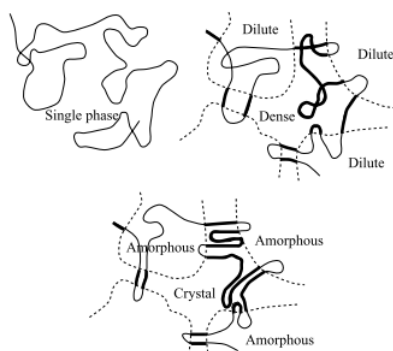


Pre-ordering and the early stage crystallization of PET (Poly(ethylene terephthalate))

Poly(ethylene terephthalate) (PET) is one of the most important industrial plastic materials, primarily due to its material properties. These are due in part to the PET crystallinity, for example good mechanical strength, tolerance to high temperature as well as chemical stability. A fundamental understanding of PET crystallization is important to improve the processing and aid further developments of this material. In this study we focused especially on the early stage of crystallization of thin PET films.



The aim of our experiments was to detect such a pre-ordering state for thin PET films, and to test the hypothesis that this kind of pre-ordering process might be favoured at free surfaces or constrained by the substrate due to its potential influence on chain alignment and segmental mobility.

Figure 1 The scheme of pre-ordering and crystallization for PET polymers³

We measured a broad peak at intermediate time (500 s). This is consistent with preordering

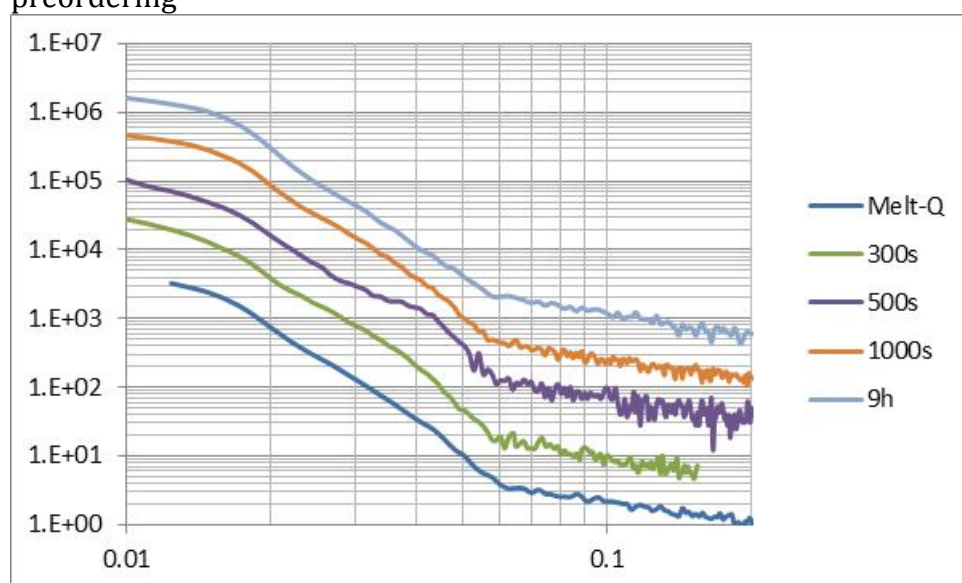


Figure 2 GI-SAXS profiles of various annealing times at a temperature of 110 °C.

We confirmed using GI-WAXS that the crystal structure of our thin PET films is the same as that of bulk PET. Pre-ordering of thin PET film was observed by GI-SAXS. However crystallization seems to take a longer time than for the bulk, possibly due to the reduction in the number of nucleating agents.

References

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