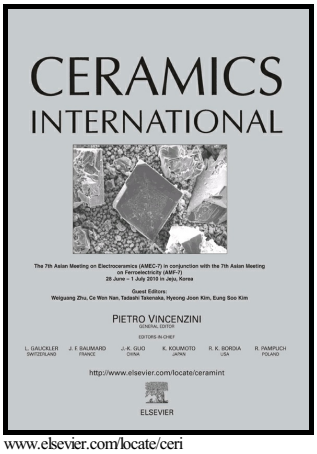

www.elsevier.com/locate/ceri

Enhanced optical properties of ZnS–rGO nanocomposites for ultraviolet detection applications

Mahdi Hajimazdarani, Nima Naderi, Benyamin Yarmand, Alireza Kolahi, Parvaneh Sangpour

PII: S0272-8842(18)31705-X
DOI: https://doi.org/10.1016/j.ceramint.2018.06.260
Reference: CERI18704

To appear in: *Ceramics International*

Received date: 19 June 2018
Revised date: 27 June 2018
Accepted date: 29 June 2018

Cite this article as: Mahdi Hajimazdarani, Nima Naderi, Benyamin Yarmand, Alireza Kolahi and Parvaneh Sangpour, Enhanced optical properties of ZnS–rGO nanocomposites for ultraviolet detection applications, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2018.06.260

Enhanced optical properties of ZnS–rGO nanocomposites for ultraviolet detection applications

Mahdi Hajimazdarani, Nima Naderi*, Benyamin Yarmand, Alireza Kolahi, Parvaneh Sangpour
Materials and Energy Research Center, Karaj, Iran
*n.naderi@merc.ac.ir

Abstract

In this research, fabrication and characterization of ultraviolet (UV) detectors based on zinc sulfide–reduced graphene oxide (rGO) nanocomposite with the focus on the wurtzite structure of zinc sulfide was carried out. The nanoparticles of ZnS were synthesized using chemical deposition method and annealed at 500 °C under flow of argon. X-ray diffraction pattern showed that ZnS with the wurtzite phase was formed at 500 °C. Here, rGO as a unique material with similar properties to graphene such as high electron transport was used in order to improve the optical properties of ZnS. For this purpose, rGO was added to ZnS with three different weight percentages of 5, 10 and 15. Scanning electron microscopy showed that ZnS nanoparticles were well placed in rGO sheets. The UV-visible spectra of the synthesized composites showed that with increasing rGO in composite, light absorption is increased. Photoluminescence (PL) spectra also showed that with increasing the percentage of rGO the generation of electron-hole in composite was increased and PL peak was enhanced. The effect of elevated generation of electron-hole pairs was apparent in optoelectrical properties of fabricated UV detectors based on the sample with higher concentration of rGO in composite. For this sample, the response time was decreased to 310 *ms*, and the sensitivity to UV irradiation was increased by 7.7 times.

Keywords: zinc sulfide; reduced graphene oxide; nanocomposite; photoluminescence; UV detector