



## 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.



	<b>Experiment title:</b> Nano-porosity assesment of calcium phosphate cements for bone tissue engineering	<b>Experiment number:</b> MA-3247
<b>Beamline:</b> ID16A-NI	<b>Date of experiment:</b> from: 16/11/2016 to: 18/11/2016	<b>Date of report:</b> 10/02/2017
<b>Shifts:</b> 6	<b>Local contact(s):</b> Julio Cesar da Silva	<i>Received at ESRF:</i>

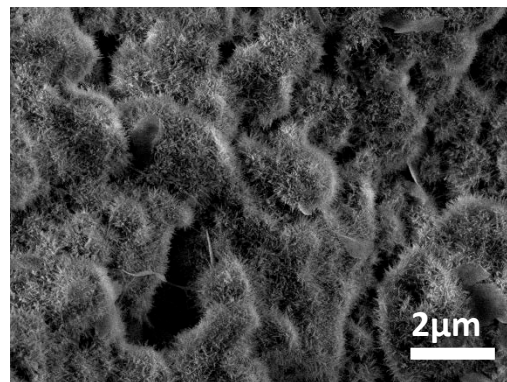
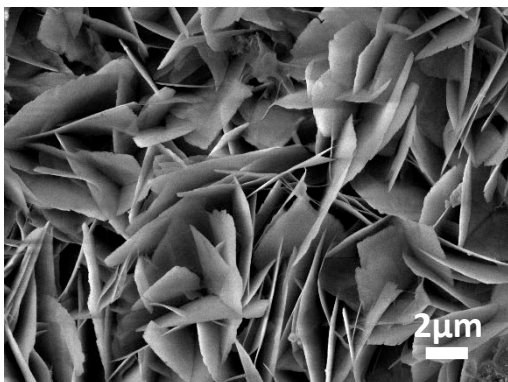
**Names and affiliations of applicants (\* indicates experimentalists):**

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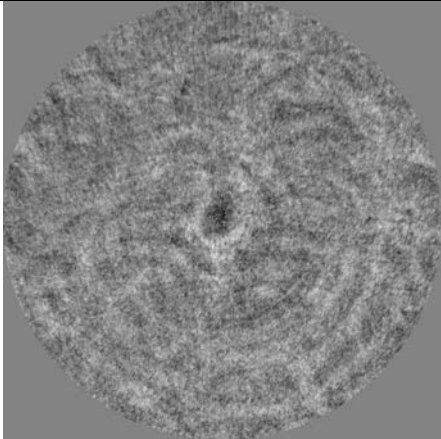
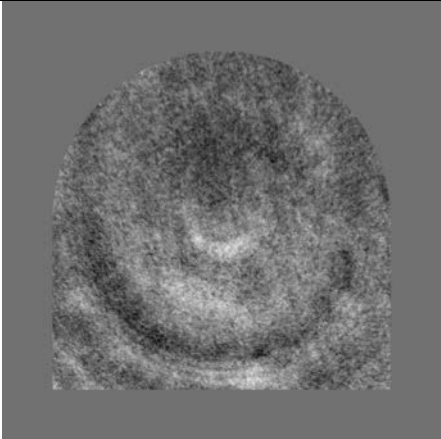
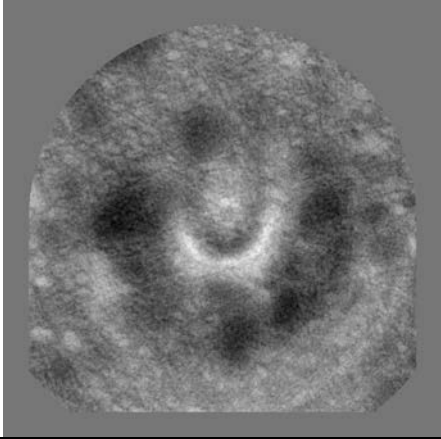
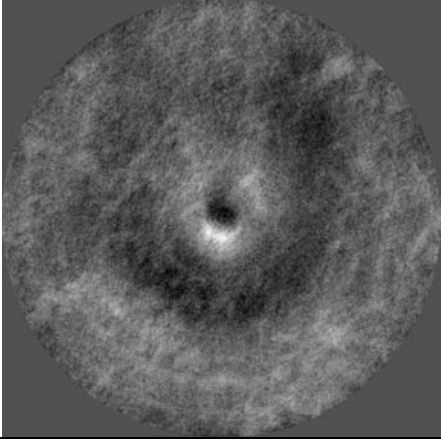
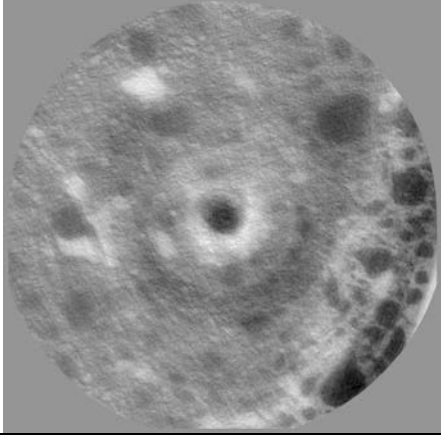
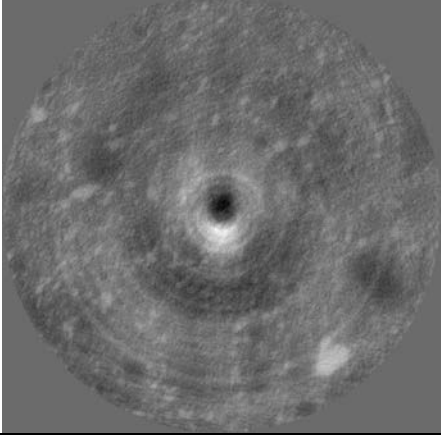
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**Report:**

The objective of our experiment was to use holotomography to determine the intrinsic porosity of calcium phosphate cements at the micro scale (pore size between 0.01 and 10  $\mu\text{m}$ ). For this purpose we prepared 200  $\mu\text{m}$  thick and 2 mm length sticks of calcium phosphate cement using coarse and fine powder (liquid to powder ratio = 0.35). The following SEM images show the micro structure of the material (using coarse powder at the left and using fine powder at the right):



We scanned two specimens, one of coarse powder and one of fine powder, using three different sets of parameters for each specimen in order to determine the configuration that allow us to capture the porosity. The scanning parameters and the corresponding image reconstruction are shown in the following table:

	Coarse powder	Fine powder
Setting 1: <ul style="list-style-type: none"> <li>• X-ray energy: 17 keV</li> <li>• Scanned volume: 25 <math>\mu\text{m}</math> side length</li> <li>• Nominal isotropic voxel size: 25 nm</li> <li>• Number of projections: 2000</li> </ul>		
Setting 2: <ul style="list-style-type: none"> <li>• X-ray energy: 17 keV</li> <li>• Scanned volume: 50 <math>\mu\text{m}</math> side length</li> <li>• Nominal isotropic voxel size: 50 nm</li> <li>• Number of projections: 3000</li> </ul>		
Setting 3: <ul style="list-style-type: none"> <li>• X-ray energy: 17 keV</li> <li>• Scanned volume: 100 <math>\mu\text{m}</math> side length</li> <li>• Nominal isotropic voxel size: 100 nm</li> <li>• Number of projections: 3000</li> </ul>		

The images obtained had artifacts (rings and shadows) that make not possible to discretize between pores and material. In order to improve the quality of the images, thicker specimens of cylindrical section must be fabricated. However, we do not have the technology required to do it. The problem of the ring artifacts have to be solved.