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A single nanoparticle-based real-time monitoring of biocatalytic progress and detection of hydrogen peroxide

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Abstract

This paper reported a new method to observe the catalytic progress of the natural horseradish peroxidase (HRP) *in-situ* on single gold nanoparticles (GNPs) by the combination of dark field imaging and plasmonic resonance scattering spectra. The produced single HRP-GNP exhibited localized catalytic property toward H₂O₂-Diaminobenzidine (DAB), which could be used to detect the concentration of H₂O₂ in micro/nanospace. The linear range for H₂O₂ sensing was from 0.01 μM to 5 μM with a detection limit of 10 nM. The new design strategy could be applied for a broader bioanalysis situation by substituting the HRP with other specified biocatalyst.

KEYWORDS: Au Nanoparticles, plasmonic resonance scattering (PRS) spectrum, dark field microscopy, hydrogen peroxide

1. Introduction

Noble metallic nanoparticles have attracted significant attention because of their interesting catalytic, electronic and plasmonic optical properties [1-3]. Localized surface plasmon resonance (LSPR) of a metal nanoparticle strongly

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