

国立大学法人 九州工業大学

第37回 歯工学連携講演会

Ultrasensitive Nanobioaffinity Sensing Platforms for Biomedical and Environmental Applications

バイオ医療と環境応用のための超高感度ナノバイオ親和性に基づく
センシングプラットフォーム

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Over the last decade, tremendous research efforts have been made on creating highly sensitive and selective biosensing platform in conjunction with gold nanoparticles for a wide range of biological and environmental applications. In this lecture, she will highlight our recent developments made on the combined use of biofunctionalized gold nanoparticles and surface enzyme reactions to enhance the sensitivity and selectivity of optical and electrochemical biosensors for medical diagnostics and river water quality control. The first part of her lecture includes the development of new surface-based sandwich assay in conjunction with biofunctionalized Au nanocubes (NPs) for the detection of a cardiac failure biomarker namely, B-type natriuretic peptide (BNP) at concentrations ranging from 1 aM to 500 nM. In addition, the use of dual nanoparticles with SPR can further improve the sensitivity down to sub aM concentrations of protein biomarkers in a surface sandwich assay. The second part of her lecture contains the combined use of biofunctionalized Au nanoparticles and surface enzyme reactions for the development of electrochemical biosensing platforms which can be usefully employed for catechol and avian influenza virus (AIV) proteins. For example, the selective and sensitive detection of phenolic compounds can be achieved using tyrosinase and AuNPs modified screen printed carbon electrode (SPCE). Femtomolar concentrations of proteins such as AIV proteins can be voltammetrically analyzed via the formation of surface sandwich complexes of AIV-aptamer-NP/AIV/antiAIV-alkaline phosphatase on SPCE followed by the electrocatalytic reaction with the substrate, 4-aminophenylphosphate (APP).

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