سامية محمد مصطفى

شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

سامية محمد مصطفى

شبكة المعلومات الجامعية

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

سامية محمد مصطفى

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

سامية محمد مصطفى

شبكة المعلومات الجامعية

بعض الوثائق الأصلية تالفة

سامية محمد مصطفى

بالرسالة صفحات لم ترد بالأصل

MODERN TECHNIQUES AND NOVEL METHODS IN MICROANALYSIS

Presented by

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(M.Sc.)

A dissertation submitted for the degree
of Doctor of Philosophy
(Chemistry)

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MODERN TECHNIQUES AND NOVEL METHODS IN MICROANALYSIS

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DEDICATION

To my beloved parents and family

Sayed A. M. Marzouk

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Sayed A. M. Marzouk

PUBLICATIONS

The following papers were extracted from this thesis:

Journal Papers:

Sequential Flow-Injection Potentiometric Determination of Iodide and Iodine In Povidone Iodine Pharmaceuticals.

(Hassan, S. S. M.; Marzouk, S. A. M. *Electroanalysis* **1993**, *5*, 855)

A novel Ferroin Membrane Sensor for Potentiometric Determination of Iron.

(Hassan S. S. M. ; Marzouk, S. A. M. *Talanta* **1994**, *41*, 891)

Amperometric Monitoring of Lactate Accumulation in Rabbit Ischemic Myocardium.

(Marzouk S. S. M.; Cosofret, V. V.; Buck, R. P.; Yang, H.; Cascio, W. E. ; Hassan, S. S. M. *Talanta*, **1997**, in press)

Conducting Salt-Based Amperometric Biosensor For Measurement of Extracellular Lactate Accumulation in Ischemic Myocardium.

(Marzouk S. A. M.; Cosofret, V. V.; Buck, R. P.; Yang, H.; Cascio, W. E; Hassan, S. S. M. *Anal. Chem.* **1997**, Accepted)

Development of a Diamine Biosensor.

(Xu, C. X.; Marzouk, S. A. M.; Cosofret, V. V.; Buck, R. P.; Neuman, M. R.; Sprinkle, R. H. *Talanta* **1997**, in press)

Amperometric Flow-Injection Determination of Putrescine and Putrescine Oxidase based on Immobilized Enzyme Reactor.

(Marzouk, S. A. M.; Xu, C. X.; Cosofret, V. V.; Buck, R. P.; Neuman, M. R.; Sprinkle, R. H.; Hassan, S. S. M *under preparation for publication*)

ABSTRACT

Modern Techniques and Novel Methods in Microanalysis

by

Sayed A. M. Marzouk

The studies presented in this dissertation were limited to the development of some new sensors based on potentiometric and amperometric transduction modes. The developed sensors were applied successfully, mainly, in pharmaceutical and biomedical analyses.

In the potentiometric part, two potentiometric PVC membrane sensors for selective determination of iodide and ferroin were developed. The iodide membrane sensor was incorporated in a flow cell and the flow system was optimized for sequential flow-injection determination of iodide and iodine in pharmaceutical preparations containing povidone iodine. The ferroin sensor was used for iron quantification after its simple conversion into ferroin. The sensor was applied to iron determination in water, rocks, cement, glass, alloys, and pharmaceutical preparations.

In the amperometric part, three different miniaturized amperometric biosensors were fabricated on flexible Kapton substrate. The first sensor was of the first generation type and was based on immobilized lactate oxidase. This sensor was used for direct continuous monitoring of extracellular lactate accumulation in ischemic rabbit myocardium. The second sensor was of the third generation type and based on immobilized lactate oxidase and tetrathiafulvalene-

tetracyanoquinodimethane charge transfer complex. This sensor allowed the lactate measurement during no-flow ischemia under severe oxygen deprivation. The third sensor was of the first generation type and was based on immobilized putrescine oxidase. This sensor was developed to be used for in vivo detection of the most common type of the vaginal infections, bacterial vaginosis. An immobilized enzyme reactor, coupled with amperometric detection, was developed for the flow injection assay of putrescine oxidase for the diagnosis of premature rupture of fetal membranes.

Key words:

Ion-Selective Electrodes, Polymer membrane Electrodes, Flow-Injection Analysis, Sequential Analysis, Iodide Determination, Povidone Iodine, Ferroin, Iron Determination, Pharmaceutical Analysis, Kapton, Planar Substrate, Enzyme Sensors, amperometric Biosensors, Lactate Determination, No-Flow Ischemia, Organic Conducting Salts, Diamine, Bacterial Vaginosis, Pre-term delivery, Enzyme Reactors, Premature Rupture of Fetal Membranes.

TABLE OF CONTENTS

CHAPTER 1

Introduction

CHAPTER II

Sequential Flow-Injection Potentiometric Determination of Iodide and Iodine in Povidone Iodine Pharmaceuticals