The effect of pH on NiFeP Alloy Electrodeposition for Development of Steam Generator Tube Repair Technique

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Abstract

The effect of bulk pH on deposition mechanism and material properties of NiFeP ternary alloy electrodeposits from sulfamate bath was investigated to develop steam generator tube repair technique. Impedance studies on NiFeP ternary alloy electrodeposition were carried out and it was concluded that increasing bulk pH in the range from 1 to 3.8 did not vary the mechanism of NiFeP ternary alloy electrodeposition, but decreased solution resistance(Rs) and charge transfer resistance(Rct) in Nyquist plots measured under -0.85V because of decreasing hydrogen bubbles on the surface in an adsorbed state. When bulk pH in electrolytes increased during electrodeposition, residual tensile stress in deposits increased with increasing NH_4^+ ion in electrolytes, Ni content in deposits increased with decreasing polarization, and the degree of crystal irregularity in deposits decreased.