TS-002 <Invited Talk>

# Localized Surface Plasmon Resonance (LSPR) Biosensors on Metal Nanoparticles with the Design of Bioreceptors

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Label-free biomolecular assay based localized surface plasmon resonance (LSPR) of noble metal nanoparticles enables simple and rapid detection with the use of simple equipment. Nanosized metal nanoparticles exhibit a strong absorption band when the incident light frequency is resonant with the collective oscillation of the electrons, which is known as the LSPR. Here we demonstrate localized surface plasmon resonance (LSPR) substrates such as plasmonic Au nanodisks fabricated by a nanoimprinting process and gold nanorod-immobilized surfaces and their applications to highly sensitive and/or label-free biosensing. To increase detection sensitivity various bioreceptors weree designed. A single chain variable fragment (scFv) was used as a receptor to bind C-reactive protein (CRP). The results of this effort showed that CRP in human serum could be quantitatively detected lower than 1 ng/ml. Aptamers, which were immobilized on gold nanorods, were used to detect mycotoxins. The specific binding of ochratoxin A (OTA) to the aptamer was monitored by the longitudinal wavelength shift of LSPR peak in the UV-Vis spectra resulting from the changes of local refractive index near the GNR surface induced by accumulation of OTA and G-quadruplex structure formation of the aptamer. According to our results, OTA could be quantitatively detected lower than 1 nM level. Additionally, aptamer-functionalized GNR substrate was quite robust and can be regenerated many times by rinsing at 70 OC to remove bound target. During seven times of washing steps, the developed OTA sensing system could be reusable. Moreover, the proposed biosensor exhibited selectivity over other mycotoxins with an excellent recovery for detection in grinded corn samples, suggesting that the proposed LSPR based aptasensor plays an important role in label-free detection of mycotoxins.

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