Recent Advances in Plasmonic Biosensors for Cancer Prognosis and Prediction of Treatment Benefit

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Abstract

Plasmonic biosensors have emerged as powerful analytical tools for real-time and label-free detection of biomolecular interactions [1]. Recent innovations in nanomaterials, microfluidics, and surface chemistry have significantly enhanced the sensitivity, limit of detection, and specificity of plasmonic platforms, making them highly suitable for oncology applications [2].

This talk will highlight the latest advancements in plasmonic affinity biosensors, with a focus on the key challenges encountered in their development for cancer prognosis and prediction of treatment benefit. We will explore recent advances in plasmonic nanostructure design, and sensor instrumentation. Additionally, the talk will highlight innovations in functional surface coatings and assay development for the sensitive and selective detection of analytes in complex biological environments. Emphasis will be placed on the role of Localized Surface Plasmon Resonance (LSPR) biosensor technology aimed at the detection of cancer biomarkers, including circulating tumor DNA (ctDNA), exosomes, and specific protein signatures [3, 4]. We will also discuss integration strategies with AI-based data analysis and microfluidic systems for point-of-care applications [5]. These advancements pave the way toward truly personalized medicine, offering new prospects in cancer diagnosis and treatment decision-making.

Keywords: Plasmonic Biosensors, Cancer Prognosis, Point-of-Care Diagnostics, Cancer Biomarkers.

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