

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 via the User Portal:

<https://www.esrf.fr/misapps/SMISWebClient/protected/welcome.do>

Reports supporting requests for additional beam time

Reports can 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: Comparing the crystallization and polymorphic behavior of monoglycerides in three different solvent systems

Experiment number:
26-02-682

Beamline: BM26B	Date of experiment: from: 07/03/2014 to: 10/03/2014	Date of report: 06/11/2014
Shifts: 9	Local contact(s): Guiseppe Portale	<i>Received at ESRF:</i>

Names and affiliations of applicants (* indicates experimentalists):

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Report:

This fundamental study aimed at comparing the crystallization and polymorphic behavior of monoglycerides in different solvent systems. The mesomorphic phase behavior of saturated monoglycerides in water has been studied for years and is well known. In contrast, the phase behavior of monoglycerides in a liquid oil is much less studied. As a lot of uncertainty remains, this study aimed at elucidating differences and similarities between the behavior of a saturated monoglyceride in a hydrophilic solvent (water) versus a hydrophobic solvent (liquid oil).

Both a pure monoglyceride, i.e. monopalmitin (>99% pure), and a commercial monoglyceride containing monopalmitin, i.e. Myverol, were added to a hydrophobic solvent (liquid oil) and a hydrophilic solvent (water). Using SAXS/WAXD measurements, the crystallographic structure in both solvents was determined. The data obtained using synchrotron radiation were coupled with DSC data acquired in our laboratory. Moreover, cryo-SEM images were recorded to illustrate the microstructural characteristics of the systems.

The results of this study will be published in Food Research International.

DOI: 10.1016/j.foodres.2014.10.027

Verstringe, S., Moens, K., De Clercq, N. and Dewettinck, K. Crystallization behavior of monoacylglycerols in a hydrophobic and a hydrophilic solvent. Food Research International.

Abstract of the paper:

Systems containing monoacylglycerols (MAGs) in both a hydrophobic solvent (liquid oil) and a hydrophilic solvent (water) can be used for the development of calorie-reduced food products. In this study, the crystallization behavior of MAGs in a hydrophobic solvent (rapeseed oil) and a hydrophilic solvent (water) was studied and compared. Pure monopalmitin (MP) and a commercial MAG containing MP were used for this study. Differential scanning calorimetry (DSC) data were coupled with X-ray diffraction (XRD) data obtained using synchrotron radiation and cryo-scanning electron microscopy (cryo-SEM) images were recorded to illustrate the microstructural characteristics of the systems. Although the polymorphic behavior of the MAGs was found to be the same in both solvents, the crystallization onset temperature was found to be concentration-dependent in the systems with liquid oil as solvent, in contrast to the systems with water as solvent. On the other hand, the temperature of the polymorphic transition from the α to the sub- α polymorph was constant in both systems. Differences in microstructure could be attributed to the inherent properties of the hydrophobic or hydrophilic solvent.