

ELECTROCHEMICAL BEHAVIOUR OF POLYPYRROLE FILMS IN LiCl AND CsCl AQUEOUS ELECTROLYTES

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Conducting polymers (CPs) have gained increasing attention owing to their strong potential as alternatives to their inorganic counterparts. Among several CPs, polypyrrole and polyaniline has been identified as active materials in a number of new growing technologies such as energy storage, chemical sensors, Opto-electronic devices and artificial muscles: Polypyrrole doped with large immobile dodecylbenzene sulfonate anions (PPy/DBS) operating in aqueous electrolytes has been demonstrated as one of the successful systems suitable for the use as soft actuators or artificial muscles. The insertion and expulsion of counter ions into PPy/DBS films operating in aqueous electrolytes during electrochemical redox process mainly determines the actuation mechanism of such PPy/DBS films. It is, therefore, necessary to get better understanding of ionic motion into PPy/DBS films. The main objective of this study is to explore and compare electrochemical behavior of PPy/DBS films in Lithium Chloride (LiCl) and Cesium Chloride (CsCl) Aqueous electrolytes. For this investigation, PPy/DBS films of thickness 1 μ m were electropolymerized on Pt wire with a current density of 1 mA/cm² from aqueous solution containing 0.05 M sodium dodecyl benzene sulphonate (NaDBS) and 0.05 M pyrrole. The pristine films were electrochemically characterized in 0.1 M LiCl, 0.1 M CsCl, 3 M LiCl, and 3 M CsCl aqueous electrolytes using cyclic voltammetry technique. It was found that electrochemical behavior of PPy/DBS films highly depend on the concentration of the cycling electrolytes and the anion movement (Cl⁻) into the films becomes significant at concentrated electrolytes. Furthermore, it is greater in 3 M CsCl electrolytes than in 3 M LiCl electrolytes.

Keywords: *Conducting polymers, Polypyrrole, Cyclic Voltammetry, LiCl, CsCl*