A Single Nanoparticle-based Sensor for Hydrogen Peroxide (H_2O_2) Detection in Biological and Environmental Fields

김유라, 김영호, 최진희, 최인희†
서울시립대학교
(inheechoi1@uos.ac.kr†)

Hydrogen peroxide (H2O2) is one of the strongest oxidants, which have increasingly drawn attentions in both biological and environmental fields. Although a variety of H2O2 detection methods including enzymatic and electrochemical techniques have been developed, they have still some problems: poor sensitivity, reproducibility, selectivity, stability and in vivo applicability. Here, we present a novel method for hydrogen peroxide (H2O2) based on single plasmonic nanoprobes and redox-active cytochrome c (Cyt c) -mediated plasmon resonance energy transfer (PRET). Using this sensor, H2O2 was detected in a wide concentration range from 100 mM to 10 nM including physiologically relevant micromolar and nanomolar concentrations. Furthermore, we successfully detected the H2O2 generated from Caenorhabditis elegans (C. elegans) under an exposuring condition of graphene oxide (GO). We believe that our approach could provide an avenue for achieving dynamic, high spatial resolution monitoring of reactive oxygen species (ROS) in toxicological, biological and environmental fields in the future.