

## 可再生使用的磁性纳米修饰C反应蛋白电流型免疫传感器

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摘要：

利用Fe<sub>3</sub>O<sub>4</sub> (核)/Au (壳) (简称GMPs) 标记C反应蛋白酶标抗体 (HRP-anti CRP), 构建了一类新型的磁性纳米探针 (HRP-anti CRP /GMPs), 将其修饰在丝网印刷电极 (SPCE) 表面构建了可再生使用的CRP安培型酶联免疫传感器。首先将多壁碳纳米管 (MCNTs) -硫堇(Thi)-Nafion复合物固定于SPCE表面制备了基底电极 SPCE | MCNTs-Thi-Nafion; 进而外加磁场在SPCE背面, 将HRP-anti CRP /GMPs探针吸附固定在基底电极表面。获得了免疫电极 (SPCE | MCNTs-Thi-Nafion/ HRP-anti-CRP/GMPs) 在含CRP溶液中温育后, 对CRP检测线性浓度范围为0.1~110 ng/mL, 检测下限为0.04 ng/mL(3σ)。上述磁性探针表面具有较高的抗体和酶标记容量, 故对待测物捕获能力大大提高, 且通过酶催化放大检测电流, 可成倍提高分析灵敏度。通过外加磁场, 该类探针易于实现在平面型的SPCE电极表面固定和洗脱; 这不仅简化了探针在电极表面的固定步骤, 而且使得该类免疫传感器可再生利用, 降低了使用成本。此传感器集分离、富集和检测于一体, 具有灵敏度高、结果稳定性好、可再生使用等优点, 有望用于人血清中痕量CRP的快速现场检测。

关键词：C反应蛋白；磁性纳米探针；可再生使用；安培酶联免疫传感器

## A renewable immunosensor for CRP based on magnetic nano particles modified screen printed electrode

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**Abstract:**

A renewable amperometric immunosensor for C reactive protein (CRP) based on a novel magnetic nano probes modified on screen printed electrode (SPCE) was fabricated. The probes was prepared by horseradish peroxidase (HRP) labeled CRP antibody (HRP-anti-CRP) assembled on nano Fe<sub>3</sub>O<sub>4</sub>(core)/Au(shell)(GMPs) particles. The immunosensor was prepared by following steps. Firstly, multi-walled carbon nanotubes (MCNTs)-Thionine(Thi)-Nafion composite was prepared and dropped on the surface of SPCE to prepare the basic electrode (SPCE | MCNTs-Thi-Nafion). Secondly, the nanoprobe were introduced on the surface of the basic electrode by permanent magnet, then to prepare the immunosensor (SPCE | MCNTs- Thi-Nafion/HRP-anti-CRP/GMPs). Through one-step immunoassay format, the immunosensor was incubated with CRP solution. Under optimized conditions, the decreased current was proportional to the CRP concentration from 0.1 to 110ng/mL with a detection limit of 0.04 ng/mL at signal/noise ratio of 3, This method reduced the cost and simplified the preparation process of the immunosensor. The immunosensor can simultaneously realize separation, enrichment and determination, with high sensitivity and good stability, which would be valuable for clinical immunoassay for CRP in human serum.

**Keywords:** C reactive protein; magnetic nano probes; renewable; amperometric enzyme linked immunosensor

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