Optical and Electrical Nanobiosening Platform for Detection of miRNA based on Nanoplasmonics

Jihye Lee[1,2] Jun-Young Lee[1,2] Jeong-Hyeon Kim[1,2] and Jong-Souk Yeo[1,2*]

[1] School of Integrated Technology, Yonsei University, Incheon, Republic of Korea
[2] Yonsei Institute of Convergence Technology, Yonsei University, Incheon, Republic of Korea
*corresponding author: jongsoukyeo@yonsei.ac.kr

In the field of nanoplasmonics, there are much attention for early detection of a target biomarker with low cost point-of-care test [1]. One of the approaches in nanoplasmonic biosensing is to attach a biomarker on the nanostructure, thus enabling a near-field interaction with the change in resonant wavelength. However, the optical signals induced by the biomolecules result in a spectral shift too small to be identified at low concentration. Here, we demonstrate the complementary signal detection method that can read out the optical and electrical signal based on the nanoplasmonics. Here, the change in photoconductivity is used to detect a miRNA-21 as a biomarker for breast cancer. This approach depends on not only radiative damping but also non-radiative damping process in plasmonics [2].

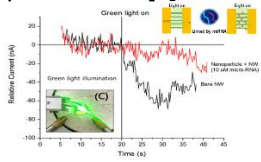

Figure 1: Photoconductivity change by attaching the miRNA-21 on the nanowire

REFERENCES:

1. J. Lee, J. Park, J. Y. Lee and J. S. Yeo, Contact Transfer Printing: Contact transfer printing of side edge prefunctionalized nanoplasmonic arrays for flexible microRNA biosensor, Adv. Sci., 2 (9), 1500121 (2015)

2. J. H. Kim and J. S. Yeo, Enhanced detection of broadband incoherent light with nanoridge plasmonics, Nano Lett, 15(4), 2291, (2015)