

Physical properties of Bi doped CdTe thin films grown by the CSVT method

O. Vigil-Galán^{a,*}, J. Sastré-Hernández^a, F. Cruz-Gandarilla^a,
J. Aguilar-Hernández^a, E. Marín^b, G. Contreras-Puente^a,
E. Saucedo^c, C.M. Ruiz^c, V. Bermúdez^c, M. Tufiño-Velázquez^a

^a*Escuela Superior de Física y Matemáticas, Instituto Politécnico Nacional, 07738 México D. F., México*

^b*Centro de Investigación en Ciencia Aplicada y Tecnología Avanzada, Instituto Politécnico Nacional, 11500 México, D. F., México*

^c*Departamento de Física de Materiales, Universidad Autónoma de Madrid, 28049 Madrid, Spain*

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Abstract

A study of the physical properties of CdTe thin films doped with Bi is presented. CdTe:Bi thin films were deposited by the close space vapor transport (CSVT) technique using powdered CdTe:Bi crystals grown by the vertical Bridgman method. CdTe:Bi crystals were obtained with nominal Bi doping concentrations varying in the 1×10^{17} – $8 \times 10^{18} \text{ cm}^{-3}$ range. The physical properties of CdTe:Bi thin films were studied performing photoluminescence, X-ray, SEM, photoacoustic spectroscopy and resistivity measurements. We observed a decrease of the resistivity values of CdTe:Bi films with the Bi content as low as $6 \times 10^5 \Omega\text{-cm}$ for Bi concentrations of $8 \times 10^{18} \text{ cm}^{-3}$. These are meaningful results for CdTe-based solar cells.

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Keywords: CdTe; Thin films; Bi doping; Physical properties; CSVT method

1. Introduction

CdTe polycrystalline films are very promising for solar cell applications, due to the unequalled properties of the CdTe/CdS heterojunction [1–6]. It is well known that a low resistivity absorber material is required to obtain high performance devices. Cooper has

*Corresponding author. Tel.: +52 55 5729 6139; fax: +52 55 5586 2957.

E-mail addresses: vigil46gg@yahoo.com.mx, osvaldo@esfm.ipn.mx (O. Vigil-Galán).