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Ultra-sensitive detection by metal nanoparticles-mediated enhanced SPR biosensors

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Abstract:

Surface plasmon resonance (SPR), as an optical technique, has widely been used for the detection of biomarkers. Various investigations have been conducted to address the impacts of SPR on the kinetics of biological interactions between the ligand and its cognate bio-element. Up until now, various biofunctionalized metal nanoparticles (NPs) have been used for the ultrasensitive detection of biomarkers in the enhanced SPR. The enhancement of plasmonic properties and refractive index using metal NPs in SPR-based biosensors have extremely resulted in the development of multimodal nanosystems used for the cancer diagnosis and monitoring. In all the enhanced SPR systems utilized for the direct/sandwich assay, each NP is covalently modified with the analyte molecules like antibody (Ab) or a nucleic acid such as DNA/RNA aptamer (Ap) capable of interaction with the related biomarker(s). The increasing of density near the gold surface and plasmonic coupling of gold film and NPs can provide a large shift in the

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