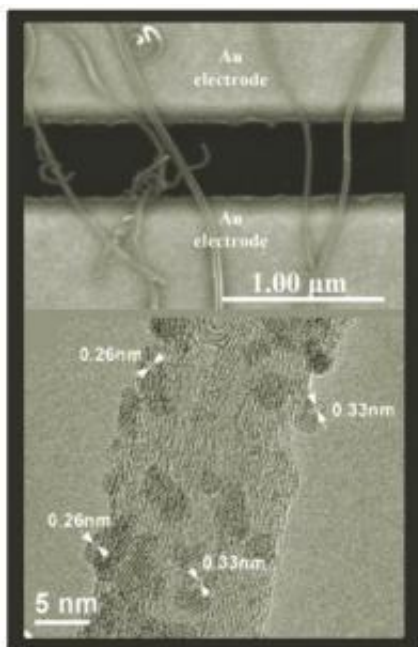


New Gas Sensor Based on Multiwalled Carbon Nanotubes

May 27 2009



Hybrid sensor fabrication process: (top) SEM image of a few MWCNTs spanning across two neighboring Au fingers of the interdigitated electrode; (bottom) HRTEM image of a MWCNT uniformly coated with SnO nanocrystals.

Argonne Center for Nanoscale Materials staff in the Nanofabrication & Devices Group together with collaborative users from the University of Wisconsin-Milwaukee have fabricated a miniaturized gas sensor using hybrid nanostructures consisting of SnO₂ nanocrystals supported on multiwalled carbon nanotubes (MWCNTs).

In contrast to the high-temperature operation required for SnO₂ nanocrystals alone, and to the insensitivity towards H₂ and CO for CNTs alone, the hybrid sensor exhibits room-temperature sensing capability when exposed to low-concentration gases such as NO₂, H₂, and CO. The performance of the hybrid nanostructure sensor is attributed to the effective [electron transfer](#) between SnO₂ nanocrystals and MWCNTs and to the increase in the specific surface area.

The hybrid platform as a sensing element provides an opportunity to engineer sensing devices with quantum-mechanical attributes due to the electron transfer. The nanomaterials employed are affordable, and the [nanofabrication](#) technique is simple and compatible with existing microfabrication capabilities; the latter, in turn, facilitates a scale-up process. This new sensing scheme will be instrumental for the development of new [sensors](#) based on hybrid nanostructures.

More information: "Room-Temperature Gas Sensing Based on Electron Transfer between Discrete Tin Oxide Nanocrystals and Multiwalled Carbon Nanotubes," G. Lu, L.E. Ocola, and J. Chen, *Adv. Mater.*, 21, 1-5, 2009.

Provided by Argonne National Laboratory ([news](#) : [web](#))

Citation: New Gas Sensor Based on Multiwalled Carbon Nanotubes (2009, May 27) retrieved 4 May 2024 from <https://phys.org/news/2009-05-gas-sensor-based-multiwalled-carbon.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.