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T. Kavinkumar, S. Manivannan



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Uniform Decoration of Silver Nanoparticle on Exfoliated Graphene Oxide Sheets and its Ammonia Gas Detection

T. Kavinkumar and S. Manivannan*

Carbon Nanomaterials Laboratory, Department of Physics,
National Institute of Technology, Tiruchirappalli- 620 015, India.

*Corresponding author's email:ksmani@nitt.edu

Tel.: +91-431-2503616, Fax: +91-431-2500133

Abstract

Silver nanoparticles (AgNP) decorated graphene oxide (GO) sheets were prepared by reducing AgNO_3 with vitamin C in the presence of GO. Different molar concentration of AgNO_3 played a significant role in the size of AgNP in GO. The synthesized AgNP-GO composites were characterized by powder X-ray diffraction, scanning electron microscopy, ultraviolet–visible–near infrared, Fourier transform infrared and micro Raman spectroscopy techniques. We demonstrated the fiber optic gas sensor using reduced graphene oxide (rGO) and AgNP-GO composites for 0-500 ppm ammonia vapor concentrations at 27°C . Sensitivities of rGO, 0.1 M AgNP-GO and 0.6 M AgNP-GO composites coated fiber optic sensors were calculated as -0.08, -0.177, -0.12 counts/ppm respectively. The agglomeration of AgNP at 0.6 M concentration along with increased particle size significantly decreased the sensing performance.

Keywords: Graphene oxide, reduced graphene oxide, silver nanoparticles, fibre optic gas sensor, ammonia sensor, vitamin C.

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