شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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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

HANAA ALY

Ain Shams University
Faculty of Science
Chemistry Department

Designing of molecularly imprinted polymers-Based Chemical sensors for the Detection of protein

Thesis Submitted by

Nashwa Hamdy Ashmawy

M. Sc. (2015)

Chemistry department, Faculty of Science,
Ain Shams University

For the PhD Degree of Science

In

Chemistry

To

Department of Chemistry

Faculty of Science

Ain Shams University

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Designing of molecularly imprinted polymers-Based Chemical sensors for the Detection of protein

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Dedication

This thesis is dedicated first of all to my God and creator who on and on supporting me to achieve this work and supporting me in all my life "thanks for Allah"

To my supervisors for their continuous encouragement during this work

To my parents (God prolong their age) and all my family

To My friends who encourage and supported me

Nashwa Hamdy Ashmawy

Published papers

polymers

MDPI

Article

Solid-Contact Potentiometric Sensors Based on Stimulus-Responsive Imprinted Polymers for Reversible Detection of Neutral Dopamine

Ayman H. Kamel [1], Abd El-Galil E. Amr [2,3,*], Nashwa H. Ashmawy [1], Hoda R. Galal [4], Mohamed A. Al-Omar [2] and Ahmed Y. A. Sayed [2]

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Abstract: Herein, we present for the first time a novel potentiometric sensor based on the stimulus-responsive molecularly imprinted polymer (MIP) as a selective receptor for neutral dopamine determination. This smart receptor can change its capabilities to recognize according to external environmental stimuli. Therefore, MIP-binding sites can be regenerated in the polymeric

polymers

MDPI

Article

Validation of a Novel Potentiometric Method Based on a Polymeric PVC Membrane Sensor Integrated with Tailored Receptors for the Antileukemia Drug Cytarabine

Ayman H. Kamel [1], Abd El-Galil E. Amr [2,3,*], Nashwa H. Ashmawy [1], Hoda R. Galal [4], Abdulrahman A. Almehizia [2], Teraze A. Youssef [1], Mohamed A. Al-Omar [2] and Ahmed Y. A. Sayed [2]

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molecules

MDPI

Article

Novel Carbon/PEDOT/PSS-Based Screen-Printed Biosensors for Acetylcholine Neurotransmitter and Acetylcholinesterase Detection in Human Serum

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Paper under submission

Solid-state biosensors for electrochemical monitoring of human serum albumin.

Abstract

Abstract

The aim of this work is to prepare and characterize biosensors to detect and quantify of some basic molecules and Portions in biological fluids.

Chapter one

The basic principles, historical background, classifications, selectivity, applicability, some strategies used in fabrication and application of potentiometric sensors.

Chapter two

It presents for the first time a novel potentiometric sensor based on the stimulus-responsive molecularly imprinted polymer (MIP) as a selective receptor for neutral dopamine determination. This smart receptor can change its capabilities to recognize according to external environmental stimuli. Therefore, MIP-binding sites can be regenerated in the polymeric membrane by stimulating with stimulus after each measurement. Based on this effect, reversible detection of the analyte via potentiometric transduction can be achieved. MIPs based on 4-

vinylphenylboronic acid as the functional monomer were prepared as the selective receptor. This monomer can successfully bind to dopamine via covalent binding and forming a five- or six-membered cyclic ester in a weakly alkaline aqueous solution. In acidic medium, the produced ester dissociates and regenerates new binding sites in the polymeric membrane. The proposed smart sensor exhibited fast response and good sensitivity towards dopamine with a limit of detection 0.15 μM over the linear range 0.2–10 μM. The selectivity pattern of the proposed ISEs was also evaluated and revealed an enhanced selectivity towards dopamine over several phenolic compounds. Constant-current chronopotentiometry is used for evaluating the short-term potential stability of the proposed ISEs. The obtained results confirm that the stimulus-responsive MIPs provide an attractive way towards reversible MIP-based electrochemical sensors designation.

Chapter three

It presents a simple, rapid and easy method is proposed for the detection of a cytostatic therapeutic drug, cytarabine, in real samples. The method is based on potentiometric transduction using prepared and characterized new ion-selective electrodes for cytarabine. The electrodes were integrated with novel man-tailored imprinted polymers and used as a sensory element for recognition. The electrodes revealed a remarkable potentiometric response for cytarabine over the linearity range 1.0×10^{-6}–1.0×10^{-3} M at pH 2.8–4 with a detection limit of 5.5×10^{-7} M. The potentiometric response was near-Nernstian, with average slopes of 52.3 ± 1.2 mV/decade. The effect of lipophilic salts and plasticizer types on the potentiometric response was also examined. The electrodes exhibited an enhanced selectivity towards cytarabine over various foreign common ions. Validation and verification of the presented assay method are demonstrated by evaluating the method ruggedness and calculating the detection limit, range of linearity, accuracy (trueness), precision, repeatability (within-day) and reproducibility (between-days). The proposed ion-selective electrodes revealed good performance characteristics and possible application of

these electrodes for cytarabine monitoring in different matrices. The electrodes are successfully applied to cytarabine determination in spiked biological fluid samples and in pharmaceutical formulations.

Chapter four:

Herein, novel electrochemical methods based on potentiometric and impedimetric transduction were presented for targeting albumin protein. The presented methods employed screen-printed ceramic electrodes with conductive ink as a background support, achieving the goal to make easy and cost-effective electrodes with good detection merits. The bio-sensors were fabricated using either tridodecyl methyl-ammonium chloride (TDMAC) or aliquate 336S in plasticized carboxylated poly vinyl chloride (PVC-COOH) as polymeric matrix. The analytical performances of the resulting biosensors were evaluated using two different electrochemical techniques, including potentiometry and electrochemical impedance spectroscopy (EIS). For potentiometric assay, the biosensors exhibited a potentiometric response towards albumin with a