J Biosens Bioelectron 2016, 7:2 (Suppl)
http://dx.doi.org/10.4172/2155-6210.C1.028

Using nanogap in label-free impedance based electrical biosensors to overcome electrical double layer effect

Oguz Hanoglu, Mustafa Yuksel, Handan Acar, Selim Sülek, Sedat Agan, Necmi Biyikli, Mustafa O Guler and **Ali Kemal Okyay**
Istanbul Kemerburgaz University, Turkey

Point-of-care biosensor applications require low-cost and low-power solutions. They offer being easily accessible at home site. They are usable without any complex sample handling or any kind of special expertise. Impedance spectroscopy has been utilized for point-of-care biosensor applications; however, electrical double layer formed due to ions in the solution of interest has been a challenge, due to shielding of the electric field used for sensing the target molecules. In this presentation, we introduce a nanogap based biosensor structure with a relatively low frequency (1 kHz – 100 kHz) measurement technique, which not only eliminates the undesired shielding effect of electrical double layer but also helps in minimizing the measurement volume and enabling low concentration (μ molar level) detection of target molecules (streptavidin). Repeatability and sensitivity tests proved stable and reliable operation of the sensors. These biosensors might offer attributes such as low-cost label-free detection, fast measurement and monolithic chip integrability.

oguznanoglu@gmail.com

Integrated hybrid biosensors for automated manipulation and drug screening of whole biological organisms of human diseases

Pouya Rezai
York University, Canada

Small vertebrate and invertebrate organisms such as *Danio rerio*, *C. elegans* and *D. melanogaster* are widely used as model organisms to answer fundamental biological questions about human diseases and to screen chemicals against them for finding new therapeutic drugs. Many biological assays and investigations on these organisms are still conducted manually by laboratory personnel who must possess high levels of expertise in particular unit operations and have access to highly specialized equipment to conduct the assays. Therefore, controllable and sensitive biological studies cannot be performed at the point-of-care or the point-of-need, resulting in significant negative impacts on the outcomes of these researches. In my talk, I will introduce you to bio-microfluidics, a domain of bioengineering research that aims at developing miniaturized and automated devices for efficient biological studies in a cost-effective and sensitive manner. The focus of my talk will be placed on microfluidic chips for studying neurological and behavioral responses of whole-organisms to external cues. Examples include microchips for cardiac and central nervous system studies on *Drosophila melanogaster* larvae, correlating neuro-behavioral responses of *C. elegans* to electrical signals, and adult Drosophila egg-laying assays on chemically- and physically-controllable substrates. Since development of these microchips is highly dependent on materials with sensing and actuation functionalities and their transformation into microstructures in the devices, I will also introduce our recent activities in developing conductive polymeric microstructures in microchannels for sensing and detection applications.

pouya.rezai@lassonde.yorku.ca