Abstract

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Synthesis & Catalysis: Open Access

2022

Synthesis and electrochemical characterization of polypyrrole films doped with organic surfactants

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Abstract

Problem Statement: Polypyrrole is a conductive polymer with very interesting electrocatalytic properties. However, this presents stability problems and low conductivity on some passive substrates such as gold1. This leads to the use of high potentials in electrosynthesis to achieve oxidation of the monomer. However, due to over-oxidation, polypyrrole loses its electrochemical properties2. To solve this problem, two strategies are often used. The first is to use potentiostatic techniques, which give rise to more stable films and second, to choose dopants that allow to improve the conductive properties of the film. In this way, synthesis conditions can be chosen which produce polypyrrole films with the desired electrochemical properties2,3. The following poster shows preliminary results of electrochemical synthesis strategies of polypyrrole (PPy) doped with anions of organic surfactants: bis-ethylhexyl benzosulfonate (BEHSS-) and polystyrenesulfonate (PSS-) (Fig. 1) in aqueous medium. For this, cyclic voltammetry (CV) and pulse chronoamperometry were used as electropolymerization techniques. Subsequently, the polymers obtained by Raman spectroscopy, CV in 0.01M potassium ferricyanide + 0.1M potassium chloride and electrochemical impedance spectroscopy were characterized and the films synthesized with the BEHSS- and PSS- anions in pulsed aqueous media Chronoamperometric compared to the synthesis by cyclic voltametry, present greater stability and better conductive properties. On the other hand, the electrochemical impedance measurements in the high frequency range showed that the films synthesized with BEHSS - favor better the transfer of charge in aqueous medium compared to polypyrrole films doped with PSS. Conclusions: The films synthesized by means of pulse chronoamperometry allow better the transfer of charge in aqueous medium to the films prepared by means of cyclic voltammetry. Likewise, films prepared with voluminous dopants improve the stability of the films, allowing to expand the potential window used for the synthesis of polypyrrole.

Received: January 03, 2022; **Accepted:** January 08, 2022; **Published:** January 27, 2022

Biography:

Alberto Molina is a master's student at the University of the Andes. He holds his undergraduate degree in chemistry from the University of Cordoba and did his degree work in the study of the volumetric and viscosimetric properties of ionic liquids in half accusation. This work was part of a research project from which four mastery jobs emerged. Finally, my thanks to the chemistry department of the University of the Andes, who has provided the laboratory for electrochemistry and materials available for this project and its funding