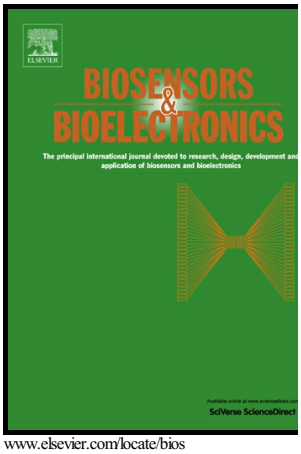

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Ultrasensitive electrochemical immunosensor based on horseradish peroxidase (HRP)-loaded silica-poly(acrylic acid) brushes for protein biomarker detection

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Abstract

We report an ultrasensitive electrochemical immunosensor designed for the detection of protein biomarkers using horseradish peroxidase (HRP)-loaded silica-poly(acrylic acid) brushes (SiO_2-SPAABs) as labels. HRP could be efficiently and stably accommodated in the three-dimensional architecture of the SiO_2-SPAABs and the SiO_2-SPAABs-HRP exhibited high catalytic performance towards o-phenylenediamine (OPD) oxidation in the presence of H_2O_2, which resulted in significant differential pulse voltammetric (DPV) response change and color change. Using human IgG (HIgG) as a model analyte, a sandwich-type immunosensor was constructed. In particular, graphene oxide (GO) and SiO_2-SPAABs-HRP were used to immobilize capture antibody (Ab_1) and bind a layer of detection antibody (Ab_2), respectively. The current biosensor exhibited a good linear response of HIgG from 100 pg/mL to 100 μg/mL with a detection limit of 50 pg/mL (S/N = 5). The sensitivity