UNIVERSITI TEKNOLOGI MARA

MANGANESE OXIDE THIN FILM USING AEROSOL ASSISTED CHEMICAL VAPOUR DEPOSITION (AACVD) TECHNIQUE FOR SOLAR ENERGY HARVESTING

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MSc

August 2020

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

The demand for renewable and clean energy has resulted in the rapid development of its technology. One of the ways to generate energy from natural sunlight is by using a photoelectrochemical cell. Currently, the race is on to find the most suitable and most efficient material for the semiconductor electrode of the photoelectrochemical cell. This research is focused on the study of Manganese oxide material deposited using the AACVD technique, with Mn_2O_3-$4TiO_2$ thin film and Mn_2O_3-Co_2O_3-TiO_2 thin film deposited using the technique within a specific range of time and temperature. AACVD technique had been chosen because of its ability to produce high quality thin film by using a simple method, with various compositions and has low production cost. The first objective was to define the highest light absorption level by varying the temperature and time during the AACVD process for manganese oxide thin film. The characterization of the material analyses was carried out using XRD, Raman and FESEM. A UV-Vis machine was used to define the material's optical band gap using Tauc plot. The photocurrent density recorded using photoelectrochemical test was 2.5 mA/cm^2 and 4.91 mA/cm^2 respectively for Mn_2O_3-$4TiO_2$ thin film and Mn_2O_3-Co_2O_3-TiO_2 thin film. The photoconversion efficiency was 0.95% for Mn_2O_3-$4TiO_2$ thin film and 2.82% for Mn_2O_3-Co_2O_3-TiO_2 thin film. This concluded the improvement on photocurrent density and efficiency compared to previous studies.

ACKNOWLEDGEMENT

Firstly, Alhamdulillah, thank you Allah SWT for giving me the opportunity to learn and increase my knowledge, hence enabling me to complete my long journey on this work. My gratitude and thanks go to my supervisor Dr Nor Afifah Yahaya and my co-supervisor Dr Mohd Nashrul bin Mohd Zubir.

My appreciation also goes to UITM Shah Alam and University Malaya for being part of the collaboration in completing this study. The lab's staff and dear fellow friends who are also battling in this beautiful and challenging journey. A special thanks also to my colleagues and friends for helping me with this project.

Finally, this thesis is dedicated to my late father, Hamzah Bin Che Will, who taught me to appreciate knowledge and never give up. My dearest and beautiful mom, Hafsah binti Muda, who never missed praying for my success in this journey and my entire life.

Thank you.

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