

POLYPYRROLE COATED CELLULOSIC SUBSTRATE MODIFIED BY COPPER OXIDE AS ELECTRODE FOR NITRATE ELECTROREDUCTION

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Abstract: The aim of this work is to synthesize polypyrrole (PPy) films on nonconducting cellulosic substrate and modified by copper oxide particles for use in the nitrate electroreduction process. Firstly, the chemical polymerization of polypyrrole onto cellulosic substrate is conducted by using FeCl_3 as an oxidant and pyrrole as monomer. The thickness and topography of the different PPy films obtained were estimated using a profilometer apparatus. The electrochemical reactivity of the obtained electrodes was tested by voltamperometry technique and electrochemical impedance spectroscopy. Secondly, the modification of the PPy film surface by incorporation of copper oxide particles is conducted by applying a galvanostatic procedure from a CuCl_2 solution. The SEM, EDX and XRD analysis showed the presence of CuO particles in the polymer films with dimensions less than 50 nm. From cyclic voltamperometry experiments, the composite activity for the nitrate electroreduction reaction was evaluated and the peak of nitrate reduction is found to vary linearly with initial nitrate concentration.

Keywords : Polypyrrole, cellulosic, CuO , electrocatalysis, Nitrate