Corrosion assessment of Ag and Cr modified Fe40Al intermetallic alloy in Hank's solution by electrochemical noise

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This research presents an evaluation of the corrosion performance of binary Fe40Al alloy and ternary Fe40Al-2.5Cr and Fe40Al-2.5Ag (at %) alloys exposed to a synthetic physiological solution that simulates biological human body fluids. Electrochemical noise measurements were made on Fe40Al based alloys during exposure to the biomimetic solution over a 30-day period. The electrochemical parameters of the evaluated alloys were compared. Polarization curves revealed that the corrosion current density of the Cr-modified Fe40Al alloy was less than that of the ternary Fe40Al-2.5Ag alloy; regarding electrochemical noise measurements, analyses revealed that both ternary alloys experienced a pitting corrosion during the entire immersion period. Additionally, the alloy Fe40Al-2.5Cr predominantly exhibited a higher corrosion rate than the Ag-modified intermetallic for the entire exposure time.

Keywords: Iron aluminides, corrosion, electrochemical noise, microstructural characterization, Hank's solution

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