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Effects of the Structure of the PS-GMA Copolymer on the Compatibilization of PBT / SBS Blends

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The effects of the molecular characteristics of the poly (styrene-ran-glicydil methacrylate) (PS-GMA) copolymers on the toughening process of poly (butylene terephthalate) (PBT) by addition of styrene-butadiene-styrene block copolymers (SBS) were investigated. High values of impact strength can be obtained for the PBT/SBS blends without compatibilizer at specific conditions such as for blends with SBS with similar viscosity compared to PBT, for blends with high SBS content (40 wt%) and for blends produced under specific processing conditions. The optimization of the phase morphology and impact properties of PBT/SBS blends is a difficult task mainly due to the unstable blend phase morphology prone to coalescence that causes coarsening and results in badly disperse mixtures. The efficiency of the in-situ compatibilization of PBT/SBS blends by PS-GMA is extremely dependent on the SBS and PS-GMA molecular characteristics. For the PBT/SBS/PS-GMA blends studied, better compatibilizing effects were observed through fine phase morphologies and lower Ductile to Brittle Transition Temperature (DBTT) when the interfacial compatibilizer interaction is maximized, that is, when it is used the SBS copolymer with higher polystyrene content (38 wt%) and with longer PS blocks (Mw= 20,000 g.mol-1) and also the PS-GMA copolymer with moderate GMA contents (ca. 4 wt%) and molecular weight similar or above the critical molecular weight for PS entanglements (Mc = 35,000 g.mol-1). On the other hand, the increasing in the interfacial interaction achieved by using PS-GMA and SBS with the favorable molecular characteristics was not enough to promote effective compatibilization of PBT/SBS blends. This observation was attributed to a weak interaction of the SBS with the in-situ generated compatibilizer PBT-graft-PS-GMA at the PBT/SBS interface arising from the unfavourable PS molecular structure in SBS (small PS content and short PS molecular weight).