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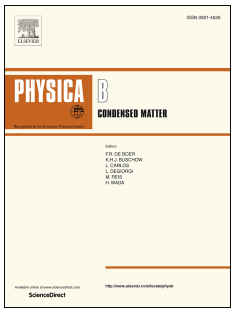

Post-deposition thermal treatment of sprayed ZnO:Al thin films for enhancing the conductivity

Sebin Devasia, P.V. Athma, Manu Shaji, M.C. Santhosh Kumar, E.I. Anila

PII: S0921-4526(18)30005-X

DOI: 10.1016/j.physb.2018.01.004

Reference: PHYSB 310651

To appear in: *Physica B: Physics of Condensed Matter*

Received Date: 11 November 2017

Revised Date: 1 January 2018

Accepted Date: 2 January 2018

Please cite this article as: S. Devasia, P.V. Athma, M. Shaji, M.C.S. Kumar, E.I. Anila, Post-deposition thermal treatment of sprayed ZnO:Al thin films for enhancing the conductivity, *Physica B: Physics of Condensed Matter* (2018), doi: 10.1016/j.physb.2018.01.004.

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ACCEPTED MANUSCRIPT

Post-deposition thermal treatment of sprayed ZnO:Al thin films for enhancing the conductivity

Sebin Devasia[a], P V Athma[a,b], Manu Shaji[c], M C Santhosh Kumar[d], E I Anila[a,*]

[a] *Optoeletronic and Nanomaterials Research Laboratory, Department of Physics, Union Christian College, Aluva, Kerala 683102 India*
[b] *Department of Physics, SNM College, Maliankara 683 516, India*
[c] *Nanophotonic and Optoelectronic Devices Laboratory, Department of Physics, Cochin University of Science and Technology, Kochi 682 022 India*
[d] *Optoelectronic Materials and Devices Lab, Department of Physics, National Institute of Technology, Tiruchirappalli 620015, India*

Abstract

Here, we report the enhanced conductivity of Aluminium doped ($2at.\%$) zinc oxide thin films prepared by simple spray pyrolysis technique. The structural, optical, electrical, morphological and compositional investigations confirm the better quality of films that can be a potential candidate for application in transparent electronics. Most importantly, the film demonstrates an average transmittance of 90 percent with a low resistivity value which was dropped from 1.39×10^{-2} to $5.10 \times 10^{-3}\Omega.cm$, after annealing, and a very high carrier concentration in the order of $10 \times 20cm^{-3}$. Further, we have used the Swanepoel envelop method to calculate thickness, refractive index and extinction coefficient from the interference patterns observed in the transmission spectra. The calculated figure of merit of the as-deposited sample was $1.4 \times 10^{-3}\Omega^{-1}$ which was improved to $2.5 \times 10^{-3}\Omega^{-1}$ after annealing.

Keywords: Spray pyrolysis, ZnO, Al doping, TCO, Refractive index, Swanepoel method

*Corresponding author
Email address: anilaei@gmail.com (E I Anila)

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