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Migration of Nanoclay in Immiscible Polymer Blends

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In this study, we investigated the migration of nanoclay in two immiscible polymers (PBT/PS) under well defined shear flow. To understand the mechanism of clay migration between PS and PBT phase, the experimental samples were elaborately prepared such that five layers of films are sandwiched. The morphology was subsequently studied by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The PBT/PS films were first made by alternately superposing PBT film and PS/clay film with the thickness of 0.2mm. Though the clay used in this study has a slight compatibility with PBT, the thermally induced migration of clay in PS phase into PBT phase was not observed. However under shear flow, the migration of clay across the interface was observed. Also this migration of clay brings about domain size reduction by the compatibilization effect of clay. As the shear rate increases, the clay is migrated even into PBT phase and the domain size is effectively reduced. In addition, if we compare the crystallinity of the blend under shear conditions, DSC analysis shows that the crystallization speed of PBT obtained under high shear rate becomes faster, which means the clay migrates into PBT phase and it play a role as a nucleating agent. Therefore, in immiscible blends system, the organoclay can be migrated into the interface by the strong shear flow and it plays a role as a compatibilizer during morphology evolution.