THE SYNTHESIZE AND RHEOLOGICAL EVALUATION OF PP/EPR IN-REACTOR ALLOYS PRODUCED BY SPLIT-FEED SEQUENTIAL POLYMERIZATION PROCESS

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The rheological behaviour, morphology and mechanical properties of in-reactor alloy of Polypropylene (PP)/Ethylene Propylene Rubber (EPR) synthesized by multi-stage sequential polymerization process are studied in this article. The Scanning Electron Microscopy (SEM), oscillation rheometry and mechanical tests were used to determine relationship between polymerization parameters, morphology, rheology and mechanical properties, which can be used as a useful method to tailoring the blend structure. The electron microscopy of samples revealed that by increasing switching frequency in polymerization time, the size of EPR dispersed phase decreased and the interconnection between the matrix and rubber domain is improved. The small amplitude oscillation rheometry showed that by increasing the switching frequency the viscosity curves shifted to higher values at low range of shear rates with no significant change at higher frequencies in Power-law region. The investigation on complex viscosity behavior at various temperature showed that the phase separation occur between around 230 °C. The modified Cole-Cole plots showed that the elasticity of melt increased by increasing switching frequency before 230 °C and the trend reversed at higher temperature. The plot of phase angle versus absolute value of complex modulus showed that up to 210°C all samples are nearly temperature independent while this trend failed at higher temperature.