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NH_3 Sensing performance of SnO_2/Graphene composite film

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A high performing sensor consisting of SnO_2/Gn nanocomposite was fabricated using a novel one-step *in-situ* sonochemical method. The reducing properties of $SnCl_2$ was used to reduce GO so that $SnCl_2$ could be transformed to SnO_2 on the basal plane of graphene. The present novel one step reaction method is identified as an economical approach for mass scale production. The combined characterization includes X-ray diffraction (XRD), scanning electron microscopy (SEM) and the Raman shift indicated the successful formation of SnO_2/Gn composites. The G-band of Raman at 1583 cm^{-1} observed in the present study is attributable to mostly a few layers (2-6) of graphene. To demonstrate the product on sensing application, gas sensors were fabricated using SnO_2/Gn composites and used in detecting NH_3 vapor at room temperature (27 ^{0}C).

The results indicated that the SnO_2/Gn composite comprised considerably high sensing performance equivalent to 12.79% response at 150 ppm NH_3 vapor, the sensors demonstrated relatively fast response times as revealed by the rapid changes in resistance and recovery when exposed to the target gas and then air, respectively. Furthermore, the performance of the gas sensor based on SnO_2/Gn is very stable for a long period of time under normal operating conditions. The highlighted property of the present sensor is the low resistance which is a few hundred ohms. Therefore, sensors developed using this material will not require high impedance circuits and will have promising applications due to their integration capability in electronic devices.

Keywords:NH_3 Sensor, SnO_2/Graphene

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