

论文

基于MEMS技术的安培酶免疫传感器研究

边超, 许媛媛, 孙红光, 张虹, 陈绍凤, 夏善红

中国科学院电子学研究所传感技术联合国家重点实验室北方基地 北京 100080

收稿日期 2005-3-16 修回日期 2005-7-28 网络版发布日期 2007-11-14 接受日期

摘要

该文采用MEMS工艺制备可集成安培酶免疫传感器,用于人免疫球蛋白IgG的检测。该传感器以硅作为基底,铂作为电极,工作电极敏感面积 1mm^2 。SU-8胶形成的微反应池结构使该传感器试剂用量仅为 μl 量级。聚吡咯作为酶与电极之间的电子转移基体聚合于工作电极敏感表面,戊二醛作为交联剂进行抗体(羊抗人IgG)的固定。抗体与酶标抗体(辣根过氧化物酶HRP标羊抗人IgG)对人IgG进行特异性夹心识别,通过检测酶标HRP对底物 H_2O_2 催化产生的电流信号实现免疫检测。该传感器工作电压 -0.3V ,检测下限 5ng/ml ,线性范围 $5\sim 255\text{ng/ml}$,响应时间 3min ,具有响应快、下限低、试剂用量少、微型化、便于集成等优点。

关键词 [安培酶免疫传感器](#) [MEMS](#) [聚吡咯](#) [IgG](#)

分类号 [TP212.3](#)

A Micro Amperometric Immunosensor Based on MEMS

Bian Chao, Xu Yuan-yuan, Sun Hong-guang, Zhang Hong, Chen Shao-feng, Xia Shan-hong

State Key Lab of Transducer Technology, Institute of Electronics, Chinese Academy of Sciences, Beijing 100080, China

Abstract

A micro amperometric immunosensor is fabricated to detect human IgG based on MEMS. The Pt electrode is deposited on silicon wafer with the sensitive area of 1mm^2 . A micro reacting pool is made of SU-8 polymer and several microlitre reagent was needed. Polypyrrole is electropolymerized on the electrode to transfer the electron between the electrode and the enzyme. Glutaraldehyde is used to bind the antibody on polypyrrole. Human IgG is specifically recognized by goat anti-human IgG and horseradish peroxidase (HRP) conjugated goat anti-human IgG in sandwich way. Human IgG is scaled by detecting the current from the catalyzed reaction between HRP and H_2O_2 .

With the working potential of -0.3V , the immunosensor displayed a good linear dose-response behavior for human IgG concentrations between 5 and 255ng/ml . A low detection limit of 5ng/ml and 3-minute response time are achieved. This micro amperometric immunosensor has many advantages such as fast response time, low detection limit, little reagent, micro bulk and easy integration with IC.

Key words [Enzyme amperometric immunosensor](#) [MEMS](#) [Polypyrrole](#) [IgG](#)

DOI:

通讯作者

作者个人主页 边超; 许媛媛; 孙红光; 张虹; 陈绍凤; 夏善红

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF \(374KB\)](#)
- ▶ [\[HTML全文\]\(OKB\)](#)
- ▶ [参考文献\[PDF\]](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含“安培酶免疫传感器” 的相关文章](#)
- ▶ 本文作者相关文章

- [边超](#)
- [许媛媛](#)
- [孙红光](#)
- [张虹](#)
- [陈绍凤](#)
- [夏善红](#)