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Morphology Development and Melt Viscoelastic Properties of PTT/PET/TLCP Ternary Blends

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The morphology development and melt linear viscoelastic properties of PTT/PET/TLCP blends were studied and results were compared with PET/TLCP and PTT/TLCP binary blends. The blend samples were prepared by melt mixing of the blends component both in an internal mixture and a modular twin screw extruder. The morphological studies were performed on cryogenically fracture samples by using SEM .The melt- state linear viscoelastic properties of samples were studied by using the rheometric mechanical spectrometer (RMS). Differential scanning calorimeter was employed to examine a crystallinity of the samples. The SEM results showed a matrix- disperse type morphology in which the TLCP phase was uniformly dispersed in the matrix. The average diameter of the TLCP particle in PET/TLCP blend was found to be comparable with that in ternary blends but smaller compared to PTT/TLCP blend. For all the blends, the average TLCP diameter was smaller for the samples prepared by extruder compared to those produced by internal mixing. These results suggest lower compatibility between PTT and TLCP phase compared to that between PET and TLCP. Results of melt viscoelastic measurements showed an almost similar seudoplastic type behavior with nearly equal viscosity for PET and PTT in whole range of frequency(shear rate) studied (0.1-1000 1/sec), while the TLCP exhibited a pronounced viscosity upturn and nonterminal behavior for storage modulus (G') at low frequency range. The viscoelastic properties of the PTT/PET binary blends seemed to obey the additive roll, suggesting that the PET and PTT melts are miscible .It was also shown that the viscoelastic properties of ternary blends was predominately controlled by matrix components indicating that TLCP phase remained as dispersed droplets in the matrix. The results obtained by DSC showed a single crystallization temperature peak (Tcc ~ 155°C) for PET/PTT binary and PET/PTT/TLCP ternary blends; the results which could support the SEM and viscoelastic results.