

基于分子印迹聚合膜的胆固醇丝网印刷生物传感芯片

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Screen Printing Bio-chip Sensor for Cholesterol Detection Based on Molecular Imprinting Self-assembled Film

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摘要

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摘要 该文基于自组装技术在丝网印刷金电极表面制备分子印迹膜, 研制胆固醇电化学仿生生物传感芯片。利用扫描电镜(SEM)对平面裸金电极、厚膜裸金电极及其修饰电极进行了形貌的分析比较, 采用循环伏安分析法对电极修饰过程的电化学特性进行表征, 采用计时电流法对胆固醇生物传感芯片的浓度响应特性进行检测。结果表明, 基于丝网印刷工艺的厚膜电极不仅能满足自组装分子印迹仿生膜的修饰, 而且电极表面具有明显的纳米放大效应。传感器对0~700 nM不同浓度胆固醇进行检测, 线性范围50 nM~700 nM, 灵敏度达到-4.94 $\mu\text{A}/[\text{Ig}(\text{nM})]$, 线性相关系数为0.994。该胆固醇传感芯片具有较高的准确性, 检测准确度达到了99.56%。

关键词: 电化学传感芯片 分子印迹 自组装单层膜 胆固醇 丝网印刷

Abstract: An electrochemical bionic sensor for cholesterol detection is developed with molecular imprinting self-assembled film deposited on the screen printed gold electrode. The surface topography of planar bare gold electrode and thick film bare gold electrode are compared with Scanning Electron Microscope (SEM). The electrochemical characteristics of the electrode during modification are studied with cyclic voltammetry technique. The results show that thick film electrode by screen printing technology is suited to the modification of molecular imprinting self-assembled film, and exhibits obvious amplification at nano level. The response of the sensor to the concentration of cholesterol is detected with chronoamperometric measurements. Cholesterol between 0 and 700 nM are detected with this sensor. The linearity range is from 50 nM to 700 nM with the sensitivity of -4.94 $\mu\text{A}/[\text{Ig}(\text{nM})]$ and linearly dependent coefficient of 0.994. And this cholesterol sensor has high accuracy, which reaches 99.56%.

Keywords: Electrochemical sensor Molecular imprinting SAM Cholesterol Screen printing

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