

**UNIVERSITI TEKNOLOGI MARA**

**THE STUDY ON THE EFFECT OF NATURAL BASED  
ADDITIVES WITH PALM/SOY OIL UPON  
DEGRADATION ON POLYPROPYLENE FILM**

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Thesis submitted in fulfillment of the requirements for the degree of

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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 reference work. This topic has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

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## ABSTRACT

Novel natural additive for polypropylene (PP) degradation was developed using dione with incorporation of palm/soy bean oil. Most industries incorporated synthetic dyes to impart color to the films. Commercialized degradable additives such as prooxidant and photosensitizer had also been incorporated into film to accelerate degradation through oxidation but most industries use synthetic metal complexes which may cause further environmental problems when degraded. In this project, the degradable additives were prepared using twin screw extruder followed by thin film fabrication by using film casting process. The incorporation of commercialized palm and soy oil are to act as pro-oxidant and also as lubricant to help the dispersion of dione additive into the PP. Dione which is a photosensitizer will induce the degradation process during exposure period. All of the samples were exposed into different types of environment to study the effect of aging on the sample. Besides, different composition of oil and dione had also being incorporated into PP before mechanical testing and characterization testing such as Different Scanning Calorimetric (DSC), Thermal Gravimetric Analysis (TGA), Fourier Transform Infrared Spectroscopy (FTIR) and Atomic Force Microscopy (AFM) were done. The use of higher composition of dione and oil has increased the degradation rate, with soy bean oil showing a faster degradation. This has been proved by, lower temperature of onset degradation ( $T_i$ ), higher formation of carbonyl index (CI), higher root mean square roughness (RMS) value and drastic lost of tensile properties upon exposure to sunlight, heat and upon burial. In addition, sunlight exposure has shown faster degradation followed by humidity aging, oven aging and lastly burial aging.

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