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MONTHA KAIHIRUN: THE EFFECT OF FILLER UPON THE PHASE MORPHOLOGY AND PROPERTIES OF POLYPROPYLENE/POLYAMIDE 6 BLENDS. THESIS ADVISORS: RICHARD A. VENABLES, Ph.D., KRISDA SUCHIVA, Ph.D., ARUNEE TABTIANG, Ph.D., 180 p. ISBN 974-662-927-1

Polypropylene/polyamide 6 blends were prepared through melt processing with compositions near the phase inversion region with and without mineral filler, both in the presence and absence of a commercially produced compatibiliser, namely maleic anhydride grafted polypropylene (PP-g-MAH). The morphologies of these compounds were determined through optical and scanning electron microscopy (SEM). Moreover, a technique for SEM analysis was developed that consisted of preparing a flat specimen surface by microtoming, staining the PA6 phase with phosphotungstic acid, followed by SEM observation of the composition image. This technique yielded a much clearer phase contrast and facilitated a quantitative determination of filler distribution.

For the ternary PP/PA6/talc blends, the talc was predominantly distributed in the PA6 phase. Since the viscosity of the PA6 phase was increased by the filler, the phase inversion region shifted to higher PA6 contents. This effect was partly counteracted by the increase in the effective volume fraction of the PA phase, due to its extension with talc. In the absence of filler, the physical properties of the blends changed distinctly through the phase inversion region when the PP continuous phase was replaced by the PA6 continuous phase; this pheomenon was supressed by the presence of filler. Whilst the phase inversion region in the extrudate laces and injection moulded tensile bars were slightly different, the dispersed phase domain sizes in the mouldings were markedly bigger.

The surface modification of talc with a fatty acid coating did not affect the distribution of the talc between the PA6 and PP phases. The addition of the PP-g-MAH to improve interfacial adhesion induced a sharp reduction of the dispersed phase size; the phase inversion region was not changed. The quantity of talc distributed in the PP phase was slightly increased upon addition of PP-g-MAH. Premixing of the PP-g-MAH, PP, and talc, before the addition of PA6, was found to be most effective in distributing the talc in the PP phase; pronounced increases in mechanical properties were obtained through this approach.