



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>

Deadlines for submission of Experimental Reports

Experimental reports must be submitted within the period of 3 months after the end of the experiment.

Experiment Report supporting a new proposal (“relevant report”)

If you are submitting a proposal for a new project, or to continue a project for which you have previously been allocated beam time, you must submit a report on each of your previous measurement(s):

- even on those carried out close to the proposal submission deadline (it can be a “*preliminary report*”),
- even for experiments whose scientific area is different from the scientific area of the new proposal,
- carried out on CRG beamlines.

You must then register the report(s) as “relevant report(s)” in the new application form for beam time.

Deadlines for submitting a report supporting a new proposal

- 1st March Proposal Round - **5th March**
- 10th September Proposal Round - **13th September**

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.

Instructions for preparing your Report

- fill in a separate form for each project or series of measurements.
- type your report in English.
- include the experiment number 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:**

Metallome diagnosis of one of the oldest bona fide microbial cell fossils.

Experiment**number:**

ES231

Beamline:

ID16B

Date of experiment:

from: 27 Sep 2014

to: 30 Sep 2014

Date of report:

24/2/21

Shifts:

6

Local contact(s):

Julie Villanova

*Received at ESRF:***Names and affiliations of applicants** (* indicates experimentalists):Laurence Lemelle^a, Alexandre Simionovici^b, Tom Schoonjans^c, Rémi Tucoulou^d, Emanuele Enrico^e, Murielle Salomé^d, Axel Hofmann^f, Barbara Cavalazzi^{f,g}**Affiliations**^a Univ Lyon, ENS de Lyon, Univ Claude Bernard, CNRS, LGL-TPE, 46 allée d'Italie, F-69342 Lyon, France.^b ISTERRE Univ Grenoble Alpes, CNRS CS 40700, 38058 Grenoble Cedex 9, France.^c Diamond Light Source Ltd, Diamond House, Harwell Science and Innovation Campus, Didcot, Oxfordshire OX11 0DE, United Kingdom.^d ESRF-The European Synchrotron Research Facility, ID21 / ID16B beamlines 71 avenue des Martyrs, CS40220, 38043 Grenoble Cedex 9, France.^e INRIM, Istituto Nazionale di Ricerca Metrologica, Strada delle Cacce 91, I-10135 Torino, Italy^f University of Johannesburg, Department of Geology, APK campus, PO Box 524, Auckland Park 2006, Johannesburg, South Africa^g Università di Bologna, Dipartimento di Scienze Biologiche, Geologiche e Ambientali Via Zamboni 67, I-40126, Bologna, Italy**Report: This experimental work was published in**

L. Lemelle, A. Simionovici, T. Schoonjans, R. Tucoulou, E. Enrico, M. Salomé, A. Hofmann, B., Cavalazzi

Analytical requirements for quantitative X-ray fluorescence nano-imaging of metal traces in solid samples.

Trends in Analytical Chemistry, 91, 104-111, 2017.

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Analytical requirements for quantitative X-ray fluorescence nano-imaging of metal traces in solid samples.

Quantitative nano-imaging of metal traces in a solid is a recent capability arising from the construction of hard X-ray nanoprobe dedicated to X-ray Fluorescence (XRF) imaging on upgraded third generation synchrotrons. Micrometer sample preparation valid for trace analysis is a fundamental part of the required developments to capitalize on the reduced Minimum Detection Limits. Practical guidelines lead us to propose a customized use of Focused Ion Beams (FIB) backed by state of the art Monte Carlo XRF modeling to initiate preparations of new samples and certified standards. The usefulness of these developments is illustrated by the first detection of Ni traces ($4.57E+07 \pm 3.2E+06$ (7.1 %) at μm^{-3}) in a 3.35 Ga old microstructure of putative microbial origin from Barberton (South Africa). A list of feasibility checks provides a way of getting below 5 ppm MDLs for acquisition-times of 10 seconds with an analytical precision better than 10%.

