URN etd-0407109-183715-1247
Author Jia-Rong Wu
Author's Email Address No Public.
Statistics This thesis had been viewed 44 times. Download 0 times.
Department
Year 2007
Semester 2
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title Optical-Electrical Properties of Cuprous Oxide Films Deposited by Reactive Magnetron Sputtering
Date of Defense 0000-00-00
Page Count 93

Keyword
cuprous oxide
reactive magnetron sputtering
microstructure
heterojunction device

Abstract
Cuprous oxide (Cu2O) is a direct band gap semiconductor with optical band gap energy of 2.0 - 2.5eV. It is a non-stoichiometric p-type semiconductor. The attractiveness of cuprous oxide as a photovoltaic materials because of its high absorption coefficient in visible regions, non-toxicity, abundantly available starting material (Cu) on the earth and low cost producibility.
In this study, the cuprous oxide films were grown by dc reactive magnetron sputtering. The first is to find the deposition conditions of Cu2O phase. The second is to research the effect of various sputtering parameters on microstructure and electrical properties. The p-Cu2O/n-ITO and p-Cu2O/i-ZnO/n-ITO heterojunction devices were prepared by magnetron sputtering. The I-V characteristic of device was measured by solar cell simulator system.
The results show that the Cu2O could be obtain at deposition conditions of DC sputtering power 100W, pressure 3.3 Pa, Ar flow rate 10 sccm, O2 flow rate 1 sccm and different substrate temperature from 50oC to 300oC. The n-type semiconductor of Cu2O films were obtained at substrate temperature 50oC and 100oC. With increasing the substrate temperature from 150 oC to 300 oC, the Cu2O films obtained were a p-type semiconductor. The mobility of 12 cm2/V-s was obtained at substrate temperature 300oC. The resistivity of Cu2O films decreased from 867 Ω-cm to 77 Ω-cm after annealing in vacuum at 300oC for 20min. The p-Cu2O/n-ITO heterojunction device exhibits large leakage current resulting in ohmic-like I-V characteristics. An i-ZnO layer was included to decreased the reverse leakage current between the p-Cu2O and n-ZnO layers. The p-Cu2O/i-ZnO/n-ITO heterojunction devices could be obtain for a rectifying characteristic.
Advisory Committee Ming-Jeng Chiang - advisor

Files No Any Full Text File.
Date of Submission 2008-07-31