



Experiment title: Influence of nanofillers in polymer crystallization under defined flow conditions	Experiment number: 26-02-282
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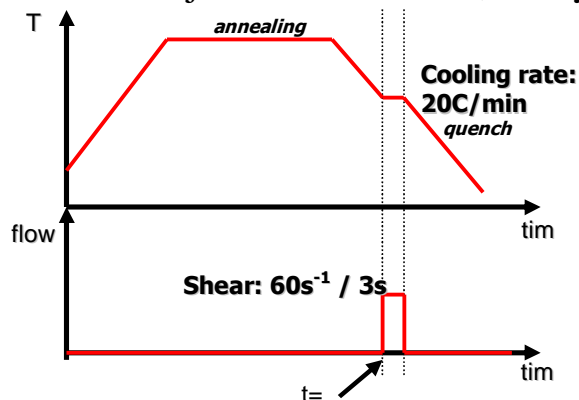
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Report:

The morphological aspects of the crystallization of a commercial polypropylene (HD120M0 by Borealis), compounded with a commercial nucleant agent (DMDBS) have been investigated by means of rheo-SAXS experiments. The experimental protocol is the ‘short term shearing’. Polymer/additive systems are molten and annealed at 230C for 3 min to ensure formation of an homogeneous solution of the two. Hereafter the system is cooled to a chosen test temperature and then subjected to shear flow, finally it is rapidly cooled down to room temperature.



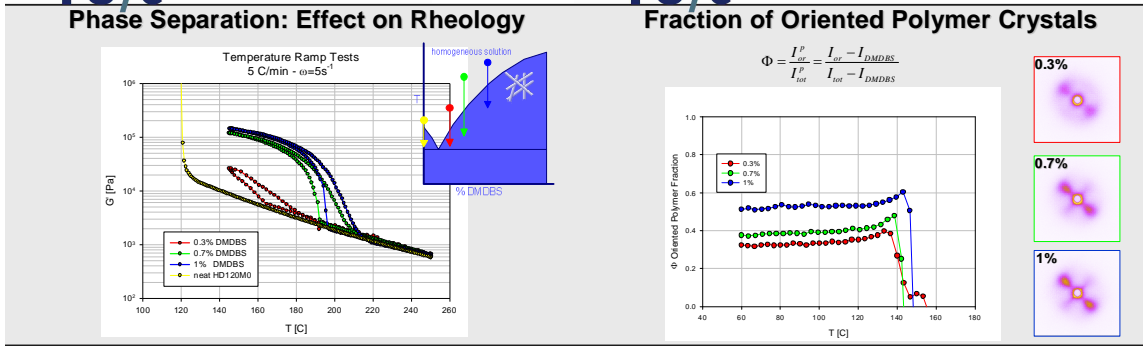


Figure 1

Figure 2

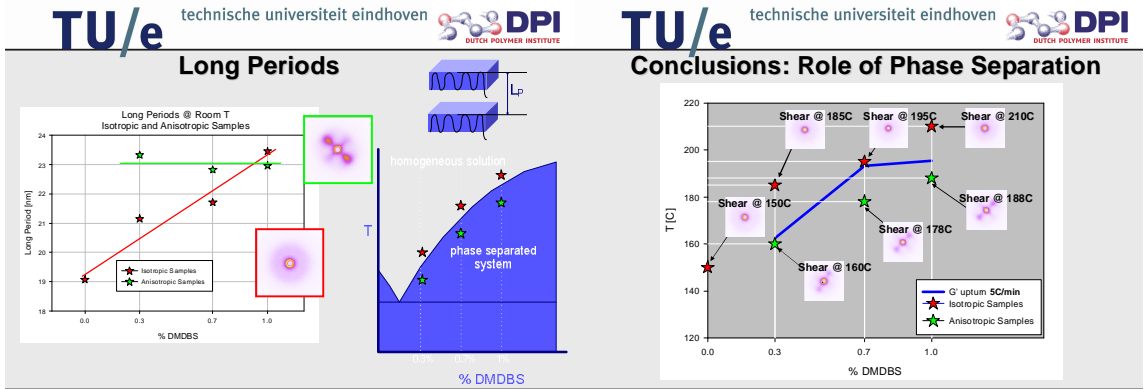


Figure 3

Figure 4

Figure 1 shows temperature dependence of storage modulus upon cooling the homogeneous polypropylene/sorbitol from melt at four different amounts of DMDBS (0, 0.3, 0.7 1.0 wt%). From the rheological data it is evident that with increasing amount of DMDBS the observed storage modulus in the polymer melt arises with the phase separation of DMDBS prior to crystallization of polypropylene. Figure 2 shows the estimated orientation of polymer crystals (determined from SAXS) that arises during shear at three different concentrations of sorbitol after the phase separation of DMDBS. Figure 3 shows long periods for PP/DMDBS systems sheared above (red line) and below (green line) the phase separation temperatures of the three compounds. Figure 4, summarises the morphology at room temperature showing the influence of temperature at which the shear is applied.