

Influence of Shear on the Templated Crystallization of Poly(butylene terephthalate)/Single Wall Carbon Nanotube Nanocomposites

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The templating effect due to single wall carbon nanotubes (SWCNT) and shear on polymer crystallization has been studied in films of nanocomposites based on poly(butylene terephthalate) (PBT). By using a rheometer, a step shear was applied to the molten polymer. After shear cessation, the sample was immediately cooled down to the crystallization temperature. Crystalline development, in real time, was investigated by small angle X-ray scattering (SAXS) with a synchrotron radiation beam parallel to the film. SWCNT bundles template polymer lamellae to grow perpendicular to the SWCNT surfaces in a shish-kebab fashion even under quiescent conditions. Due to the power of SWCNT as nucleating agents, the shear rate has a minor effect on the crystallization kinetics. However, the fraction of oriented material increases significantly with shear rate. The results indicate that SWCNT act as nuclei stabilizers, providing surfaces which favour polymer crystallization.