



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: What is the oxidation state of Cr in the UO ₂ matrix of Cr doped UO ₂ Nuclear Fuels	Experiment number:
Beamline:	Date of experiment: from: 10/11/2022 to: 14/2/2022	Date of report:
Shifts:	Local contact(s): Elena Bazarkina (email: elena.bazarkina@esrf.fr) Kristina Kvashnina (email: kristina.kvashnina@esrf.fr)	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Dr Gabriel Murphy <i>Forschungszentrum Jülich GmbH, 52428, Jülich, Germany</i> Dr Nina Huittinen <i>Helmholtz-Zentrum Dresden-Rossendorf, 01328, Dresden, Germany</i>		

Report:

Experiment outline:

Cr doped UO₂ is an accident tolerant nuclear fuel used for energy production, however the redox and mechanism for incorporation in UO₂ remains debatable. This work sort to rectify this by using high energy resolution fluorescence detection X-ray absorption spectroscopy (HERFD-XAS and EXAFS) to measure the Cr K edge in Cr doped UO₂ single crystals to determine for the first time the oxidation state of Cr in Cr doped UO₂ nuclear fuels.

Experimental outcome

The experiment was successfully able to measure the Cr redox state in addition to others within the UO₂ bulk material and single crystals. This investigation is the first to unequivocally resolve the redox state of Cr in Cr doped UO₂ nuclear fuels. The results of this investigation are to be published in high impact journal.

A second follow up experiment is planned to measure Co and Mn UO₂ samples which were intended in the proposal but difficulties that were unexpected were encountered and the work could not be completed.

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