

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Thermal Analysis, X-ray and Electron Diffraction Studies on Crystalline Phase Transitions in Solvent-Treated Poly(hexamethylene terephthalate) MING-CHIEN WU, EAMOR M. WOO, Department of Chemical Engineering, National Cheng Kung University, TAIYO YOSHIOKA, MASAKI TSUJI, Institute for Chemical Research, Kyoto University — Crystal polymorphism, transformation, and morphologies in poly(hexamethylene terephthalate) (PHT) samples produced by solvent-casting from chloroform were examined by using differential scanning calorimetry (DSC), wide-angle X-ray diffraction (WAXD), and in-situ transmission electron microscopy (TEM). Solvent-induced crystallization of PHT at room temperature yielded an initial crystal of γ -form, as confirmed by WAXD. Upon DSC scanning, the original γ -form in PHT exhibited three endothermic peaks, whose origins and association were carefully analyzed. The γ -form could be transformed to β -form at 125°C via a solid-to-solid transformation mechanism. In addition, WAXD showed that γ - and β -forms co-existed in the temperature range of 100-125°C. These mixed crystal-forms were further identified using TEM, and the selected-area electron diffraction patterns revealed that both γ - and β -form crystals co-existed and were packed within the same spherulite. Evidence of solid-solid transformation from γ -form to β -form in PHT was presented and discussed.

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Date submitted: 17 Nov 2004

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