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基于Au NPs-CeO2@PANI纳米复合材料固定化酶的葡萄糖生物传感器

作　者：马莉萍, 左显维, 王艳凤, 李云霞, 张彪, 韩根亮

单　位：甘肃省科学院传感技术研究所

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摘　要：

制备了一种基于金纳米粒子（Au NPs）、氧化铈纳米颗粒（CeO2）和导电聚苯胺（PANI）的具有核壳结构的纳米复合材料（Au NPs-CeO2@PANI），利用该纳米复合材料和壳聚糖形成的复合膜成功实现了对葡萄糖氧化酶（GOD）的固定。采用透射电镜和X射线衍射对Au NPs-CeO2@PANI材料进行了表征。电化学方法研究了传感器性能，结果表明基于Au NPs-CeO2@PANI纳米复合材料修饰的葡萄糖生物传感器线性范围为6.2×10-6～2.8×10-3 mol/ L，响应时间为5 s，检测下限为1.0×10-6 mol/ L；相同条件下Au NPs-CeO2@PANI纳米复合材料修饰的电极也显示出了比单一或二者复合的纳米材料修饰电极更优越的性能。

关键词：生物传感器；Au NPs-CeO2@PANI纳米复合材料；固定化酶；电化学检测；葡萄糖氧化酶

A glucose biosensor based on Au NPs-CeO2@PANI nanocomposites immobilized enzyme

Author's Name:

Institution:

Abstract:

The core-shell nanocomposites comprising of covalently linked Au Nanoparticles (Au NPs)), cerium oxide (CeO2) and polyaniline(PANI) were prepared (Au NPs-CeO2@PANI). Chitosan (Chit) and Au NPs-CeO2@PANI are used to form a composite matrix film (Chit/Au-CeO2-PANI) on the surface of Pt electrode to immobilize glucose oxidase (GOD). The Au NPs-CeO2@PANI nanocomposites was characterized by transmission electron microscope (TEM) and X-ray diffraction (XRD). Electrochemical studies revealed that the presence of Au NPs-CeO2@PANI nanocomposites resulted in increasing electroactive surface area for GOD loading and enhancing electron transport between GOD and electrode. The Chit/Au-CeO2-PANI /GOD modified electrode showed superior performances over the individual components and their binary combinations, in terms of useful linear range (6.2×10 -6 to 2.8×10-3 mol/ L) with a correlation coefficient of 0.9968, rapid response time (5 s) and low detection limit (1.0×10-6 mol/ L).

Keywords: biosensor; Au NPs-CeO2@PANI nanocomposites; immobilization enzyme; electrochemical detection; GOD

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