

## Mg-doped CdS films prepared by chemical bath deposition. Optical and electrical properties (Article)

Caballero-Briones, F.<sup>a</sup>, Calzadilla, O.<sup>b</sup>, Chalé-Lara, F.<sup>a</sup>, Rejón, V.<sup>c</sup>, Peña, J.L.<sup>c</sup>

<sup>a</sup> Instituto Politécnico Nacional, Laboratorio de Materiales Fotovoltaicos, **CICATA-Altamira**, Km 14.5 Carretera Tampico-Puerto Industrial **Altamira**, Altamira, Mexico

<sup>b</sup> Universidad de La Habana, San Lázaro y L, Vedado, La Habana, Cuba

<sup>c</sup> Department of Applied Physics, CINVESTAV-IPN Unidad Mérida, Km 6 Antigua Carretera Progreso, Mérida, Mexico

### Abstract

Mg-doped CdS thin films were prepared onto glass substrates by the chemical bath deposition method increasing Mg<sup>2+</sup> contents in the chemical bath. Film composition was studied by X-ray photoelectron spectroscopy. The physical properties of the films such as the lattice parameter, crystallite size and crystal structure were studied by X-ray diffraction and the film morphology was examined by atomic force microscopy. XPS results indicate an incorporation of up to 0.27 at. %. X-ray diffraction showed that films occur primarily in the hexagonal phase. The band gap increased with the Mg<sup>2+</sup> added to the bath. The film resistance reduced with the Mg doping and an increased photocurrent response was observed under illumination. Using photocurrent sensing atomic force microscopy (PCAFM) in selected samples, an increasing photocurrent response was measured in the grain boundaries. I-V curves in PCAFM indicate n-type doping character. © 2015, National Institute R and D of Materials Physics. All rights reserved.

### Author keywords

CdS; Chemical bath deposition; Magnesium doping; Optical and electrical properties