# Fluorometric Sensing Platform Based on Localized Surface Plasmon Resonance using Quantum Dots-Gold Nanocomposites Optimizing the Linker Length Variation

# Abstract

**Fluorometric sensing platform based on localized surface plasmon resonance using quantum dots-gold nanocomposites optimizing the linker length variation**

Fahmida Nasrin[1], Ankan Dutta Chowdhury[2], Kenshin Takemura[1], Enoch Y. Park[1,2*]

([1]Lab. Biotechnol., Grad. Sch. Sci. Technol., Shizuoka Univ., [2]Lab. Biotechnol., Res. Inst. Green Sci. Technol., Shizuoka Univ.)

[*]park.enoch@shizuoka.ac.jp

The successful development of a label free sensing approach using the localized surface plasmon resonance (LSPR), controlling the distance between fluorescent CdZnSeS/ZnSeS quantum dots (QDs) and gold nanoparticles (AuNPs) has been established for the detection of virus. Here, we present a new combination of AuNPs and CdZnSeS/ZnSeS QDs linked with a peptide chain of 18 amino acids after functionalization in its both ends. The synthesized peptide has been used as a linker between these duos and provided the anchoring sides for the antibody conjugation. In the optimized condition, the fluorescent properties of the QDs have been enhanced due to the surface plasmon effect of the adjacent AuNPs. On the basis of the significance on LSPR sensing, we have attempted to detect different concentration of influenza virus in this work. The detection sensitivity has been analyzed by the quenched spectra of the fluorescence of QDs due to the induced steric effect of the attached virus molecule on the LSPR behavior. A detection limit of 26.4 fg $mL^{-1}$ influenza virus has been obtained in a linear range of $10^{-14}$ to $10^{-9}$ g $mL^{-1}$. On the basis of the obtained results and the detection mechanism, this proposed biosensor can be a good option for the detection of general biomolecule by altering the conjugated antibody and analytes, in the various range of sensing application.