Biosensors & Bioelectronics-2013

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference and Exhibition on
Biosensors & Bioelectronics

June 17-19, 2013 Hilton Chicago/Northbrook, USA

Glucose microbiosensors based on single-stranded DNA wrapped single walled carbon nanotubes through layer-by-layer electrostatic self-assembly

Zhuo Kang

University of Science and Technology Beijing, China

Abstract

Surface modification of transducers is a critical step in preparing biosensors. Recently, much research is focused on enhancement of biosensor performance by incorporating nanomaterials. Carbon nanotube (CNT) is considered as one of the most intriguing candidates due to its versatile outstanding properties. However, compared to the metal oxide, the single walled carbon nanotube (SWNT) has a chemical stable surface which is difficult to be functionalized. Because of the inert nature of SWNTs, the receptor molecules can be fixed only on the edges of the nanotubes. Although with the acid or alkali treatment, SWNTs could be shorten and modified with some active functional groups on the wall, there is no doubt this process would simultaneously damage surface crystal structure of SWNTs, thus affect electrical property. In this study, we used single-stranded DNA (ssDNA) to modify SWNTs in order to acquire negatively charged SWNTs and increase their solubility in water. This allowed us to propose a novel strategy of Layer-by-Layer electrostatic self-assembly based on ssDNA-SWNTs, poly (ethylenimine) (PEI) and glucose oxidase (GOx). Besides, the direct electrochemistry of GOx in this sandwich-like structure was investigated. The fabricated glucose microprobe exhibited sensitivity of 6 nA/mM, wide linear range from 0.1 mM to 9.4 mM and desirable selectivity. This work not only demonstrated the feasibility of employing ssDNA-SWNTs to realize electrostatic self-assembly, but also provided an ideal platform to fabricate high performance enzyme biosensors.

Biography

Zhuo Kang is a Ph.D candidate from Prof. Yue Zhang's group in School of Material Science and Engineering at University of Science and Technology Beijing. He is currently visiting Purdue University as a joint Ph.D student. His research interest is nanomaterials based biosensors. He received his B.S in Material Physics from University of Science and Technology Beijing in 2011.

kangzhuo.nano@gmail.com