

3736815 SCPO/M : MAJOR : POLYMER SCIENCE ; M.Sc. (POLYMER SCIENCE)

KEY WORD : POLYPROPYLENE / ARAMID FIBRE / KEVLAR / COMPOSITES

WORAPONG CHAWALITAMPORN : MECHANICAL PROPERTIES AND MORPHOLOGY OF POLYPROPYLENE/ARAMID FIBRE COMPOSITES.

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137 p. ISBN 974-589-142-8

Composites of polypropylene (PP) and Kevlar aramid pulp were prepared using an internal mixer at a mixing temperature of 180°C and a rotor speed of 60 rpm. It was found that mechanical properties were improved with increasing Kevlar pulp loading. Hydrolysis of Kevlar pulp by NaOH was carried out to increase the amine end-group on Kevlar surface. Compatibilisers, e.g., maleic anhydride-grafted poly[styrene-b-(ethylene-co-butylene)-b-styrene] (SEBS-g-MA) and maleic anhydride-grafted polypropylene (PP-g-MA) were added to composites in order to create the chemical reaction between anhydride groups on the compatibilisers and amine end-groups on Kevlar pulp surface. It was found that the addition of SEBS-g-MA to the composite resulted in decreased mechanical properties, but improved impact property. This is due to the fact that SEBS-g-MA is an elastomer which plays a role as impact modifier in the system. The addition of PP-g-MA to the composite also resulted in decreased mechanical properties of the composite, because the modulus of pure PP-g-MA is much lower than that of pure PP.

Crystallisation of PP in the composite was investigated using DSC. It was observed that varying Kevlar pulp and compatibilisers loadings affected the crystallisation behaviour of PP. About 2% Kevlar pulp is able to increase the amount of crystallinity of PP. On the other hand, SEBS-g-MA was found to inhibit PP crystallisation, whereas PP-g-MA had no effect on the crystallisation of PP in the composite.

Morphology of the composites observed by SEM revealed that more fibre breakage and fibrillation was found in the composites with added compatibiliser than those without, implying the better adhesion at fibre/matrix interface in the former case. Solvent extraction of PP/Kevlar composites showed more matrix residue adhered to Kevlar surface when compatibiliser was added to the composite.