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

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

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:**	**Experiment number**: MA266
Beamline: ID11	**Date of experiment**: from: 31 January 2007 to: 06 February 2007	**Date of report**:
Shifts: 15	**Local contact(s)**: Caroline CURFS (e-mail: curfs@esrf.fr)	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Dr.ir Sanjay Rastogi

Luigi Balzano*

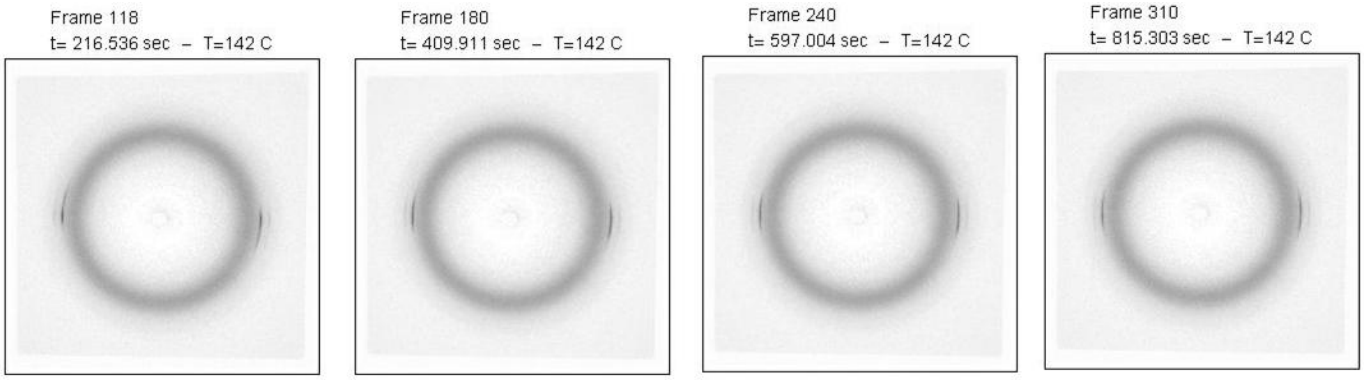
Nilesh Kukalyekar*

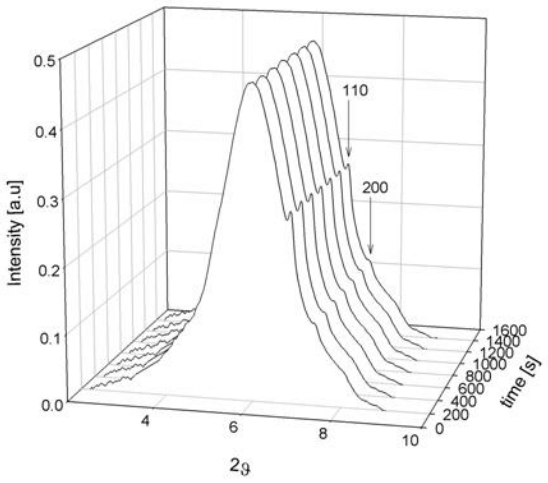
Report:

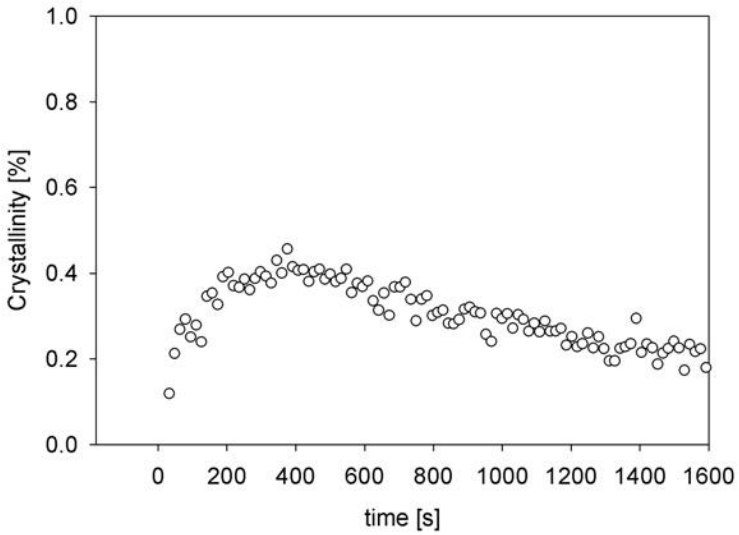
We make use of a specially synthesized linear high density polyethylene (HDPE) with a bimodal molecular weight distribution (MWD) to demonstrate that it is possible to generate a suspension of extend chain shish crystals *only*. Such a suspension can be generated at high temperatures, close to the equilibrium melting temperature of folded chain lamellae ($T_m^0 = 141.2°C$) and requires stretch of the longest chains of the MWD.

After the application of a shear flow of $120s^{-1}$ for 1s at 142°C, X-ray scattering suggests the presence of a large number of metastable needle-like precursors with limited or no crystallinity. Precursors that are too small dissolve with a mechanism based on the reptation of the high molar mass chains. Precursors that exceed a critical size crystallize forming extended chain shishes.

The figure below shows two dimensional WAXD patterns acquired in the beamtime allocated for the experiment MA266. The images were radially integrated and crystallinity was calculated after fitting the amorphous halo. The use of ID11 (high resolution WAXD) made possible maesuring crystallinity as low as 0.4 wt%.


Frame 118
t= 216.536 sec – T=142 C
Frame 180
t= 409.911 sec – T=142 C
Frame 240
t= 597.004 sec – T=142 C
Frame 310
t= 815.303 sec – T=142 C


Intensity [a.u]
0.0
0.1
0.2
0.3
0.4
0.5
110
200
4
6
8
10
2ϑ
0
200
400
600
800
1000
1200
1400
1600
time [s]


Crystallinity [%]
0.0
0.2
0.4
0.6
0.8
1.0
0
200
400
600
800
1000
1200
1400
1600
time [s]