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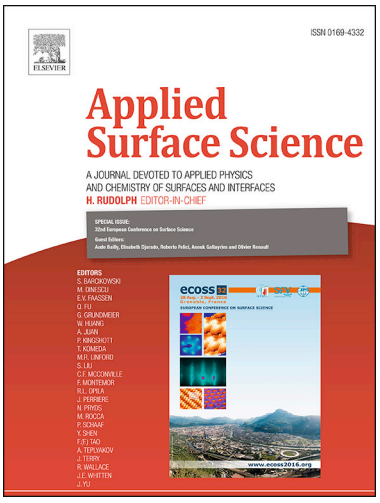


Full Length Article

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Shih-Feng Tseng

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# Investigation of post-annealing aluminum-doped zinc oxide (AZO) thin films by a graphene-based heater

Shih-Feng Tseng*

Department of Mechanical Engineering, National Taipei University of Technology, Taipei 10608, Taiwan

*Correspondent Author: tsf@ntut.edu.tw

Tel / Fax: +886-2-27712171 ext. 2043 / +886-2-27317191

## Abstract

Aluminum-doped zinc oxide (AZO) thin films were deposited on commercial glass substrates by a radio-frequency (RF) magnetron sputter. The effects of annealing times as well as annealing temperatures on the structural and electrical characteristics of AZO thin films annealed by a lab-made graphene-based heater were investigated. The annealing temperature was fixed at 200℃ for this study. The measured results of an X-ray diffraction (XRD) showed that the ZnO (002) peak intensity of as-deposited AZO thin films was larger than that of annealed ones. The calculated grain sizes were decreased from 13 nm to 9.3 nm as the annealing times were increased from 40 s to 1800 s, respectively. Moreover, the grain size and resistivity of as-deposited AZO thin films were larger and lower than those of annealed ones, respectively. To reduce oxygen absorption on films surface at the grain boundary during annealing in air, the annealing time of 40 s and temperature of 200℃ were the optimal parameters to obtain the lowest resistivity of $9.1 \pm 0.59 \times 10^{-2}$ Ω cm in this study.

***Keywords:*** AZO thin films, Annealing, Graphene-based heater, Structural and electrical characteristics.