Electroanalytical Behaviors of Chemically Modified Electrodes Bearing Complexing Ligands

LAU Chung Yin

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Principal Supervisor: Dr. SHIU Kwok Keung

Hong Kong Baptist University

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ABSTRACT

Conducting polypyrrole modified electrodes incorporated with alizarin red S were prepared by electropolymerization under different solvent systems. Mixtures of water and a non-aqueous solvent (either acetonitrile or ethylene glycol) were employed. Electroanalysis of copper(II) species was performed voltammetrically. The effects of solvent system on the performance of the electrodes were evaluated in terms of the normalized current, alizarin red S coverage, polymerization charge and the ligand-to-metal ratio for copper analysis. Experimental results showed that the water content in the solvent mixture had strong influence on the electroanalytical performance of the polypyrrole film.

Polypyrrole modified electrodes prepared from acetonitrile with high water content and ethylene glycol with large amount of water functioned poorly while sensitive and reproducible results were obtained by introducing small amount of water into the solvent system. The morphology of the polypyrrole films was examined and it seemed that there was direct correlation between the film morphology and the electroanalytical behavior for copper(II) determination. The polypyrrole films changed from smooth surface to nodular form as the water content in the preparation solvent mixtures increased. It was proposed that the solvent composition affected the electroanalytical behavior by influencing the morphology of polypyrrole modified electrodes obtained.
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