

**Experiment title:**

Influence of crystal sizes in phase transition: a gel study

Experiment**number:**

SC-270

Beamline:

ID11-BL2

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Shifts:

SIX

Local contact(s):

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28 AOUT 1997**Names and affiliations of applicants** (* indicates experimentalists):

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Report:

In-situ wide-angle X-ray scattering (WAXS) experiments have been performed to study the phase behaviour of syndiotactic polystyrene (sPS) with three solvents, i.e., decalin, benzylmethacrylate, and cyclohexylmethacrylate. The in-situ structural changes have been followed together with DSC, SAXS and Raman spectroscopy. From here, it has emerged that two different structural modifications exist within the solvent-included helical δ -phase, known to be a polymer-solvent compound. In the first modification, δ' , the solvent molecules (intercalated between the phenyl rings of sPS) are ordered, whereas in the second modification, δ'' , disordering of the solvent molecules within the helices occurs. The existence of the δ' phase depends on the phenyl ring interaction between sPS and the solvent. The γ -phase (the solvent-free helical phase) is not observed in this study which is in contrast to earlier reported results on sPYsolvent systems measured by conventional methods. The transformation from the helical (δ'') to the planar zigzag (β) occurs via melting and recrystallisation. Under specific conditions, the P-phase could be met&able, even in its thermodynamically stable region.

Figure 1: Heating run from -20 to 230°C at 5°C/min of a quenched 20 wt% sPS/BzMA sample (a) 3-D plot of WAXS data and (b) 2-D plot of WAXS data (temperatures are indicated in the plot)

Figure 2: Heating run from -20 to 230°C at 5°C/min of a quenched 40 wt% sPS/CHMA sample (a) 3-D plot of WAXS data and (b) 2-D plot of WAXS data (temperatures are indicated in the plot)

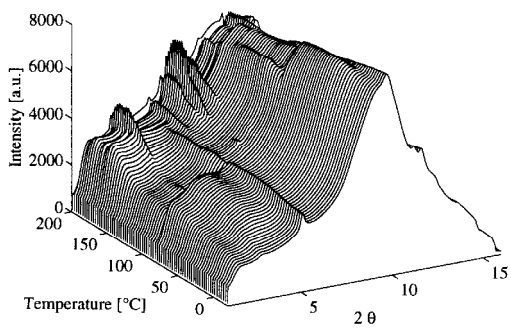


Figure 1a

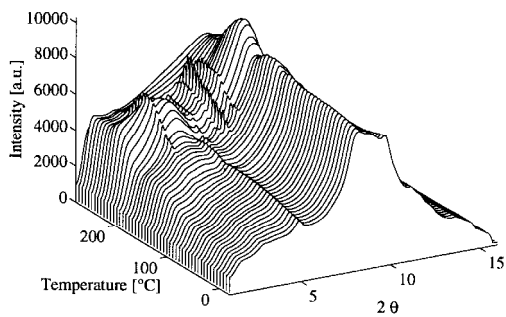


Figure 2a

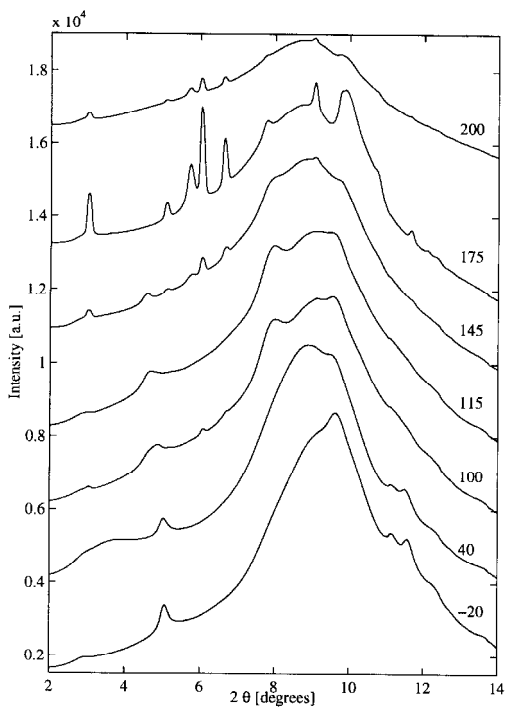


Figure 1b

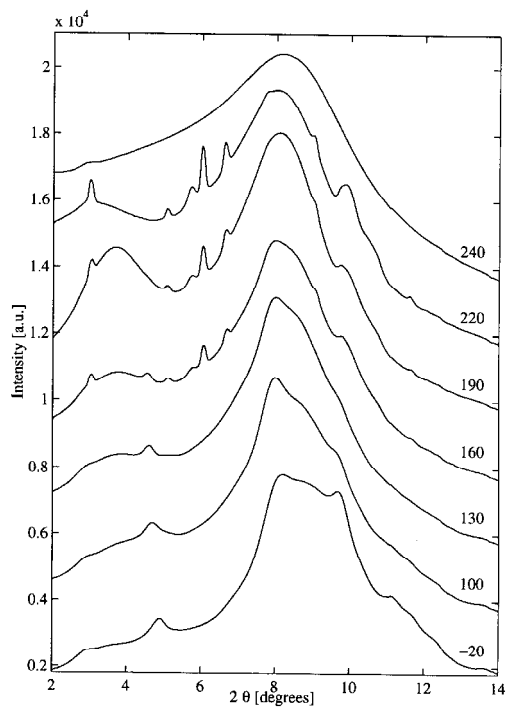


Figure 2b