



Experiment title: Development of supermolecular structure during strain-induced crystallization of polymers

Experiment number:
SC-870

Beamline: BM26B	Date of experiment: from: 24/09/01 to: 28/09/01	Date of report: 29/08/02
Shifts: 9	Local contact(s): Dr. Wim Bras	<i>Received at ESRF:</i>

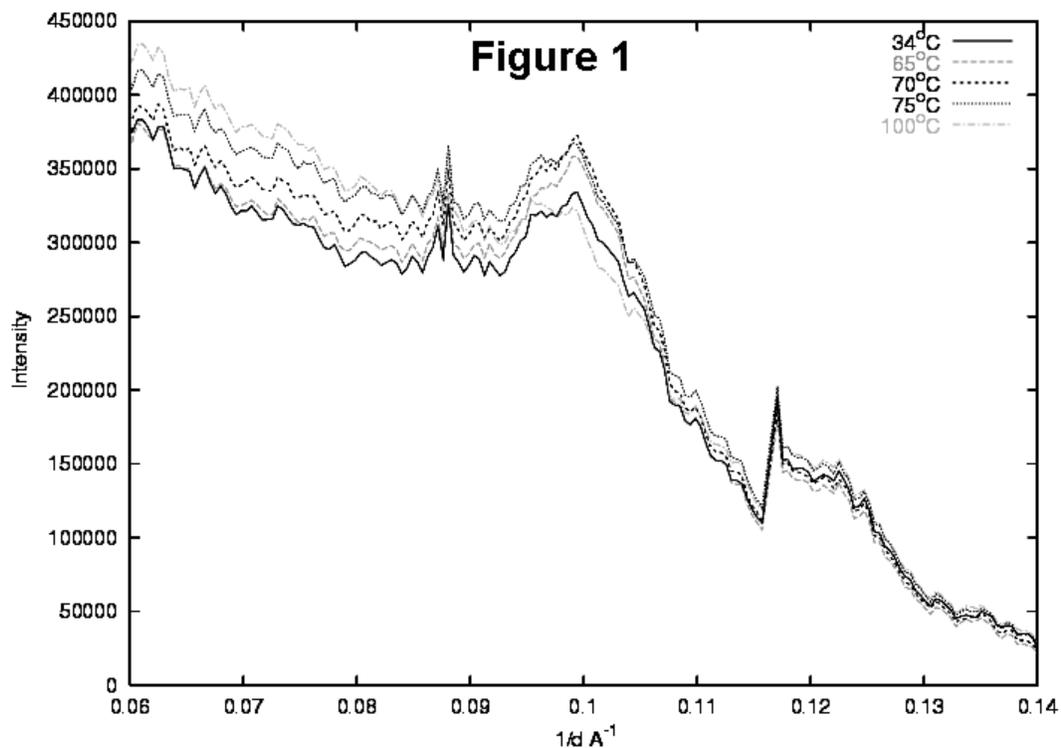
Names and affiliations of applicants (* indicates experimentalists):

A Mahendrasingam*, AK Wright*, C Martin*, DJ Blundell, W Fuller, School of Chemistry and Physics, Keele University, Staffs, ST5 5BG, UK

Report:

In this study we have recorded simultaneous SAXS/WAXS during the thermal annealing of uniaxially cold drawn polyethylene terephthalate (PET) using the Keele drawing camera. The camera allows samples to be drawn uniaxially and to be thermally annealed at elevated temperatures with an accuracy of 1.0°C. In this report we describe the results obtained during thermal annealing from 34°C to 100°C of cold drawn PET. SAXS/WAXS data was recorded simultaneously using a two dimensional SAXS detector and a linear WAXS detector with five minutes exposure time. A selected WAXS scan along the meridional direction showing a mesophase reflection at $\sim 0.1 \text{ \AA}^{-1}$ at temperatures of 34°C, 65°C, 70°C, 75°C and 100°C is shown in the figure below. It can be seen from this figure that the intensity of the mesophase reflection increases as the temperature is increased from 34°C to

70°C and that as soon as the sample is above the glass transition temperature and starts to crystallise, the intensity of the mesophase reflection starts to decrease



A selected sequence of SAXS diffraction patterns were subtracted from initial frame at 34°C to highlight the changes in the SAXS pattern which is shown in figure 2. The SAXS patterns shown in figure 2a, 2b and 2c are taken at 65°C, 70°C and 75°C respectively. These SAXS patterns shows that prior to crystallisation there is weak equatorial scattering and during the crystallisation the development of a typical four-point pattern.

