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# A facile horseradish peroxidase electrochemical biosensor with surface molecular imprinting based on polyaniline nanotubes

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## ABSTRACT

A green, highly sensitive and selective electrochemical imprinted biosensor for horseradish peroxidase (HRP) was designed and prepared based on the combination of polyaniline nanotubes (PANTs) and self-assembly surface molecular imprinting technique. PANI nanotubes, as supporting material, could effectively enhance imprinting efficiency and the electrode conductivity and facilitate electron transfer. The imprinted biosensor was characterized by electrochemical methods, Fourier transform infrared spectroscopy (FTIR) and scanning electron microscope (SEM). It showed a very highly electrocatalytical activity for reduction of hydrogen peroxide and could be used in amperometric determination of H<sub>2</sub>O<sub>2</sub> in the ranges of 0–10 μM and 10–90 μM with a detection limit of 0.01 μM (S/N=3). The imprinted sensor showed still an excellent selectivity for HRP and was successfully employed to detect different concentration levels of HRP from 1.0 × 10<sup>-9</sup> to 0.10 mg/mL with a detection limit of 3.56 × 10<sup>-10</sup> mg/mL (8.1 fM) (S/N = 3) with Fe(CN)<sub>6</sub><sup>3/4-</sup> probe by differential pulse voltammetry (DPV). The developed method was successfully used in determination of H<sub>2</sub>O<sub>2</sub> in human urine sample.

**Keywords:** Horseradish peroxidase; hydrogen peroxide; electrochemical imprinted biosensor; polyaniline nanotubes; self-assembly; catalytic activity

## 1. Introduction

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