

电化学沉积二氧化锆制备DNA电化学传感器

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基金项目:

摘要:

设计了一种简单、方便的电化学DNA生物传感器的制作方法,首先在硼掺杂的金刚石电极(BDD)表面电化学沉积一层二氧化锆薄膜,利用二氧化锆的分子结构特点,将探针DNA即5'末端修饰磷酸基团的寡核苷酸短链(ssDNA)连接到二氧化锆薄膜上。以亚甲基蓝(MB)为氧化还原的电子媒介体,应用循环伏安法和差分脉冲法测试了该电极的性能。由于硼掺杂的金刚石电极背景电流非常小,DNA与二氧化锆的连接稳定,使得制备的电化学传感器表现出高的灵敏度、良好的线性、长期的稳定性等。传感器的线性范围为 $2.15 \times 10^{-10} \sim 2.15 \times 10^{-7} \text{ mol} \cdot \text{L}^{-1}$ 。

关键词: 硼掺杂的金刚石 二氧化锆 生物传感器 亚甲基蓝

Zirconia Modified Electrochemical DNA Biosensor

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Abstract:

We develop an electrochemical DNA biosensor, using a boron-doped diamond(BDD) electrode modified with zirconia(ZrO_2),the zirconia thin porous film was fabricated by cyclic voltammatic method in an aqueous electrolyte of ZrOCl_2 and KCL at room temperature, DNA probes were attached onto the ZrO_2 /BDD electrode due to the strong binding of the phosphate group of the DNA with the Zirconia film and the excellent biocompatibility of the BDD. DNA immobilization and hybridization were characterized by cyclic voltammetry and differential pulse voltammetry, using methylene blue as indicator. After the hybridization of DNA probe with the complementary DNA,the peak current of MB decreased obviously. The response current were linearly related to the concentration of the target oligonucleotide sequence in the range 2.15×10^{-10} to $2.15 \times 10^{-7} \text{ mol L}^{-1}$.

Keywords: boron-doped diamond zirconia biosensor methylene blue

投稿时间: 2011-05-16

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