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Label-free electrochemical immunosensors *via* use of fragmented antibody (Fab) and electrochemically active nanoparticles: Simultaneous detection of multiple biomarkers for early diagnosis of allergic rhinitis

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Antibody-based immunosensors have gained considerable interest as a promising approach for rapid, selective, and sensitive analysis. However, it is still a challenge to find advanced approaches that could improve the simplicity, specificity, and sensitivity for clinical applications. To enhance performance of antibody-based immunosensors, we introduce a novel approach to design a label-free immunosensors *via* use of fragmented antibody (i.e., Fab) and electrochemically active nanoprobes (i.e., ferrocene (Fc)-modified silica nanoparticles). The use of Fab may improve the sensor's sensitivity by the oriented immobilization on the electrode surface. The surface coverage with target proteins specifically bound to Fab prohibits the accessibility of electrochemically active nanoprobes to the electrode surface, eventually leading to the revention of the interfacial electron transfer (i.e., blocking effects). To amplify such blocking effects associated with target protein-Fab complex formation, negatively charged Fc-modified silica nanoparticles are utilized as a scaffold to design macromolecular electroactive probes. We investigate the feasibility of the novel label-free immunosensors to simultaneously detect multiple biomarkers (i.e., albumin, Clara cell protein 16, tryptase, and interleukin 5) for early diagnosis of allergic rhinitis in nasal discharge. Finally, four biomarkers in artificial and human nasal discharge are simultaneously determined with multi-array sensor system equipped in a microfluidic device.

Biography

Sang Gyeong Shin received her B S degree in department of chemistry at Kwangwoon University in 2017. Currently, she is studying for her M S degree in chemistry at the same university. Her research interest is mainly in the development of colorimetric and electrochemical immunosensors.

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