EUROPEAN **S**YNCHROTRON **R**ADIATION **F**ACILITY

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ESRF

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.

ESRF	**Experiment title:** Morphology of transcrystalline layers in isotactic polypropylene based composites: static and dynamic …	**Experiment number**: ME 16
Beamline: ID 11	**Date of experiment**: from: 01/03/00 to: 03/03/00	**Date of report**: 25/03/01
Shifts: 6	**Local contact(s)**: Stephan Grigull	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Dr E. Wachtel*, Chemical Service Unit, Weizmann Institute of Science, Israel
Prof. H.D. Wagner, Dept of Materials and Interfaces, Weizmann Institute of Science, Israel
Prof. G. Marom and E. Assouline* Casali Institute of Applied Chemistry, Hebrew University of Jerusalem, Israel
Prof. J.-F. Gérard, Laboratoire des Materiaux Macromoleculaires, INSA Lyon, France

Report:

We investigated the morphology of transcrystalline layer in isotactic polypropylene based composites, using a 8 μm wide beam.
The results on monoclinic α transcrystallinity are reported in: Lamellar Twisting in α Isotactic Polypropylene Transcrystallinity Investigated by Synchrotron Microbeam X-Ray Diffraction, E. Assouline, E. Wachtel, S. Grigull, A. Lustiger, H.D. Wagner and G. Marom, POLYMER 2001, 42 (14): 6239-6245
Abstract:
We report for the first time details of the morphology of α isotactic polypropylene transcrystallinity induced by aramid fibers as determined by high spatial resolution X-ray diffraction. We suggest that the parent lamellae nucleate at the fiber surface with the crystallite c-axes parallel to the fiber axis, twist one quarter turn about the parent a*-axis within an approximate distance of 25 μm and then continue to grow without further twisting. The result is unexpected since lamellar twisting has never been observed in pure α spherulitic polypropylene.

Morphological changes under tensile stress were studied for α transcrystallinity for low strains. The sample was held in an Instron 25 kN servohydraulic testing machine available at ESRF. At any low strain, up tp 2%, the X-ray patterns remain unchanged at a given distance

from the fiber and were consistent with the above-reported results. It appears that the strain is generated predominantly within the amorphous phase whereas the crystal structure and the orientation of the lamellae remain unchanged. These results are interpreted in terms of anchoring of the transcrystalline layer to the fiber surface.
(The relevant article has been submitted)

γ orthorhombic polypropylene transcrystallinity was studied following the same procedure as for α transcrystallinity. It was found that the growth axis of the lamellae (the c-axis) is radial and that the ab face is randomly oriented on the fiber surface. This finding was supported by the absence of epitaxial relationship between the lattice of Kevlar aramid fiber and the lattice of γ iPP crystals.
(The relevant paper is in preparation)