3836542 SCPO/M : MAJOR : POLYMER SCIENCE ; M.Sc. (POLYMER SCIENCE)
KEY WORD : POLYPROPYLENE / POLYETHYLENE / COMPATIBILISATION MORPHOLOGY

NID RUNGRUANGPORNPONG : EFFECT OF COMPATIBILISERS ON THE MECHANICAL PROPERTIES AND MORPHOLOGY OF PP/HDPE BLENDS. THESIS ADVISOR : PRASERT KHUNKAMCHOO Ph.D., SAUVAROP LIMCHAROEN Dr.rer.nat., KALYANEE PREMPHET Ph.D., 150 p. ISBN 974-588-954-7

The blends of isotactic polypropylene (iPP), high density polyethylene (HDPE) and compatibilisers were investigated. Effect of melt flow rate ratio of polymer matrix (iPP) to dispersed phase (HDPE) was studied prior to the influence of compatibilisers in order to ensure the blending system with desirable properties. Two series of compatibilisers, i.e., styrene-(ethylene-butylene)-styrene (SEBS) and ethylene-propylene copolymer (EPR) with different compositions and molecular weights were used as the third component. The blends were prepared by melt blending using a laboratory twin screw extruder. Then the specimens were injection moulded for tensile and impact testing. It was found that the melt flow rate ratio of polymer matrix to dispersed phase of 0.68 could enhance the mechanical properties more than those of the system with high melt flow rate ratio, particularly percentage of elongation at break and impact strength. It was noted from the current investigation that SEBS G 1652 and EPR 49% were very effective and able to be used as impact modifiers and compatibilisers for PP and HDPE blends. It could be due to an increase of compatibility between two phases and, hence, a better adhesion between surfaces. Furthermore, it was found that the transition temperature of PP, HDPE and compatibilisers were shifted according to the data obtained from dynamic mechanical thermal analyser (DMTA).

The reduction of dispersed phase size into small droplets with increasing the concentration of compatibiliser was observed by SEM micrograph. It was noted that the blends became more elastic than the uncompatibilised one, particularly the system containing SEBS G1652 or EPR 49%. From the etched fracture surface, it can be observed that there were gaps and holes which believed to be the etched out compatibiliser located between the dispersed phase of PE and PP matrix. The result obtained was supported by the pictorial phase morphology obtained from Image Raman Microscope which elucidated the composition distribution for the investigated ternary blend of PP/HDPE/SEBS G1651.