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ELECTROCHEMICAL BEHAVIOUR OF Ag (I) AT Pt ELECTRODE IN 1-BUTHYL-3-METHYL-IMIDAZOLIUM CHLORIDE (BMIMCl) AT 343-363 K

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The electrochemical reduction of Ag (I) on a platinum electrode, has been studied in the ionic liquid 1-buthyl-3-methylimidazolium chloride (BMIMCl) at 343-363 K, by square wave voltammetry (SWV), cyclic voltammetry (CV), convolutive potential sweep voltammetry (CPSV), chronoamperometry (CA), and chronopotentiometry (CP).

It has been found that during cathodic polarization, deposition of metallic Ag from the BMIMCl onto the platinum surface proceeds in a single step:

$$Ag(I) + 1e \rightarrow Ag(0)$$

which has been found reversible or quasi-reversible depending on the experimental conditions (i.e scan rate).

The diffusion coefficient of Ag(I) (D) has been determined by different techniques and compared with those reported in the literature in another similar media (1). The validity of the Arrhenius law was also verified.

Electro-crystallization of silver plays an important role in the whole electrodeposition process (2). Experimental current–time transients followed the theoretical models based on instantaneous nucleation with three-dimensional growth of the nuclei at the studied temperatures.

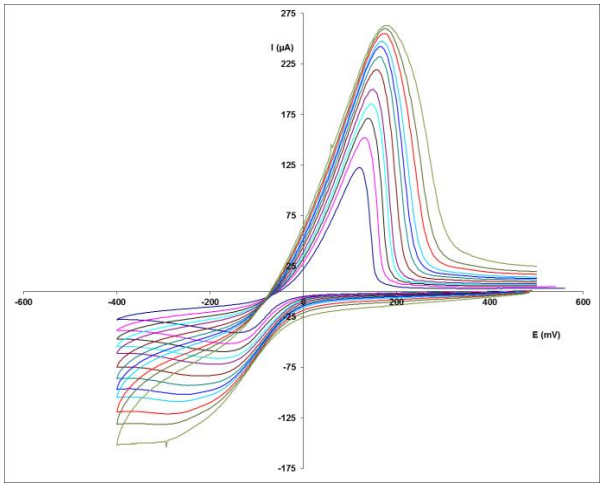

Figure 1: Cyclic Voltammograms obtained with an Ag(I) solution (Co= 2.60.10^{-5} mol cm^{-3}, T=343 K) on a Pt electrode (S = 0.165 cm^{2}). Scan rates ranging from 20 to 700 mV s^{-1} Pseudoreference: Ag.

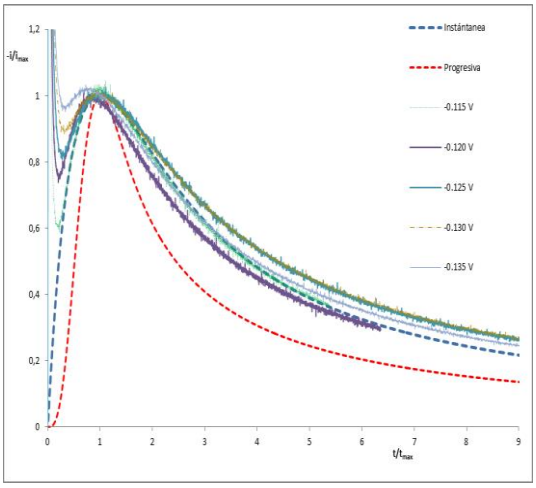

Figure 2.- Comparison of the dimensionless experimental data derived from the current–time transients with the theoretical model for instantaneous and progressive nucleation at different working potentials (from -0.115 to -0.135 V vs Ag) at 363 K

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