



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: Searching for primordial metabolisms on >3.3 Gy microfossils from Barberton	Experiment number: ES937
Beamline: ID16B	Date of experiment: from: 11 Nov 2020 to: 15 Nov 2020	Date of report: 13/09/21 <i>Received at ESRF:</i>
Shifts: 6	Local contact(s): Rémi Tucoulou	
Names and affiliations of applicants (* indicates experimentalists): Lemelle, L. ; Simionovici, A. ; Tucoulou, R. ; Hofmann, A. *Univ Lyon, ENS de Lyon, Univ Claude Bernard, CNRS, LGL-TPE, 46 allée d'Italie, F-69342 Lyon, France, Laurence.lemelle@ens-lyon.fr *ISTerre, Univ. Grenoble Alpes, CNRS, CS 40700, 38058 Grenoble Cedex 9, France, <input type="checkbox"/> Institut Universitaire de France (IUF), alexandre.simionovici@univ-grenoble-alpes.fr Department of Geology, University of Johannesburg, Johannesburg, South Africa. ahofmann@uj.ac.za		

Report:

This XRF nano-imaging experimental work was successfully carried out in full remote mode. High resolution nano-XRF maps were recorded on 7 FIB cuts newly prepared for this session. Among them, 3 were microfossils from Kromberg outcrop, and the maps provided results which validate the fossils investigated by nano-XRF on ID16B that was recently published in:

Cellular remains in a ~3.42-billion-year-old seafloor hydrothermal environment, B. Cavalazzi, [L. Lemelle](#), [A. Simionovici](#), S. L. Cady, M. J. Russell, E. Bailo, R. Canteri, E. Enrico, A. Manceau, A. Maris, M. Salomé, E. Thomassot, N. Bouden, R. Tucoulou, [A. Hofmann](#), *Sci. Adv.* 7, 29, 2021.

<https://www.science.org/doi/10.1126/sciadv.abf3963>

ESRF News: <https://www.esrf.fr/home/news/general/content-news/general/where-did-life-originate-on-earth-ancient-hot-springs-under-the-seafloor-could-have-the-answer.html>

Subsurface habitats on Earth host an extensive extant biosphere and likely provided one of Earth's earliest microbial habitats. Although the site of life's emergence continues to be debated, evidence of early life provides insights into its early evolution and metabolic affinity. Here, we present the discovery of exceptionally well-preserved, 3.42-billion-year-old putative filamentous microfossils that inhabited a paleo-subseafloor hydrothermal vein system of the Barberton greenstone belt in South Africa. The filaments colonized the walls of conduits created by low-temperature hydrothermal fluid. Combined with their morphological and chemical characteristics as investigated over a range of scales, they can be considered the oldest methanogens and/or methanotrophs that thrived in an ultramafic volcanic substrate.

The nano-XRF mapping of the four other FIB samples went also successfully. The Ni content detected in the Archaean FIB sample on the purported microfossils appears, however 10x less abundant than in the Kromberg samples.