



Experiment Report Form

The double page inside this form is to be filled in by all users or groups of users who have had access to beam time for measurements at the ESRF.

Once completed, the report should be submitted electronically to the User Office using the **Electronic Report Submission Application:**

<http://193.49.43.2:8080/smis/servlet/UserUtils?start>

Reports supporting requests for additional beam time

Reports can now be submitted independently of new proposals – it is necessary simply to indicate the number of the report(s) supporting a new proposal on the proposal form.

The Review Committees reserve the right to reject new proposals from groups who have not reported on the use of beam time allocated previously.

Reports on experiments relating to long term projects

Proposers awarded beam time for a long term project are required to submit an interim report at the end of each year, irrespective of the number of shifts of beam time they have used.

Published papers

All users must give proper credit to ESRF staff members and proper mention to ESRF facilities which were essential for the results described in any ensuing publication. Further, they are obliged to send to the Joint ESRF/ ILL library the complete reference and the abstract of all papers appearing in print, and resulting from the use of the ESRF.

Should you wish to make more general comments on the experiment, please note them on the User Evaluation Form, and send both the Report and the Evaluation Form to the User Office.

Deadlines for submission of Experimental Reports

- 1st March for experiments carried out up until June of the previous year;
- 1st September for experiments carried out up until January of the same year.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report, in English.
- include the reference number of the proposal to which the report refers.
- make sure that the text, tables and figures fit into the space available.
- if your work is published or is in press, you may prefer to paste in the abstract, and add full reference details. If the abstract is in a language other than English, please include an English translation.



	Experiment title: Structure vs performance	Experiment number: ME161
Beamline: ID11	Date of experiment: from: 26 th Sept 2001 to: 29 th Sept 2001	Date of report: Sept 1 st 2002
Shifts:	Local contact(s): Dr Ann Terry	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Tosca Corstjens (*) Sanjay Rastogi (*)		

Report:

The aim of the present research is to obtain blending between a polymer and a (polymerized) solvent on the molecular level. Because of its rigid rod structure, poly(γ -benzyl-L-glutamate) (PBLG) is chosen as the polymer. Benzylmethacrylate (BzMA) has been chosen as the solvent for two reasons; First of all the structure of the solvent is very similar to the structure of the side-chain of PBLG, favoring interactions between the polymer and solvent. Moreover, the solvent can be polymerized, because of the presence of a C=C bond. In cast films of PBLG and BzMA separate zones of the polymer and solvent are present. WAXS and Raman results show that upon heating the cast films homogenization occurs and solvent molecules intercalate between the helices of PBLG. At 150 °C a hexagonal packing is obtained. The dimensions of the obtained packing depend on the solvent concentration, which confirms that solvent molecules are present within the crystalline lattice. DSC experiments imply that the observed changes upon heating correspond to thermodynamic processes. On cooling the homogeneous samples, disordering of the hexagonal packing occurs. Polymerization of the homogeneous samples results in a disordering of

the hexagonal packing and in a contraction of the unit cell. The latter once more confirms intercalation of solvent molecules within the crystalline lattice. The applied principle of polymerization of a solvent in a molecular homogenous system can be favorable for many applications, for which morphology control at the molecular level is required.

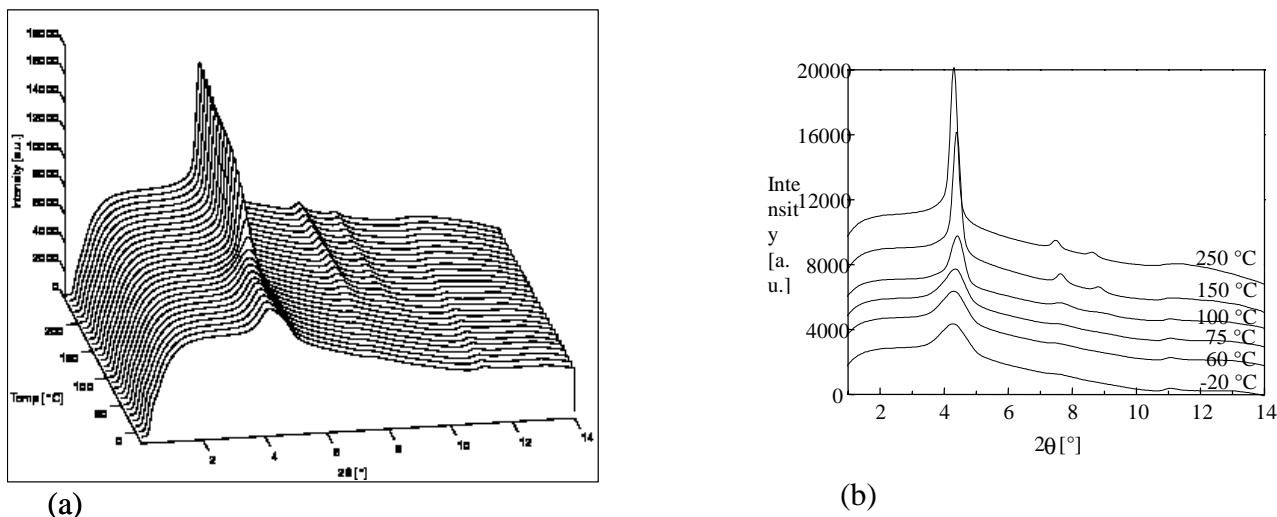


Figure 1: WAXS patterns ($\lambda = 1 \text{ \AA}$) upon heating a cast film of pure PBLG (a) 3-D representation, (b) 2-D representation.

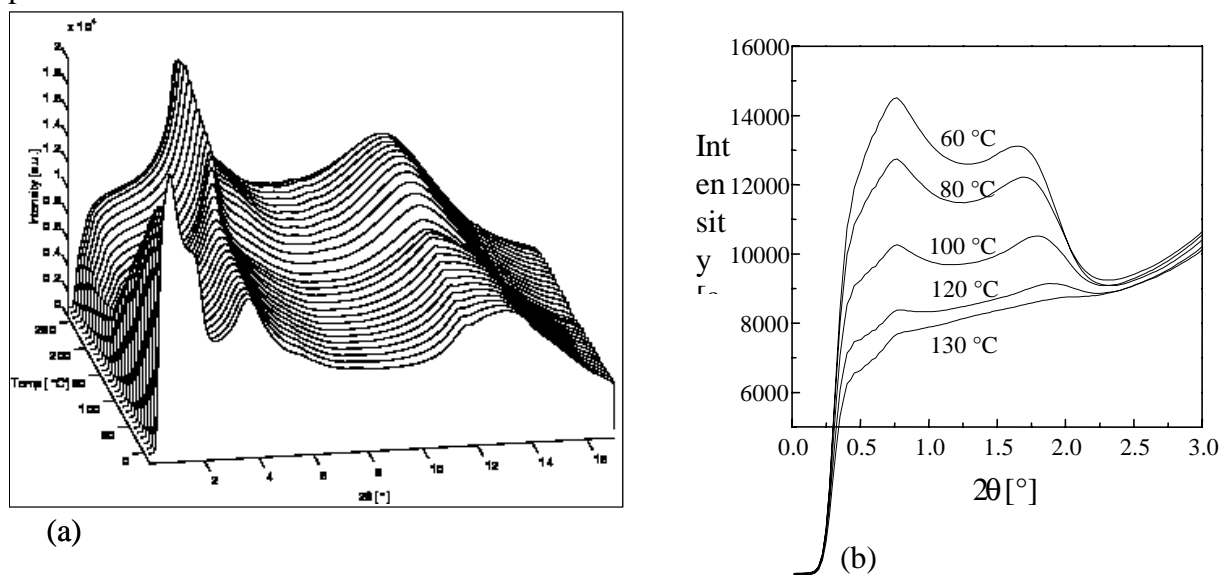
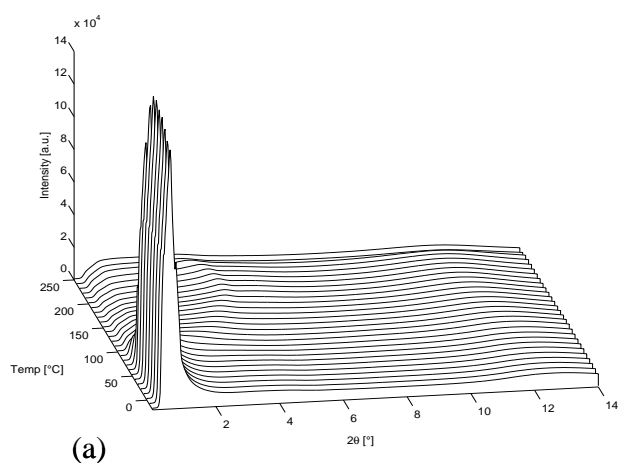
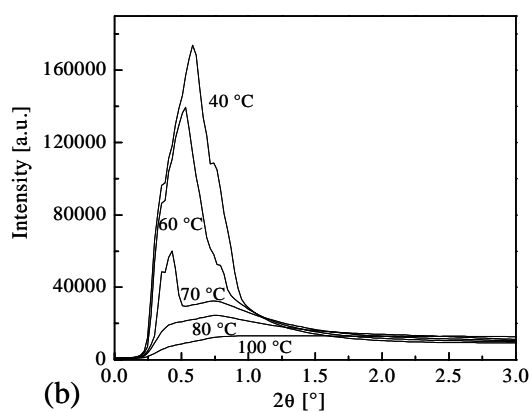


Figure 2: WAXS patterns ($\lambda = 1 \text{ \AA}$) upon heating a 60/40 wt% PBLG/BzMA sample (a) 3-D representation, (b) 2-D representation close to the beamstop.

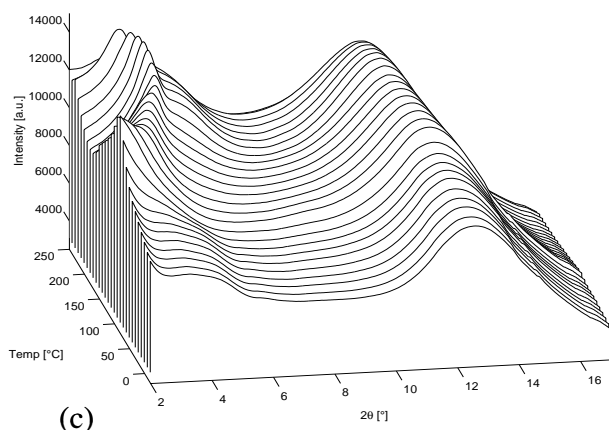
Figure 3



(a)



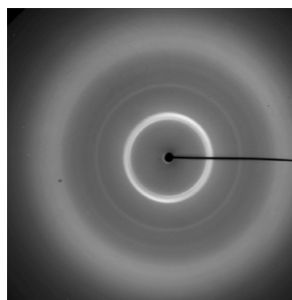
(b)



(c)

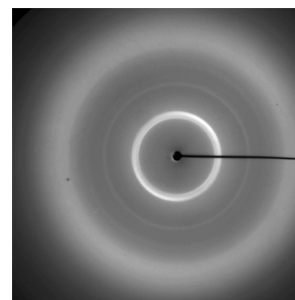
Figure 4

Before
UV irradiation

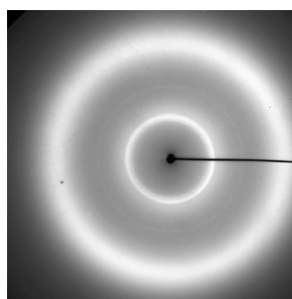


(a)

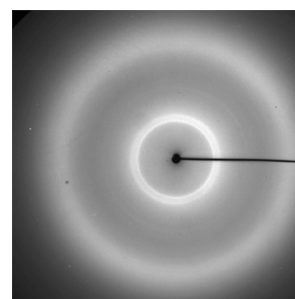
After
UV-irradiation



(b)



(c)



(d)

Figure 3: WAXS patterns ($\lambda = 1\text{\AA}$) upon heating a 20/80 wt% PBLG/BzMA sample (a) 3-D representation, (b) 2-D representation close to the beamstop, (c) 3-D representation at larger diffraction angles.

Figure 4: WAXS patterns upon polymerization of homogeneous PBLG/BzMA samples (a) and (b) correspond to 35/65 wt%, (c) and (d) to 20/80 wt%.

