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Pd 담지된 CNT 소자을 이용한 수소센서 제작과 센서 감지원리에 대한 연구

A sensing mechanism of the Pd-decorated carbon nanotube devices

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Recently, it has been demonstrated that carbon nanotubes represent a new type of chemical sensor material which is capable of detecting tiny concentrations of molecules with high sensitivity under ambient conditions But carbon nanotubes are not sensitive to many types of molecules including hydrogen, indicating an apparent lack of specific interactions between nanotubes and these molecules We believe that nanotube sensors with molecular specificity can be obtained through rational chemical and/or physical modification of nanotubes Here, we show that excellent molecular hydrogen sensors can be enabled by decorating single-walled carbon nanotubes (SWNT) with palladium (Pd) nanoparticles either by simple evaporation, or chemical treatment We investigate gas sensing mechanism of the carbon nanotube field effect transistors decorated with Pd nanoparticles Upon decorating Pd nanoparicles on the carbon nanotube transistor, transfer characters of the device become almost unaffected by the gate voltage changes Nevertheless, the magnitude of the current through the device shows sensitivity toward the exposures of NO2, NH3 and H2 gas We suggest that the decorated Pd nanoparticles on carbon nanotube devices not only emasculate the gate field but also induce hole carriers in the carbon nanotube Such hole carrier density seems to be diluted or enhanced upon the adsorption of NH3 or NO2 molecules, respectively We attribute the successful sensing mechanism of H2 gas to the work function decrease of the surface of Pd particles