Effects of Side-Chain Polyether Additive on Zinc Electrodeposition from Ammoniacal Solution

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A typical side-chain polyether, glycerol polyoxyethylene ether (GPE), was used as a single additive on zinc electrodeposition from ammoniacal solution. The electrochemical effects of GPE additive on zinc electrodeposition were investigated by means of cyclic voltammetry (CV), potentiodynamic polarization tests and chronoamperometry (CA). The morphology of zinc deposits on glassy carbon (GC) surface after zinc electrowinning was observed using SEM (scanning electron microscopy). The results indicated that the nucleation overpotential (NOP) was obviously increased up to 120 mV in addition of 1.5 g L⁻¹ GPE in the electrolyte, and the hydrogen evolution reaction was significantly prevented in the presence of additive. The GPE additive has the effect to enhance cathodic polarization. In addition, the zinc electrodeposition process is greatly affected by agitation due to the diffusion control of Zn ion and the nucleation mechanism of zinc electrodeposition is independent of GPE. The more smooth, compact and fine-grained zinc deposits were obtained with 1.5 g L⁻¹ GPE in the electrolyte.

Keywords: Zinc electrodeposition, Side-chain polyether, Ammoniacal solution, Electrochemical characterization, Deposit morphology

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