

Accepted Manuscript

Structural characterization of Zr-doped ZnO films deposited on quartz substrates by reactive radio frequency magnetron co-sputtering

Nark-Eon Sung, Kug-Seung Lee, Ik-Jae Lee



PII: S0040-6090(18)30090-7
DOI: <https://doi.org/10.1016/j.tsf.2018.02.011>
Reference: TSF 36473
To appear in: *Thin Solid Films*
Received date: 20 June 2017
Revised date: 13 December 2017
Accepted date: 5 February 2018

Please cite this article as: Nark-Eon Sung, Kug-Seung Lee, Ik-Jae Lee , Structural characterization of Zr-doped ZnO films deposited on quartz substrates by reactive radio frequency magnetron co-sputtering. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Tsf(2017), <https://doi.org/10.1016/j.tsf.2018.02.011>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Structural characterization of Zr-doped ZnO films deposited on quartz substrates by reactive radio frequency magnetron co-sputtering

Nark-Eon Sung, Kug-Seung Lee, and Ik-Jae Lee*

Pohang Accelerator Laboratory, POSTECH, Pohang 37673, South Korea

Abstract

Zr-doped ZnO ($\text{Zn}_{1-x}\text{Zr}_x\text{O}$, $0 \leq x \leq 0.067$; ZZO) thin films were grown at room temperature by reactive radio frequency co-sputtering on quartz substrates. The ZZO films have a strong preferred orientation toward the *c*-axis but this orientation weakened as *x* increased. The size of crystallites of the ZZO films decreased and the surfaces of the ZZO films smoothed as *x* increased. The Zn atom were divalent and slightly affected only in the *c*-axis. Zn *K*-edge X-ray absorption near edge structure (XANES) spectra of the ZZO films show that the Zn atom were divalent and slightly affected only in the *c*-axis. The Zr atoms were tetravalent and their *K*-edge XANES spectra were slight different from that of ZrO_2 . Polarization-dependent Zn *K*-edge extended x-ray absorption fine-structure (EXAFS) spectra revealed that the local structural variation was stronger along the *c*-axis than along other axes. The Zn atom site was well replaced by Zr atom regardless of *x*. Average optical transmittance in the visible region was $\geq 90\%$, and as *x* increased, optical band gap increased and blue-shifted.

Keywords: Transparent Conducting Oxide, X-ray Diffraction, X-ray Absorption Near Edge Spectroscopy, Extended X-ray Absorption Fine Structure, Energy Band Gap.

*E-mail: ijlee@postech.ac.kr

Download English Version:

<https://daneshyari.com/en/article/8032795>

Download Persian Version:

<https://daneshyari.com/article/8032795>

[Daneshyari.com](https://daneshyari.com)