

论文

基于层-层自反应的葡萄糖氧化酶有序多层膜电极

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摘要:

以脒胺修饰的金电极为基础电极, 利用席夫碱反应使经高碘酸根氧化的葡萄糖氧化酶在该电极表面进行自身的层-层有序组装. 用电化学交流阻抗法对多层酶膜形成过程的跟踪结果表明, 该多层酶膜的生长是一个逐步形成的均匀过程. 用循环伏安法和I-t曲线法研究了该酶电极对葡萄糖的电催化氧化. 实验结果表明, 当采用羟基二茂铁作为人工电子转移媒介体时, 该酶电极对葡萄糖具有很好的电催化氧化功能. 该传感器制作简便, 响应迅速, 性能稳定, 催化电流与葡萄糖浓度在一定范围内成正比, 并且可以通过控制葡萄糖氧化酶的组装层数来调节该生物传感器的灵敏度与检测限.

关键词: 葡萄糖氧化酶; 生物传感器; 层-层自反应; 有序多层膜; 电催化

Ordered Multilayer Film Electrode Containing Glucose Oxidase Based on Layer-by-layer Self-reaction

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Abstract:

Highly stable glucose oxidase(GOx) multilayer films were fabricated on cystamine modified gold electrode surfaces by layer-by-layer self-reaction of periodate-oxidized glucose oxidase. The fabricated process was followed by electrochemical impedance spectroscopy. The experimental results showed that the film was homogeneous and formed in an ordered manner. The gold electrode modified with the GOx multilayers showed excellent electrocatalytical response to the oxidation of glucose when ferrocenemethanol was used as an artificial redox mediator. From the analysis of voltammetric signal, the coverage of active enzyme on the electrode surface was estimated, which had a linear relationship with the number of GOx besides the first layer. This suggested that the analytical performance such as sensitivity, detection limit, and so on, was tunable by controlling the number of the fabricated GOx layer. In addition, the biosensor exhibited a good reproducibility and stability.

Keywords: Glucose oxidase; Biosensor; Layer-by-layer self-reaction; Ordered multilayer film; Electrocatalysis

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