Carbon Nanoflake/ Tin Oxide Composites Gas Sensors for NH_3 Detection

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Recently, functional nanostructured materials such as wires, rods, belts, and tubes, have a great considerable attention because of their unique applications in diverse industrial fields. For industrial applications, the key problem to solve is the development of synthetic process to prepare them economically and control their physico chemical properties easily. In this regards, we have synthesized carbon nano flake(CNFL) by using electrochemical exfoliation method and applied for the detection of NH_3 gas.

A thin film resistive gas sensor using a composite material(CNFL/SnO_2) was manufactured by the drop casting method, and the sensor was evaluated for various ammonia concentrations and operating temperatures. Physical characteristics of the composite material were assessed using SEM and EDS. The composite material having 10% of SnO_2 showed 300% improved response and high repeatability at the optimal temperature of 400 degrees of Celsius compared to a gas sensor fabricated using a pristine SnO_2 nano-particle. Besides the fact that these composite films present a high sensitivity to NH_3, it appears that contents of CNFL/SnO_2 play an important role on the sensitivity of the chemical gas sensors. Such behavior still deserves further understanding and the key parameters remain to be elucidated.

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References

[1] Ching-Yuan Su, Ang-Yu Lu, Yanping Xu, Fu-Rong Chen, Andrei N. Khlobystov, and Lain-Jong Li, ACS Nano, **5** (2011), 2332.
[2] S. Iijima, Nature, **354** (1991) 56.

Figures

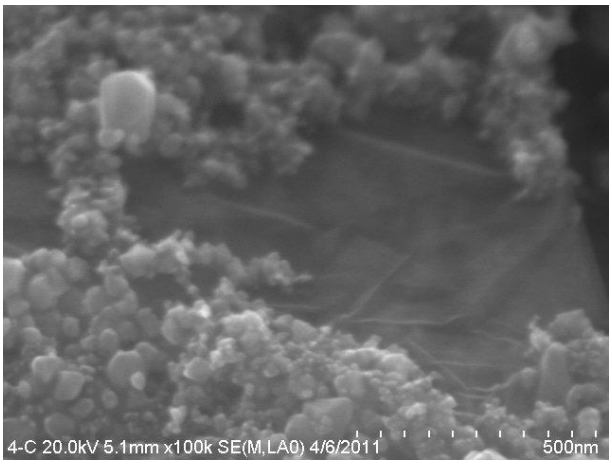

Figure 1. SEM images showing the morphology of the CNFL/SnO2-NP on an alumina substrate.

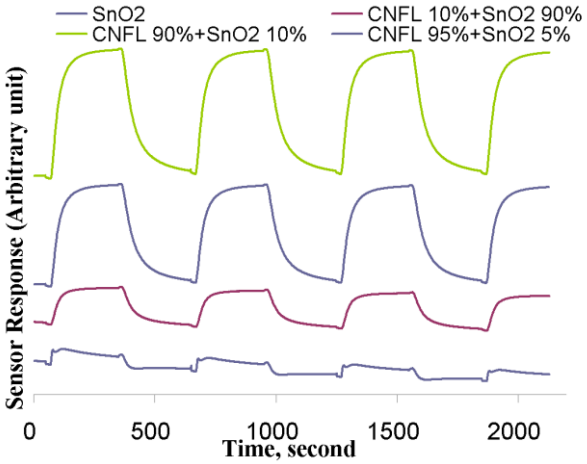

Figure 2. Dynamic response of CNFL/SnO_2 gas sensor exposed to 100 ppm NH_3.