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A. Attaf, A. Bouhdjer, H. Saidi, M.S. Aida, N. Attaf, H. Ezzaouia

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On tuning the preferential crystalline orientation of spray pyrolysis deposited indium oxide thin films

A. Attaf [(a)], A. Bouhdjer [(a)], H. Saidi[(a)], M.S. Aida[(b)], N. Attaf[(b)], H. Ezzaouia[(c)]

[a] Physic Laboratory of Thin Films and Applications LPCMA, University of Biskra, Algeria

[b] Laboratoire de Couches Minces et Interfaces Faculté des Sciences Université de Constantine, Algeria

[c] Laboratoire des semi-conducteurs, nanostructures et Technologie Avancée, Research and Technology Centre of Energy, Borj-Cedria Science and Technology Park, BP 95, 2050 Hammam-Lif, Tunisia

A B S T R A CT

In the present work we investigated the change of preferred crystalline orientation of indium oxide thin films prepared by ultrasonic spray technique on glass, single crystalline Si (400) and KCl single crystal substrates heated at 500 °C. The structural analysis suggests that films deposited on glass and Si wafer substrates are polycrystalline with a preferred grain orientation along the (222) plane. However, films deposited on KCl single crystal substrate, exhibit preferred (400) orientation. The films deposited on KCl substrates have larger grain size than the ones deposited on the other substrates . The electrical characterization indicated that films deposited on KCl substrates have lower resistivity of 0.8 x 10^{-3} Ω cm. While films prepared on glass substrates exhibit higher resistivity in the order of 33 Ω cm. This discrepancy is explained in terms of Oxygen diffusion from the films towards the KCl substrate.

Key words: Indium oxide, Thin films, Ultrasonic Spray, optical and electrical properties.

1. Introduction

During the last decades, an increasing interest has been paid to the transparent conducting oxides (TCO) thin films due to their interesting properties such as high optical transparency and large electrical conductivity. Therefore, TCO thin films are considered as serious candidate for numerous applications namely: photovoltaic devices, transparent windows; liquid crystal displays (LCD), light emitting diode (LED), solar cell, gas sensors and anti- reflecting coatings [1]. Among these TCO films, indium oxide has been less investigated by comparison to the commonly used zinc and tin oxides thin films. Technical and scientific literature outlined that the structural and electrical

*Corresponding author. Tel.: +213770384492 ; Fax : 033543192
E-mail address : ab_attaf@univ-biskra.dz (A. attaf).