

UNIVERSITI TEKNOLOGI MARA

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

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MSc

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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.

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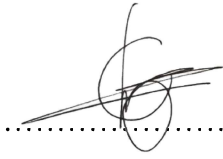
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ABSTRACT

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 $\text{Mn}_2\text{O}_3\text{-4TiO}_2$ thin film and $\text{Mn}_2\text{O}_3\text{-Co}_2\text{O}_3\text{-TiO}_2$ 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 $\text{Mn}_2\text{O}_3\text{-4TiO}_2$ thin film and $\text{Mn}_2\text{O}_3\text{-Co}_2\text{O}_3\text{-TiO}_2$ thin film. The photoconversion efficiency was 0.95% for $\text{Mn}_2\text{O}_3\text{-4TiO}_2$ thin film and 2.82% for $\text{Mn}_2\text{O}_3\text{-Co}_2\text{O}_3\text{-TiO}_2$ thin film. This concluded the improvement on photocurrent density and efficiency compared to previous studies.

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