UNIVERSITI TEKNOLOGI MARA

FABRICATION AND CHARACTERIZATION OF PU/G COMPOSITE: STUDY ON THERMAL AND CONDUCTIVITY PROPERTIES

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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 results 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

This study explores the potential of graphene for improvement of properties of thermoplastic polyurethane (PU) composites in sight of thermal property, electrical conductivity, hardness, gel content and bonding spectra (FTIR). Polyurethane/graphene (PU/G) composite were produced by having exfoliation of graphene with DMF and subsequently blend with PEG and IPDI by in-situ addition polymerization with varying concentrations (0–0.18 wt%) of graphene, which resulted in uniform dispersion and partial exfoliation of graphene-sheets in PU matrix. The PU/G synthetization has been confirmed by IR spectra analysis by showing the obvious urethane linkages and hydrogen bonding. The PU's Tg property has increase about 55% with the addition of graphene films improved gradually with increasing graphene concentration. An improvement in hardness has been recorded as 7B pencil hardness imitated the hardness of the PU/G2. The gel content of PU was less effected by the addition of graphene by having a prove showed all of the results gel content within 80%-90%. Next, the electric conductivity increased up to 76% with addition of 0.088% of graphene into PU. Due to the ability of graphene to conduct electricity and covalent bond between PU and graphene, the composite had improve its conductivity.

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