

## 基于生物素-亲和素放大的SPR传感器检测大肠杆菌研究

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摘要:

建立了一种基于表面等离子体共振(SPR)技术的大肠杆菌特异性快速检测方法。采用EDC/NHS将葡聚糖修饰的CM5芯片表面活化, 通过亲和素固定生物素标记的二抗(羊抗兔IgG抗体), 利用一抗(兔抗大肠杆菌 ATCC25922单克隆抗体)和二抗反应, 将兔抗大肠杆菌单克隆抗体固定在传感芯片表面。利用一抗和二抗的质量扩增效应和生物素-亲和素的多级放大效应, 实现了对低浓度大肠杆菌 ATCC25922的快速检测, 提高了SPR传感器灵敏度。利用NaOH溶液对芯片再生, 可对多个不同浓度样品进行检测, 采用相对响应单位(RU)记录数据。本传感芯片对大肠杆菌 ATCC25922响应的线性范围为 $1.5 \times 10^2 \sim 1.5 \times 10^7$  CFU/mL, 检测限为 $1.5 \times 10^2$  CFU/mL, 相关系数 $r$ 为0.9815。这种方法简便快捷, 有望成为一种在线检测治病菌的有力手段。

关键词: SPR传感器; 生物素-亲和素多级放大; 大肠杆菌 ATCC25922; 快速检测

## Streptavidin (SA)-Biotin Amplification Strategy Based SPR Sensor for Rapid Detection of Escherichia coli

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**Abstract:**

A surface plasmon resonance (SPR) biosensor has been established for rapid detection of Escherichia coli. An activation step performed on CM5 chips was carried using EDC/NHS. The biotin-labeled secondary antibody (goat anti-rabbit IgG) was immobilised onto CM5 chip modified with streptavidin via the biotin-streptavidin interaction. Then, rabbit anti-E. coli ATCC25922 polyclonal antibody (primary antibody) was immobilized on sensor chip by antibody-antigen recognition. The detectable signal was amplified by the amplification of primary and secondary antibodies and the streptavidin-biotin amplification strategy. All the SPR experiments were performed used a Biacore 3000 and CM5 chips. Regeneration was achieved using NaOH in order to detect several samples. The change of RU was linearly correlated with the concentration of E. coli ATCC25922 ( $r=0.9815$ ). This method exhibited high performance with a dynamic range of  $1.5 \times 10^2 \sim 1.5 \times 10^7$  CFU/mL, and a detection limit was  $1.5 \times 10^2$  CFU/mL. This method has exhibited great potential in bacteriological testing.

**Keywords:** SPR sensor; streptavidin-biotin amplification; Escherichia coli ATCC25922; rapid detection

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