Hydrogen Sensing Characteristics of Pd Grain based Nanowires

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With the increasing interest in nanoscale science and technology, nanowires have been the subject of a great deal of research in the past decade. The most common techniques for fabricating such nanowires are the bottom-up fabrication paradigms with the major drawback that the nanowires need to be located in a predetermined position for the integration of nanowire-based sensors. These inherent demerits of bottom-up methods should be overcome for reliable and controllable nanowire-based device fabrication. To address this issues, various electrochemical methods have been developed for growing palladium nanowire synthesized between gold electrodes deposited on SiO2 substrate. In this work, we developed novel DC assisted dielectrophoresis (DEP) process using floating electrode to create Pd nanowire in predefined electrodes and demonstrated the hydrogen detection. We investigated the effect of the Pd grain growth as functions of DEP force, DC bias, and solution concentrations, leading to the development of the enhanced hydrogen sensors. Finally, the effects Pd grain size of single nanowire were evaluated for the hydrogen sensing.