

基于特殊形貌CdS纳米颗粒修饰的DNA传感器在DNA杂交信号检测中的应用

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摘要:

用水热法制备出具有特殊核桃状外表的纳米小球修饰在玻碳电极的表面, 通过5'端巯基修饰的探针DNA共价结合在CdS层敏感层上形成共聚物, 再与靶DNA杂交, 利用循环伏安法(CV)和差分脉冲伏安法(DPV)研究修饰电极的电化学行为。修饰CdS纳米颗粒的电极检测得到的DNA杂交信号有明显的增强, 峰电流强度值与靶DNA浓度值的负对数具有较好的线性关系, 信号增强的最大值在靶DNA浓度为101 μ M时得到。传感器灵敏度提高, 检测下限可达 1pM 以下。

关键词: DNA传感器; CdS纳米颗粒; 循环伏安法; 差分脉冲伏安法

CdS-modified DNA Sensor for Direct Signal-amplified Sensing of DNA Hybridization

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Abstract:

The CdS nanospheres with special walnut-like surface are prepared by solvothermal method and characterized first, then the mercapto group-linked probe DNA was covalently immobilized onto the CdS layer and exposed to ODN target for hybridization. Sensitive electrical readouts coupled with Cyclic Voltammogram (CV) and Differential Pulse Voltammogram (DPV) techniques show significant increased responses. The sensor is able to robustly discriminate the DNA hybridization responses with good sensitivity and stability and the selectivity of the sensor is tested using a series of matched and certain-point mismatched sequence with concentration grads ranging from 10-6 μ M to 101 μ M. The peak values are almost linear with the minus logarithm of target DNA concentrations with detection limit < 1pM. The optimized target DNA concentration at 101 μ M for the signal amplification is obvious.

Keywords: DNA sensor; CdS nanoparticles; Cyclic Voltammogram; Differential Pulse Voltammogram

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