

**AuNP necklace array based electrochemical Field Effect Transistor (eFET) to measure the Membrane Potential of a cell**

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The cellular membrane potential is usually measured by inserting the micro-needles as a probe. This invasive measurement sometimes damages the cell during the process. Since the cellular reaction introduces the polarization inside the cell or near the cellular membrane, a few nanometer thick electrical double layer (EDL) on a device where the cells are deposited concomitantly changes. To measure this small EDL modulation caused by the cellular membrane potential modulation, electrochemical field effect transistors (eFET) employing low-dimensional nanomaterials, i.e., carbon nanotubes (CNT), silicon nanowires (SiNW), and graphene, have been proposed as the non-invasive measurements. Here, we will describe the eFET using ~10nm Au nanoparticle (NP) necklace array as a non-invasive biosensor platform. Due to high sensitivity and low capacitance of Au NPs, the eFET continuously measures subtle internal membrane potential modulation of green Algae during photosynthesis.