



Copper Electrodeposition onto Palladium from a Deep Eutectic System Based on Choline Chloride

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Recently, there has been an increasing interest in developing non-aqueous electrolytes which have been widely employed as an alternative media for a range of metals and metal alloys electrodepositions. A promising and new class of electrolytes among ionic liquids (ILs) are deep eutectic solvents (DESs)¹. The purpose of the copper deposition study from DESs is the application of copper coating and copper alloys in both, industry and fundamental research. In this work, the electrochemical deposition of copper onto palladium working substrate from ChCl/EG (1:2 ratio) DES electrolyte at 50 °C was investigated. Additionally, the Cu(II) electroreduction process was studied by potentiodynamic measurements, cyclic voltammetry, chronoamperometry, in the electrolytes with different concentrations of Cu(II) ions ranging from 0.1 M to 0.5 M.

The cyclic voltammetry results indicated that the bulk deposition of Cu(II) begins to occur at around -0.080 V vs. Cu. It was found that copper deposition onto the Pd cathode from ChCl:EG electrolyte under potentiostatic conditions is achievable.

Data collected from X-ray diffraction (XRD) analysis proved that the cathodic deposits are composed of Cu and CuPd intermetallic. CuPd alloys with different Pd-Cu ratios were prepared by constant potential of -0.100 V vs. Cu from ChCl/EG containing 0.1 M and 0.5 M Cu(II). It is worth noting that the X-ray data indicated that the composition of the produced Pd-Cu films could be varied by changing the concentration of Cu(II) ions in the electrolyte or changing the deposition mode.

Keywords: deep eutectic solvents(DESs), Cu-Pd alloys, electrodeposition

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References:

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