel alloy 600 at 750 °C in molten salts. The Discrete Wavelet Transform (DWT) technique was used for treating noise signal from respective transients and detect highly localized pitting corrosion. The original potential and current noise were first disintegrated into a series of time k by DWT at increasing scale j. Then, the noise resistance \( R_n(j) \) was calculated as a ratio of the standard deviation of the reconstructed potential noise to the reconstructed current noise. The experimental results demonstrated that the DWT technique could improve the calculation of the classic noise resistance \( R_{sn}(f) \) because it can remove the low frequency trend coupled in the potential or current fluctuations very well.
Keywords: Wavelet analysis; Electrochemical noise; High temperature corrosion.

FULL TEXT

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