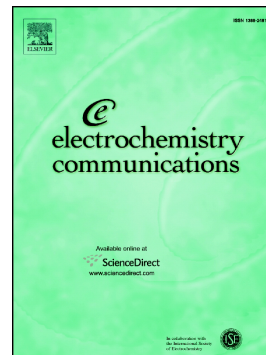


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Copper underpotential deposition at gold surfaces in contact with a deep eutectic solvent: New insights

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ABSTRACT

The electrodeposition of copper on a polycrystalline gold electrode and on Au(hkl) single crystals was investigated in a deep eutectic solvent (DES). The DES employed consisted of a mixture of choline chloride and urea (1:2). The Au(hkl)/DES interface was studied using cyclic voltammetry in the capacitive region. The blank voltammograms showed characteristic features, not previously reported, that demonstrate the surface sensitivity of this solvent. Copper electrodeposition was then studied and it was found that this takes place through the formation of an underpotential deposition (UPD) adlayer, demonstrating the surface sensitivity of this process. Voltammetric profiles showed similarities with those obtained in aqueous solutions containing chloride, suggesting that the copper UPD in this DES is strongly influenced by the presence of chloride.

KEY WORDS

Single crystal; deep eutectic solvent; interface; underpotential deposition; chloride.

INTRODUCTION

Since it was discovered that ionic liquids (ILs) are effective solvents, their use in electrochemical processes has been widespread [1, 2]. The instability of the early forms of these liquids has been overcome in the search for air and water stable ILs. Among these, deep eutectic solvents (DESS) are often used because they are both environmentally friendly and relatively cheap. These room temperature ionic liquids are prepared by mixing a hydrogen-bond donor with a quaternary ammonium salt [1, 3-9].

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