In situ green preparation of ZnO nanostructures-modified electrode and its P450 biosensor with a simple configuration
纳米 ZnO 原位修饰电极绿色制备及结构简单的 P450 酶生物传感器

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将肝脏中参与药物代谢的 P450 酶固定在电极上，组装成 P450 酶生物传感器，对候选药物的体内代谢研究及新药研发具有重要意义。本项目通过在电极表面镀上一层 Zn 形成 Zn 合金，基于原电池腐蚀原理在水热体系中优先腐蚀 Zn，形成纳米 ZnO，实现纳米 ZnO 原位修饰电极绿色制备技术。同时借助于纳米 ZnO 自组装特性将 P450 酶固定在纳米 ZnO 修饰电极界面上，实现结构简单的 P450 药物代谢酶生物传感器的构建。主要内容与关键技术包括：研究 ZnO 原位修饰常用电极（如金电极等）的绿色制备技术及机理，研究原电池腐蚀体系中氯离子等离子对 ZnO 纳米结构、形貌的调控，同时深入分析 P450 酶与纳米 ZnO 界面间的相互作用、P450 酶在纳米 ZnO 界面上的理化性质，并反馈于纳米 ZnO 结构、形貌的调整；所构建的 P450 传感器性能评估。旨在深刻认识上述科学问题，为结构简单的 P450 酶传感器的构建及其药物代谢中应用提供理论依据和基础。

The development of a nano-modified electrode consisting of cytochrome P450 proteins would be a key technology with which to establish simple drug metabolizing biosensors or screening devices for drug inhibitors. Herein we design a green corrosion of Zn alloy method for the production of ZnO nanostructures, which was used as the electrode-modified material. Then, the P450 proteins could be fixed on the ZnO-modified electrode by using the electrostatic adsorption properties of ZnO. Thus, a P450 drug metabolism electrochemical biosensor with a simple configuration was set up. The research is focus on following topics: In situ green preparation of ZnO nanostructures-modified electrode； Physics and chemistry property of P450; Interaction between ZnO nanostructures and P450 proteins, and guide to synthesis of the ZnO structure; Detected the direct electron transfer from P450 adsorbed on electrode and applied it to drug metabolism evaluation.