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:** Study of mechanical and degradation properties of co-continuous polymer calcium phosphate composites	**Experiment number**: **MA-508**
Beamline:	**Date of experiment**: from: 23/07/2008 to: 27/07/2008	**Date of report**: 23/02/2011
Shifts:	**Local contact(s):** Elodie Boller	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

LM Ehrenfried *: Dept. of Materials Science and Metallurgy, University of Cambridge, Cambridge, UK;

PR Laity *: Dept. of Materials Science and Metallurgy, University of Cambridge, Cambridge, UK

R.E. Cameron: Dept. of Materials Science and Metallurgy, University of Cambridge, Cambridge, UK

Report:

The beamtime was highly successful, allowing us to achieve all the intended objectives of our proposal. The results were very informative and have been published in the following paper:

THE DEGRADATION PROPERTIES OF CO-CONTINUOUS CALCIUM PHOSPHATE POLYESTER COMPOSITES: INSIGHTS WITH SYNCHROTRON MICRO-COMPUTER TOMOGRAPHY

Lisa M. Ehrenfried, David Farrar and Ruth E. Cameron,

Journal of the Royal Society: Interface (2010) 7, S663–S674
doi:10.1098/rsif.2010.0014.focus

Abstract:

This study investigates the in vitro degradation properties of composites consisting of a porous tricalcium phosphate (TCP) foam filled with degradable poly(DL-lactic acid) (PDLLA) via either in situ polymerization or infiltration. The motivation was to develop a material for bone repair that would be initially mechanically strong and would develop porosity during degradation of one of the components. A thorough analysis of the physical in vitro degradation properties has been conducted and reported by the same authors elsewhere.

Synchrotron microcomputer tomography analysis (conducted at ID19, ESRF, Grenoble, France) allowed detailed insights to be gained into the process of the composites' degradation, which was discovered to be strongly influenced by the manufacturing method. The polymer phase of in situ-polymerized TCP–PDLLA degraded as a bulk sample, with faster degradation in the centre of the sample as a whole. In contrast, the polymer phase of infiltrated TCP–PDLLA degraded as individual polymer spheres with faster degradation in the centre of each sphere.