Accepted Manuscript

Highly moisture and weak-acid resistant Ga-doped ZnO films with titanium dioxide co-doping fabricated by magnetron sputtering

Chaoting Zhu, Jia Li, Ye Yang, Xunna Zhao, Wenwei Zou, Ruiqin Tan, Weijie Song

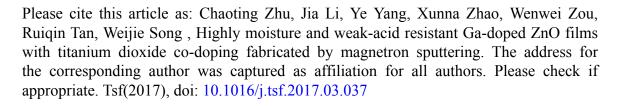
PII: S0040-6090(17)30220-1

DOI: doi: 10.1016/j.tsf.2017.03.037

Reference: TSF 35885

To appear in: Thin Solid Films

Received date: 10 November 2016 Revised date: 17 March 2017 Accepted date: 17 March 2017



This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



ACCEPTED MANUSCRIPT

Highly moisture and weak-acid resistant Ga-doped ZnO films with

titanium dioxide co-doping fabricated by magnetron sputtering

Chaoting Zhu¹, Jia Li¹, Ye Yang¹*, Xunna Zhao¹, Wenwei Zou¹, Ruiqin Tan², Weijie Song^{1,3*}

¹ Ningbo Institute of Material Technology and Engineering, Chinese Academy of Sciences, Ningbo, 315201, P. R. China

² Faculty of Information Science and Engineering, Ningbo University, Ningbo, 315201, P. R. China

³ Ningbo Key Laboratory of Silicon and Organic Thin Film Optoelectronic Technologies, Ningbo, 315201, P. R. China

Corresponding author: yangye@nimte.ac.cn, Tel&Fax: +86 574 86685164

weijiesong@nimte.ac.cn, Tel&Fax: +86 574 87913375

Abstract

In this work, we proposed a strategy to improve the damp-heat stability and weak-acid resistance of gallium doped zinc oxide (GZO) thin films by co-doping TiO_2 into GZO targets. Results showed that GZO thin films with a 0.2 wt% TiO_2 co-doping in the target (GTZO) exhibited a resistivity of $5.1 \times 10^{-4}~\Omega$ cm and an average transmittance of 82.9 %. The relative change in sheet resistance was as low as 5.1% after 24 h damp heat treatment in conditions of 97% relative humidity at 121 °C. A craterlike textured surface with a high haze value was not found in GTZO thin films after dipping in 1 vol% HCl solution for 10 minutes. These results showed that GTZO thin films have great potential for use as transparent electrode in extreme outdoor conditions.

Keywords

Gallium-doped zinc oxide; Titanium dioxide co-doping; Moisture resistance; Weak-acid resistance; Magnetron sputtering; Thin films

1. Introduction

Transparent conductive oxide (TCO) thin films are widely used as a transparent electrode in organic light emitting diode, liquid crystal display, and solar cells due to excellent transparency in the visible light and high conductivity [1-4]. Generally, these optoelectronic devices need to undergo damp-heat (DH) and acid-mist tests before be used in harsh outdoor conditions [5,6]. Thus, it requires the transparent electrodes have excellent durability in extreme DH and acid-mist conditions. In most cases,

Download English Version:

https://daneshyari.com/en/article/5465836

Download Persian Version:

https://daneshyari.com/article/5465836

<u>Daneshyari.com</u>