

## A Study on Electrochemical Stability of Polypyrrole Films in Concentrated LiCl Aqueous Electrolytes

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Polypyrrole (PPy) conducting polymer films operating in aqueous electrolytes have a shorter cycle life and such a system has, therefore, limited use as far as applications are concerned. This can be rectified to some extent when ionic liquids are used as cycling media. However, the cost involved is prohibitive. The aim of this study is to investigate the possibility of using concentrated alkali halide electrolytes to improve the cycle life of PPy films. Polypyrrole films doped with large surfactant anions, dodecyl benzene sulfonate, (PPy/DBS), were formed on quartz crystals using the galvanostatic electropolymerization technique. The redox behavior of the films up to 300 cycles in LiCl aqueous electrolytes of selected concentrations ranging from 0.1 – 8 M, was investigated using cyclic voltammetry and electrochemical quartz crystal microbalance (EQCM) techniques. During the first cycle, while large water movement was observed along with the counter ions in dilute electrolytes, such water transport in concentrated electrolytes was found to be very low. On continuous cycling the shape and capacity of the cyclic voltammograms changed significantly in dilute electrolytes. But in highly concentrated electrolytes the cyclic voltammograms remained unchanged with the number of cycles indicating that the PPy/DBS films had stable cycle life in such electrolytes.

**Keywords:** Polypyrrole, Electropolymerization, Cycle life