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Review Article

A Review of Carbon Nanotubes-Based Gas Sensors

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Abstract

Gas sensors have attracted intensive research interest due to the demand of sensitive, fast response, and stable sensors for industry, environmental monitoring, biomedicine, and so forth. The development of nanotechnology has created huge potential to build highly sensitive, low cost, portable sensors with low power consumption. The extremely high surface-to-volume ratio and hollow structure of nanomaterials is ideal for the adsorption of gas molecules. Particularly, the advent of carbon nanotubes (CNTs) has fuelled the inventions of gas sensors that exploit CNTs' unique geometry, morphology, and material properties. Upon exposure to certain gases, the changes in CNTs' properties can be detected by various methods. Therefore, CNTs-based gas sensors and their mechanisms have been widely studied recently. In this paper, a broad but yet in-depth survey of current CNTs-based gas sensing technology is presented. Both experimental works and theoretical simulations are reviewed. The design, fabrication, and the sensing mechanisms of the CNTs-based gas sensors are discussed. The challenges and perspectives of the research are also addressed in this review.

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