

**UNIVERSITY TEKNOLOGI MARA
CAWANGAN PULAU PINANG**

**AGEING OF PMMA:TiO₂ THIN FILM
INSULATION APPLICATION**

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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 if my own, unless otherwise indicated or acknowledge 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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ABSTRACT

A composite between poly (methyl methacrylate) (PMMA) with titanium dioxide (TiO₂) films were fabricated and characterized using sol-gel spin coating technique. The electrical and physical properties of (PMMA:TiO₂) nanocomposite thin films were investigated, to be used as an insulation in high voltage application. The goal of this study is to investigate the insulation properties of the PMMA:TiO₂ nanocomposite thin film for high voltage (HV) applications by varying the ageing time of the solution. In this research, the experiments are conducted by varying the aging time of PMMA:TiO₂ nanocomposite thin film from 1 to 5 hours. The purpose of varying the aging time is to observe the changes of AC and DC breakdown voltage, thickness and the surface of the insulation material. The PMMA:TiO₂ thin films were characterized by using AC and DC breakdown voltage, partisl discharge, surface profiler and atomic force microscopy (AFM). Results from electrical characterization showed that the insulation properties of DC breakdown voltage is higher than AC breakdown voltage. The higher breakdown voltage was at aging time of 3 hours that is 9 kV and 17kV respectively. It was also found that by varying the aging time of the PMMA:TiO₂ nanocomposite solution, the insulation performance of PMMA:TiO₂ thin film are affected the structural and electrical properties of the PMMA:TiO₂ nanocomposite thin film as an insulation in high voltage field.

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