Simple and sensitive point-of-care bioassay system based on enzyme-mimetic nanoparticles

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Enzyme-mediated signal amplification has been extensively used in labs for sensitive detection of analytes, but its application for point-of-care (POC) detection has been limited due to the fragile nature of enzymes. Herein, we developed a simple and sensitive bioassay device based on enzyme-mimetic nanoparticles (NPs) that retain enzyme-like activity under harsh environments. Hierarchically-structured Platinum NPs (H-Pt NPs) with excellent peroxidase-like activities were synthesized and characterized. H-Pt NPs were conjugated to an antibody for detecting analytes, and successfully integrated into lateral-flow immunoassay (LFIA) strips, which are widely-used POC bioassay devices. Quantitative analysis based on digital images of strips acquired by smart cellular phones revealed that H-Pt NP-based LFIA strips were about 20 times more sensitive than conventional LFIA strips.