Short Communication

Effect of Ag Content on Phase Evolution during the De-Alloying of Ag-Al Alloy: Combining the Electrochemical Noise with the Wavelet and Analysis

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De-alloying mechanism of Ag-Al alloys in 5 wt% hydrochloric acid (HCl) was investigated by both microstructure examination and electrochemical noise (EN). The wavelet transform has been used to analyze the EN data. Two phases formed in the Ag-Al alloys: the α -Al as matrix and the γ -Ag₂Al intermetallic phase. The volume fraction of γ -Ag₂Al became higher with the increasing of Ag content. Both α -Al and γ -Ag₂Al phases dissolved during the de-alloying process. Based on the energy distribution plot (EDP) obtained from the EN data, it is demonstrated that the de-alloying of Ag₃₀Al₇₀ was mainly controlled by Al dissolution, which led to non-uniform nanoporous structures. For Ag₄₀Al₆₀, it was mainly γ -Ag₂Al dissolution, which led to coarser nanoporous structures. For the Ag₃₅Al₆₅ near the eutectic point, the de-alloying mechanism was the concurrent uniform dissolution of α -Al and γ -Ag₂Al, which had good effect on the homogeneous diffusion formation of ligament and nanopore in nanoporous Ag.

Keywords: Nanoporous Ag; De-alloying; Electrochemical Noise; Wavelet;

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