UNIVERSITI TEKNOLOGI MARA

STUDY ON MAGNESIUM DOPING OF TIN OXIDE THIN FILM TOWARDS ELECTRICAL, OPTICAL AND STRUCTURAL PROPERTIES

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Thesis submitted in fulfilment of the requirements

for the degree of

Bachelor of Engineering (Hons) Electrical Engineering

Faculty of Electrical Engineering

July 2018

ABSTRACT

This project was to study the effect from the doping process between tin (iv) oxides (SnO_2) with magnesium acetatate ($Mg(CH_3COO)_2$). The aim of this project were to prepare SnO_2 doped with magnesium thin film to characterize the electrical, optical and surface properties. This thin film were prepared by using the spin-coating technique. The magnesium were varied by using the 2at%, 4at%, 6at%, 8at% and 10at% and the technique used was spin coating technique. The characterization that involved in this project include optical using the UV-VIS, electrical using Hall-Effect and structural properties by using the FESEM. The result from every characterization were observed for the analysis. As to increase the SnO_2 in term of resistivity and high transmittance, the optimum result that occur by this project was doped at 10at% of $Mg(CH_3COO)_2$ on the sample based on the IV characteristic, surface and the transmittance result.

ACKNOWLEDGEMENT

All praise for Allah S.W.T. the Lord Almighty, the Merciful and Beneficent Salam to Nabi Muhammad S.A.W. First of all, thanks to Allah S.W.T who have given me the strength, ability and all His help for me to complete this final year projects.

By this change, I would like to express my deep feels of appreciation and gratitude towards Dr. Puteri Sarah binti Mohamad Saad, my project supervisor for her guidance's, advices and her supports, which have helped me all along to complete this final project.

Besides, my deepest and sincere gratitude for Kak Kina, master student as co-supervisor that always supporting and lead me in completing this project. Without the guidance from her, this project cannot move to the further.

I also like to thanks to our colleagues who have given me some advices and helps in order to finish this project. I pray that all of them will be successful person and I would never forget it.

I also want to take this opportunity to thanks to Faculty of Electrical Engineering, UiTM Shah Alam for given me chance to involve in this kind of project. A special thanks to all the Technicians for given me guidance and helps the process of completing this project.

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Semiconductor metal oxide nanoparticle has big impact in the industry that focus on the manufacturing and engineering application. Recently the semiconducting oxide thin film based sensor gained large attention due to the superior electrical and optical properties. Natural non-stoichiometry, flexibility in variation of electrical and optical properties, are some of the unique advantages that make SnO_2 a suitable candidate for gas sensing applications.

SnO_2 is an abundant, low cost, and wideband-gap oxide which crystallizes in the tetragonal rutile structure. SnO_2 also applied widely in many fields such as optoelectronic devices, solar cells, flat panel displays and gas sensors [1]. In order to tune the optical properties of SnO_2 thin film, transition metal need to be used as dopant and the effect observe. This study state that by adding the some metal ions as dopant into the SnO_2 can changed the optical properties. However by using magnesium suppressed the effective Fermi level which responsible for the experimentally variations of conductivity [2]. Thus need to investigate if the magnesium acetate are best translation element that can be enhance the properties of SnO_2 in term of electrical, optical and structural.