Photoresponse and photocapacitor properties of Au/AZO/p-Si/Al diode with AZO film prepared by pulsed laser deposition (PLD) method

By: Alyamani, A (Alyamani, A.)[1] ; Tataroglu, A (Tataroglu, A.)[2] ; El Mir, L (El Mir, L.)[3,4] ; Al-Ghamdi, AA (Al-Ghamdi, Ahmed A.)[5] ; Dahman, H (Dahman, H.)[4] ; Farooq, WA (Farooq, W. A.)[6] ; Yakuphanoglu, F (Yakuphanoglu, F.)[5,7]

View ResearcherID and ORCID

APPLIED PHYSICS A-MATERIALS SCIENCE & PROCESSING
Volume: 122 **Issue:** 4
Article Number: 297
DOI: 10.1007/s00339-016-9812-5
Published: APR 2016
View Journal Impact

Abstract

The electrical and photoresponse properties of Au/nanostructure AZO/p-Si/Al diode were investigated. Al-doped ZnO (AZO) thin films were deposited via pulsed laser deposition method on silicon substrate. Structural properties of the films were performed by using transmission electron microscopy and X-ray powder diffraction (XRD). The XRD patterns showed that the AZO films are polycrystalline with hexagonal wurtzite structure preferentially oriented in (002) direction. Electrical and photoresponse properties of the diode were analyzed under in a wide range of frequencies and illumination intensities. It is observed that the reverse current of the diode increases with increasing illumination intensity. This result confirms that the diode exhibits both photoconducting and photovoltaic behavior. Also, the transient photocurrent, photocapacitance and photoconductance measured as a function of time highly depend on transient illumination. In addition, the frequency dependence of capacitance and conductance is attributed to the presence of interface states.

Keywords

KeyWords Plus: ZNO THIN-FILMS; SOL-GEL METHOD; A-SI-H; PHOTOCONDUCTING PROPERTIES; LUMINESCENCE PROPERTIES; ELECTRICAL-PROPERTIES; OPTICAL-PROPERTIES; TRANSPARENT; PHOTODIODE; HETEROJUNCTION

Author Information

Reprint Address: Yakuphanoglu, F (reprint author)

+ King Abdulaziz Univ, Fac Sci, Dept Phys, Jeddah 21413, Saudi Arabia.

Reprint Address: Yakuphanoglu, F (reprint author)

+ Firat Univ, Fac Sci, Dept Phys, TR-23169 Elazig, Turkey.

Addresses:

+ [1] KACST, Natl Nanotechnol Res Ctr, Riyadh, Saudi Arabia
+ [2] Gazi Univ, Fac Sci, Dept Phys, Ankara, Turkey

[3] Al Imam Mohammad Ibn Saud Islamic Univ IMSIU, Dept Phys, Coll Sci, Riyadh 11623, Saudi Arabia

+ [4] Gabes Univ, Fac Sci, Lab Phys Mat & Nanomat Appl Environm LaPhyMNE, Gabes, Tunisia
+ [5] King Abdulaziz Univ, Fac Sci, Dept Phys, Jeddah 21413, Saudi Arabia
+ [6] King Saud Univ, Coll Sci, Dept Phys & Astron, Riyadh 11451, Saudi Arabia
+ [7] Firat Univ, Fac Sci, Dept Phys, TR-23169 Elazig, Turkey

E-mail Addresses: fyhan@hotmail.com

Funding

Funding Agency	Grant Number
King Saud University	

View funding text

Publisher

SPRINGER, 233 SPRING ST, NEW YORK, NY 10013 USA

Categories / Classification

Research Areas: Materials Science; Physics

Web of Science Categories: Materials Science, Multidisciplinary; Physics, Applied

Document Information

Document Type: Article

Language: English

Accession Number: WOS:000372259900038

ISSN: 0947-8396

eISSN: 1432-0630

Journal Information

Table of Contents: Current Contents Connect

Impact Factor: Journal Citation Reports

Other Information

IDS Number: DG7JF

Cited References in Web of Science Core Collection: 55

Times Cited in Web of Science Core Collection: 4