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Oxidative grafting vs. monolayers self-assembling on gold surface for the preparation of electrochemical immunosensors. Application to the determination of peptide YY

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ABSTRACT

A comparison of the performance of two electrochemical immunosensors for the determination of the anorexigen biomarker peptide YY (PYY) is reported by using as scaffolds screen printed gold electrodes modified either by oxidative grafting of *p*-aminobenzoic acid (*p*-ABA) or by assembling of a 4-mercaptopbenzoic acid (4-MBA) SAM. Covalent immobilization of capture antibodies on the surface-confined carboxyl groups was carried out by EDC/NHSS chemistry, and competitive immunoassays between target PYY and Biotin-PYY were implemented. Upon labeling with alkaline phosphatase (AP)-streptavidin conjugate and 1-naphtyl phosphate addition, differential pulse voltammograms recorded between -0.2 and +0.7 V were used as analytical readout. All the steps involved in the functionalization of the electrodes and the preparation of the immunosensors were monitored by electrochemical impedance spectroscopy. The calibration plot for PYY using the AP-Strept-Biotin-PYY(PYY)-anti-PYY-Phe-N-SPAuE immunosensor provided a linear current vs. log [PYY] plot extending between 10^{-6} and 10^3 ng/mL PYY with a detection limit of 3×10^{-7} ng/mL. These analytical characteristics are remarkably better than those obtained with the immunosensor prepared with 4-MBA SAM-SPAuEs. The AP-Strept-Biotin-PYY(PYY)-anti-PYY-Phe-N-SPAuE immunosensor was used to analyze human serum and saliva samples spiked with PYY at concentrations fitting with normal levels in these biological fluids.

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