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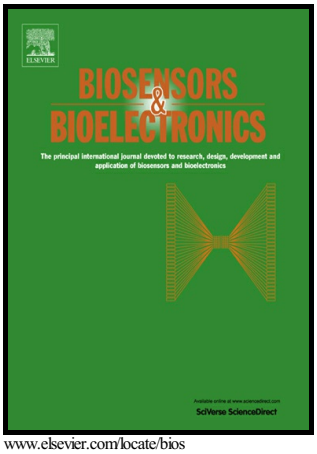

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ABSTRACT

An electrochemical biosensor was developed based on a steric hindrance hybridization assay to allow the highly sensitive detection of streptavidin. In the steric hindrance hybridization assay, the signaling strand DNA (sig-DNA) was labeled at the 3' end with CdSe quantum dots (QDs) and at the 5' end with biotin, and capturing strand DNA (the complementary strand of sig-DNA) was labeled at the 5' end with thiol. The steric hindrance effect generated by streptavidin which was bound with the signaling DNA strand. The streptavidin limited the ability of the sig-DNA to hybridize with the cap-DNA, which were linked on the surface of a gold electrode. Therefore, the concentration of streptavidin was detected indirectly based on the concentration of CdSe QDs on the electrode surface. The concentration of CdSe QDs on the electrode surface was detected by differential pulse anodic stripping voltammetry. Under optimal conditions, the streptavidin detection range using the as-prepared biosensor was 1.96 pg/mL to 1.96 μg/mL and the detection limit was 0.65 pg/mL. The experimental results showed that the electrochemical biosensor could detect streptavidin rapidly and accurately.

Keywords: differential pulse anodic stripping voltammetry; CdSe QDs; steric hindrance hybridization assay; streptavidin

1. Introduction

Quantum dots (QDs) are spherical semiconductor nanomaterials (Jie et al., 2013),