Investigation of optical and electrical properties of of Te Doped ZnO For Solar cell Application"

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Abstract

In this study structural, optical and morphological properties of tellurium doped zinc oxide (Te–ZnO) thin films prepared by sol-gel spin coating method on glass and FTO substrate. In the present review article theoretical background of sol-gel spin coating method, Te-doped ZnO thin films exhibit an enhancement of band gap energy and crystalline compared with non-doped films. The optical trans-mission spectra revealed a shift in the absorption edge toward lower wavelengths. X-ray diffraction measurement demonstrated that the film was crystallized in the hexagonal (wurtzite) phase and presented a preferential orientation. The XRD obtained patterns indicate that the crystallite size of the thin films, changed with the Te doping level. The scanning electron microscopy and atomic force microscopy results demonstrated that the grain size and surface roughness of the thin films increased as the Te concentration increased. We demonstrate that it is possible to control the structural, optical and morphological properties of ZnO thin films with the isoelectronic Te-incorporation level.

Keywords: ZnO, Te, Sol-Gel, Thin Film.

1. Introduction

There exists great interest in zinc oxide (ZnO) materials, one of the most important binary II–VI semiconductor compounds, because of their usefulness in a wide range of high technology applications, low cost, resource availability, non-toxicity and high thermal and chemical stability [1]. Applications for ZnO include its potential use in solar cells and various other optoelectronic devices [1-4]. ZnO is typically unintentionally doped n-type when grown due to a stoichiometry imbalance that results in oxygen vacancies. Thus, when attempting p-type doping of the film with acceptors such as nitrogen (N), compensated films result. One compensating strategy for oxygen vacancies is to add an isoelectronic impurity that would occupy the oxygen vacancy. Using Tellurium(Te) as the isoelectronic element may provide