Sol-Gel Synthesis of CdS/Glass & CdS/Si Thin Films for Optoelectronic Devices

I. Rathinamala (rathinamala@vvvcollege.org)
V.V.Vanniaperumal College for Women
N. Prithivikumaran
V.H.N.Senthikumara Nadar College

Research Article

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I. Rathinamala[1], and N. Prithivikumaran[2]*

[1]Department of Physics, V.V.Vanniaperumal College for Women, Virudhunagar – 626001, Tamilnadu, India.

[2]Nanoscience Research Lab, Department of Physics, V.H.N.Senthikumara Nadar College, Virudhunagar – 626001, Tamilnadu, India.

rathinamala@vvvcollege.org

Abstract

Cadmium chalcogenides have gained huge attention during the past few decades from investigators exploring various applications like optoelectronic, photovoltaic, thermoelectric devices etc. In the present work, CdS thin films had been deposited onto glass and silicon substrates using sol - gel spin coating technique. The structural, surface morphological, optical and electrical properties of the synthesized films were studied. The X-Ray diffraction analysis revealed that the prepared films have hexagonal structure with preferential orientation along (0 0 2) plane. The structural parameters such as crystallite size, strain and dislocation density of the prepared films were estimated and reported. The SEM image of the CdS thin films showed a uniform, homogeneous and granular morphology over the entire surface of the substrate. The PL spectrum showed three emission peaks; dominant peak occurs at 575 nm and the other two peaks occur at 525 nm and 480 nm. The FTIR study gave the bonding present in the CdS thin film samples. The Four-probe results showed that the electrical conductivity increases with increase in temperature. The present study suggested that CdS thin films on Si wafer could be a good promising candidate for the fabrication of optoelectronic devices.

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1. Introduction

CdS, belonging to the II – VI group is one of the promising materials for opto electronic applications. The deposition of CdS films has become increasingly important in recent years due to the widened industrial application with a large number of uses [1 – 3]. For example the heterojunctions, based on CdS thin films are very promising structures for solar cells because of suitable band gap, optical absorption, and good stability of the used materials [4 – 6]. CdS does not play a direct role in photovoltaic conversion of solar radiation, however, it is adequate as an optical window and preferred over other materials of