

ELECTROCHEMICAL BEHAVIOUR OF PPy(DBS) FILMS IN BaCl₂ ELECTROLYTES

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Abstract

Conducting polymers (CPs) are unusual organic materials featuring high electronic conductivity. Among them, some of these polymers can change their volume considerably when their redox state is altered in aqueous electrolytes. This property is exploited for the use as artificial muscles or soft actuators. The actuation property of CPs highly depends on cycling electrolytes, types and concentrations. The present work aims to explore the possibilities to use Polypyrrole, doped with the immobile anion dodecyl benzene sulfonate (PPy/DBS) films cycled in BaCl₂ electrolytes. In this study, PPy(DBS) films of thickness 400 nm were electro polymerized on 6 MHz AT-cut quartz crystal electrodes from synthesized solution containing 0.05 M pyrrole monomer in 0.05 M NaDBS solution and characterized by simultaneous cyclic voltammetry and Electrochemical Quartz Crystal Microbalance measurements(EQCM). The films were cycled in 0.1 M BaCl₂ and 1 M BaCl₂ electrolytes. When comparing with high and low concentrations of BaCl₂, a larger frequency change was obtained in low concentrations rather than in higher concentration, indicating that the actuation in thin concentrations is larger than higher.

Keywords: Polypyrrole, EQCM, BaCl₂