

论文

基于酶催化沉积质量放大的压电免疫传感器的研究

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摘要:

提出了一种酶催化沉积质量放大的高灵敏压电免疫传感器. 采用1,6-二巯基己烷在石英晶振上自组装一单分子层, 再通过另一端巯基连接胶体金, 利用胶体金的高比表面积和强吸附作用力增加抗IgG抗体的固定量, 同时借助胶体金优良的生物亲和性保持抗IgG抗体的活性. 在H₂O₂存在下, 通过标记在抗人IgG抗体上的HRP酶催化底物DAB(3,3'-联苯二胺), 反应中生成的不溶性产物沉积到石英晶振的Au电极表面, 达到质量放大的目的. 结果表明, 检测人IgG在16 ng/mL-100 μg/mL范围内有很好的线性关系, 检测下限为10 ng/mL, 在用于实际试样的回收率测定中, 结果良好.

关键词: 酶催化放大 胶体金 1,6-二巯基自组装 压电免疫传感器

An Amplified Piezoelectric Immunosensor Based on Amplification of Enzyme-catalyzed Precipitation Mass

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Abstract:

In this paper, an amplified immunosensor with highly sensitivity has been proposed based on precipitation of an insoluble product on functionalized electrode. Anti-hIgG was immobilized onto the surface of gold electrode modified with 1,6-hexanedithiol and colloidal Au interface. It was proved that the amount of immobilized antibody and the immunoactivity of bound antibodies could be well improved by colloidal Au. HRP labeled antibody reacted with antigen, then HRP biocatalyzed DAB (3,3'-diaminobenzidine) in the presence of H₂O₂, resulting in an insoluble product on the electrode surface, to achieve an obviously decreased frequency. Comparing with the direct detection of antigens, the immunosensor with the proposed amplified procedure shows improved sensitivity due to the significantly extended detection range. Analytical results indicate that the developed amplified procedure is a promising alternative for biorecognition element on the electrode surface showing an improved performance in terms of the magnitude of the response and sensitivity. The proposed immunosensor in optimal conditions has a linear range of 16 ng/mL-100 μg/mL for hIgG detection with a detection limit of 10 ng/mL. The immunosensor can be used to quantitatively determine hIgG in the sample of human serum.

Keywords: Enzyme-biocatalyzed amplification Colloidal Au 1,6-Hexanedithiol self-assemble Piezoelectric immunosensor

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