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九州大学大学院 博士課程教育リーディングプログラム
分子システムデバイスコース

Advanced Graduate Course on Molecular Systems for Devices



Open Seminar

男女共同参画セミナー

参加費無料

日時：2015年11月6日(金) 16:30～18:00

会場：伊都キャンパス 総合学習プラザ 110

Ito: Open Learning Plaza 1F Seminar Room(#110)

Highly sensitive and selective biosensing platforms with gold nanoparticles, surface enzyme reactions and micro-liquid / liquid interfaces



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Abstract

There have been extensive research developments made on creating highly sensitive and selective biosensing platforms for a wide range of biomedical, food and environmental applications. This talk will summarize our latest research efforts on developing biosensing platforms combined with biofunctionalized gold nanoparticles, surface enzyme reactions as well as ion transfer processes at liquid/liquid interfaces providing excellent selectivity and sensitivity for particularly disease biomarkers and environmentally toxic agents. The first part of my talk includes new surface sandwich bioassays involving antibody coated Au nanoparticles (NPs) in tandem with an DNA aptamer and antibody chip for the attomolar detection of B-type natriuretic peptide (BNP) and also thrombin [1-2] using surface plasmon resonance (SPR) technique. In addition, SPR platforms combined with a surface sandwich assay was developed for the detection of Alzheimer's disease biomarker proteins in serum samples. Another examples includes the development of new electrochemical surface sandwich assays with biofunctionalized Au nanoparticles and surface enzyme reactions for the femtomolar detection of both H5N1 and b-amyroid proteins in diluted serum samples. The second part of my talk will contain the use of ion transfer reaction across a polarized interface between two immiscible liquid/liquid interfaces (ITIES) for developing amperometric ion selective sensors for anti-cancer drug molecules, toxic anions and organophosphorous pesticides [4-5]. The selectivity can be greatly tailored by the incorporation of ligands specific to target molecules or ionic species in the organic phase. Lastly, some challenging issues and future prospects of biosensing technologies for medical and environmental applications will be discussed.

References:

- (1) H. R. Jang, A. W. Wark, S. H. Baek, B. H. Chung, H. J. Lee*, Anal. Chem., 2014, 86, 814-819.
- (2) S. Kim, H. J. Lee*, Anal. Chem., 2015, 87, 7235-7240
- (3) F. S. Diba, S. Kim, Lee, H. J. Lee*, Biosens. Bioelectron., 2015, 72, 355-361.
- (4) H. R. Kim, C. M. Pereira, H. Y. Han, H. J. Lee*, Anal. Chem. 2015, 87, 5356-5362
- (5) H. J. Lee et al, Chapter 9: Amperometric ion sensing approaches at liquid/liquid interfaces for inorganic, organic and biological ions in "Electrochemical Strategies in Detection Science" Edited by D. W. Arrigan, RSC (2015)

■お問い合わせ先

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