

Label-free graphene oxide based surface plasmon resonance immunosensor for the quantification of galectin 3, a novel cardiac biomarker

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Abstract

We report the first optical biosensor for the novel and important cardiac biomarker, galectin-3 (Gal3), using the anti-Gal3 antibody as a biorecognition element and surface plasmon resonance (SPR) for transducing the bioaffinity event. The immunosensing platform was built at a thiolated Au surface modified by self-assembling four bilayers of poly(diallyldimethylammonium chloride) and graphene oxide (GO), followed by the covalent attachment of 3-aminephenylboronic acid (3ABA). The importance of GO, both as the anchoring point of the antibody and as a field enhancer for improving the biosensor sensitivity, was critically discussed. The advantages of using 3ABA to orientate the anti-Gal3 antibody through the selective link to the Fc region were also demonstrated. The new platform represents an interesting alternative for the label-free biosensing of Gal3 in the whole range of clinically relevant concentrations (linear range between 10.0 and 50.0 ng mL⁻¹, detection limit of 2.0 ng mL⁻¹) with successful application for Gal3 biosensing in enriched human serum samples..

Keywords

Galectin3, Immunosensor, SPR, Graphene oxide, Cardiac biomarker, Layer-by-layer self-assembly.