

**FABRICATION AND CHARACTERIZATION OF  
ZINC OXIDE (ZnO) THIN FILMS ON GLASS  
SUBSTRATE BY RADIO FREQUENCY (RF)  
SPUTTERING TECHNIQUE**

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## **AUTHOR'S DECLARATION**

I declare that the work in the thesis was carried out in accordance with the regulation of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated, or acknowledged as reference work.

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

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## SUPERVISOR'S CERTIFICATION

We declared that we read this thesis and in our point of view this thesis is qualified in terms of scope and quality for the purpose of awarding the Bachelor of Chemical Engineering (Environment) with Honours.

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## ABSTRACT

The ZnO is popular in the research fields nowadays because it novel properties which attracted various applications to use it. There is various types of method were used to deposit the ZnO thin film. However, not all the method will produce the high quality of thin film because of it limitations. In this research, the RF sputtering method was chosen because the method has some advantages compared to the other methods. The project was conducted to fabricate the ZnO thin film on the glass substrate by using RF sputtering, and to anneal and characterize the ZnO thin films on a glass substrate at different temperature by using Filmetric, FTIR, and optical microscope. ZnO thin films were deposited on the glass substrate by RF sputtering and then, the ZnO thin films were annealed at different temperatures; 200°C, 300°C, and 400°C in tube furnace for one hour. The optical property and surface morphology of annealed ZnO thin films were characterized. The refractive index of the ZnO thin film, the measurements were decreased when the higher annealing temperature was used which is from 1.6153 (200 °C), 1.4154 (300 °C) and 1.3541(400 °C). In addition, the higher transmittance was observed which is greater than 70%, and the absorbance shows that the four sample contain ZnO as the peak at range of 420.431  $\text{cm}^{-1}$  to 450.30  $\text{cm}^{-1}$  were presented which represent ZnO stretching and the present of O-H groups at range 3568.233  $\text{cm}^{-1}$  to 3628.15  $\text{cm}^{-1}$  shows the hygroscopic nature of ZnO. The surface morphology of the thin films were increased as the annealing temperature increased where the surface roughness was reduced and become smoother as the annealed temperature increased at above 200°C.