

N°80 / OC

TOPIC(s) : Clean reactions / Alternative technologies

Electrochemical properties of some ionic liquids

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PURPOSE OF THE ABSTRACT

In the past several years, ionic liquids have attracted a fast-growing research interest as innovating solvents. This growth is explained in particular by the need of developing respectful processes of the environment [1].

In electrochemistry, ionic liquids are more used since they have, especially sufficient electric conductivity and large electrochemical window. The majority of ionic liquids has a very high viscosity, which strongly influences one of the principle steps of electrochemical processes, matter transport by diffusion of soluble products.

With the aim of using ionic liquids as electrolyte during the electrodeposition of nanostructured thin layers of zinc oxide (ZnO) [2, 3], electrochemical studies, in particular the cyclic voltammetry and the electrochemical impedance spectroscopy (EIS), were realized for three hydrophobic ionic liquids. Relevant physicochemical properties were studied, such as viscosity, density and diffusion coefficient of ferrocemethanol (taken as redox probes)[4] in the three ionic liquids considered under various conditions. This work showed the effect of the length of the alkyl chain of the cation on the electrochemical behavior of ionic liquids.

The objective of this study is to correlate the properties of the ionic liquids used with the nature of the films of zinc oxide obtained.

FIGURES

FIGURE 1

FIGURE 2

KEYWORDS

ionic liquids | Electrochemistry | Physical properties

BIBLIOGRAPHY

1. Li, H., et al., Influence of alkyl chain length and anion species on ionic liquid structure at the graphite interface as a function of applied potential. *J Phys Condens Matter*, 2014. 26(28): p. 284115.
2. Azaceta, E., et al., Electrochemical reduction of O₂ in 1-butyl-1-methylpyrrolidinium bis (trifluoromethanesulfonyl) imide ionic liquid containing Zn²⁺ cations: deposition of non-polar oriented ZnO nanocrystalline films. *Physical Chemistry Chemical Physics*, 2011. 13(29): p. 13433-13440.
3. Azaceta, E., et al., Electrochemical deposition of ZnO in a room temperature ionic liquid: 1-Butyl-1-methylpyrrolidinium bis (trifluoromethane sulfonyl) imide. *Electrochemistry Communications*, 2009. 11(11): p. 2184-2186.
4. Lovelock, K.R., et al., On the diffusion of ferrocenemethanol in room-temperature ionic liquids: an electrochemical study. *Phys Chem Chem Phys*, 2011. 13(21): p. 10155-64.