

**ELECTROCHEMICAL SYNTHESIS AND STUDY OF
POLYANILINE-ORTHANILIC ACID AND
POLYPYRROLE-POLYSTYRENE SULPHONATE
COMPOSITE AS ELECTRODE MATERIALS**

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DISSERTATION PRESENTED FOR THE DEGREE OF

MASTER OF SCIENCE

UNIVERSITY MALAYA

KUALA LUMPUR, MALAYSIA

krofieskan pada 22.03.2000
Mikrofia 14470
ab Mikrofis 2

1998

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CLOSED STACKS

Abstract

Penyediaan polyaniline dan polypyrrole secara elektrokimia dan pengkajian ciri-cirinya telah dilakukan dengan menggunakan kaedah Voltametri Berkitar. Electropempolimeran bagi polyaniline dengan kehadiran asid ortanilik telah dijalankan untuk menempatkan kumpulan sulfonik (SO_3^-) di dalam matriks polyaniline.

Perbezaan faktor-faktor seperti kepekatan monomer, kepekatan medium asid, suhu, penambah (asid ortanilik), kadar imbasan dan bahan elektrod, atas electropempolimeran telah dipelajari.

Empat jenis bahan elektrod telah digunakan iaitu platinum tulen, "sintered platinised titanium", "tin dioxide-coated titanium" dan titanium tulen. Keaktifan "electrocatalytic" bagi bahan-bahan elektrod tersebut dalam electropolimeran telah dibandingkan.

Sifat-sifat bagi tipisan bebas "polypyrrole-polystyrene sulphonate" seperti ketebalan, ketumpatan, kekonduksian elektrik bagi permukaan dan melintasi badan polimer. Kekonduksian elektrik bagi badan polimer telah diukur di bawah satu julat tekanan tinggi.

Polypyrrole yang mengandungi kumpulan sulfonik telah digunakan dalam pengestrakan ion-ion Cu^{2+} dari larutan yang sangat cair. Kepekatan akhir Cu^{2+} dalam larutan sampel yang digunakan telah mencapai satu takat di bawah 1 mg/L.

ACKNOWLEDGMENT

I would like to express my sincere gratitude to Associate Professor Dr. Chan Chee Yan for his constant supervision and invaluable guidance and advise throughout the study. I also like to thank Dr. Ng Swee Chin for his assistance and help, especially in literature searching.

I also like to thank the members of Staff of the Department of Chemistry who have rendered their assistance in one way or another.

I wish to dedicate this thesis to my beloved family, especially my father.

Abstract

A Cyclic Voltammetry study of the electrochemical preparation and behaviour of polyaniline and polypyrrole was carried out. Electropolymerization of polyaniline in the presence of orthanilic acid was carried out to introduce sulphonic groups (SO_3^-) into the conducting polyaniline matrix.

Variation of factors such as concentration of monomer, concentration of acid medium, temperature, additive (orthanilic acid), scan rate and electrode materials, on the electropolymerization was studied.

Four types of electrode materials were used, namely pure platinum, sintered platinised titanium, tin dioxide-coated titanium and pure titanium. Electrocatalytic activities of these electrode materials for the electropolymerization of aniline were compared.

Some characteristics of free-standing polypyrrole-polystyrene sulphonate films have been studied such as thickness, density, surface and bulk conductivity. Bulk conductivity was measured under a range of pressure for Ppy-PSS films.

Sulphonated conducting polypyrrole films were applied in the copper removal from very dilute simulated effluent solution. The final concentration of copper in the treated sample solution attained was below 1 mg/L.

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