Improvement of photoresponse properties of NiO/p-Si photodiodes by copper dopant

By: Gupta, RK (Gupta, R. K.)[1]; Hendi, AA (Hendi, A. A.)[2]; Cavas, M (Cavas, M.)[3]; Al-Ghamdi, AA (Al-Ghamdi, Ahmed A.)[4]; Al-Hartomy, OA (Al-Hartomy, Omar A.)[4,5]; Aloraini, RH (Aloraini, R. H.)[2]; El-Tantawy, F (El-Tantawy, F.)[6]; Yakuphanoglu, E (Yakuphanoglu, E.)[4,7]

View ResearcherID and ORCID

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Abstract

Sol-gel spin coating technique was used to fabricate undoped and Cu doped NiO films. The effects of Cu doping on the optical properties of NiO films were investigated. The optical band gap value of the NiO films was decreased with increase in Cu doping level. The band gap values for 0.1 at%, 0.2 at%, 1.0 at%, and 2.0 at% Cu doped NiO films were 3.74 eV, 3.69 eV, 3.68 eV, and 3.67 eV, respectively. The junction and photoconducting properties of the Al/Cu-NiO/p-Si/Al device were studied that I-on/I-off value of the Al/Cu-NiO/p-Si/Al device firstly increases with increase in Cu doping level up to 0.2% of Cu and then decreases with further increase in the Cu doping level. The transient photocurrent measurement indicated that photocurrent under illumination was higher than the dark current and transient photocurrent increases with increase in light intensity. The C-V characteristics of the diode were also investigated at different frequencies. The observed behavior of the diodes was explained on the basis of the interface states. (C) 2013 Elsevier B.V. All rights reserved.

Keywords

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Author Information

Reprint Address: Gupta, RK (reprint author)

+ Pittsburg State Univ, Dept Chem, Pittsburg, KS 66762 USA.

Addresses:

+ [1] Pittsburg State Univ, Dept Chem, Pittsburg, KS 66762 USA
+ [2] King Abdulaziz Univ, Sci Fac Girls, Dept Phys, Jeddah 21413, Saudi Arabia
+ [3] Firat Univ, Maden Higher Vocat Sch, TR-23169 Elazig, Turkey
+ [4] King Abdulaziz Univ, Fac Sci, Dept Phys, Jeddah 21589, Saudi Arabia

[5] Tabuk Univ, Fac Sci, Dept Phys, Tabuk 71491, Saudi Arabia

+ [6] Suez Canal Univ, Fac Sci, Dept Phys, Ismailia, Egypt
+ [7] Firat Univ, Fac Sci, Dept Phys, TR-23169 Elazig, Turkey

E-mail Addresses: ramguptamsu@gmail.com; fyhanoglu@firat.edu.tr

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