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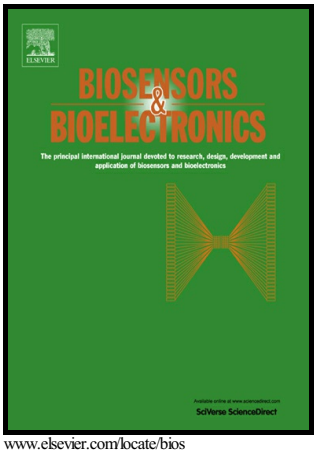

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Scaffolds for oriented and close-packed immobilization of immunoglobulins

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ABSTRACT

Immunosensing is a widely used technique that detects the interactions between antibodies and antigens such as biochemical markers, pathogens, allergens, and tumor-associated antigens. Since target antigens are often of high molecular mass and their binding affinities are sometimes weak, the spatial arrangement of immunoglobulin Gs (IgGs) on immunosensing probes should be optimized by presenting them in as close-packed a manner as possible and reducing steric hindrance around the antigen-binding Fv regions. Both clustering and oriented immobilization of IgGs on immunosensing probes are thus important for enhancing the sensitivity and antigen-binding capacity of probes. Intact IgGs, IgG-derived fragments, or IgG-compatible fragments have previously been clustered onto solid phases with a variety of scaffold chemistries (*e.g.*, crosslinkers, polymers, self-assembled monolayers, protein A/G, avidin, DNA) to improve immunosensing probes, none of these strategies has yet accomplished both clustering and oriented immobilization of IgGs. Recently, we developed an ~30-nm bio-nanocapsule (ZZ-BNC), consisting of transmembrane ZZ-L protein deploying a tandem form of the IgG Fc-binding Z domain derived from *Staphylococcus aureus* protein A on its outer surface that functioned as a scaffold for the clustering and oriented immobilization of IgGs and Fc-fused biosensing molecules. In this review, we present an overview of conventional techniques for IgG immobilization