

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.



	Experiment title: XAS measurements in thin films made with multiferroic rare earth chromites using pulsed laser deposition.	Experiment number: HE-3492
Beamline: BM25A	Date of experiment: from: 28-January-2011 to: 31-January-2011	Date of report: 01-Sept.-2011
Shifts: 12	Local contact(s): Jon Ander Gallastegui	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Jon Ander Gallastegui Mañaricua * Juan Rubio-Zuazo German Castro SpLine, Spanish CRG beamline at the European Synchrotron Radiation Facility, 6 rue Jules Horowitz B.P.: 38043-Grenoble Cedex (France), and Instituto de Ciencia de Materiales de Madrid, Consejo Superior de Investigaciones Científicas, calle Sor Juana Inés de la Cruz, 3, 28049-Madrid (Spain).		

Report:

X-ray absorption spectroscopy (XAS) measurements have been carried out in the Cr K-edge for the following compounds from the family of the rare earth chromites: $YCrO_3$, $HoCrO_3$, $YbCrO_3$ and $LuCrO_3$ (fig 1). Also XAS experiments in the Y K edge on the compound $YCrO_3$ (fig 2), and in the L_{III} edge in Ho and Yb atoms (in the compounds $HoCrO_3$ and $YbCrO_3$ respectively) have been performed. All this experiments have been carried out in the transmission mode in powder samples.

Ab-initio simulations of those X-ray absorption near edge structure (XANES) spectra are being done in order to determine the electronic structure of the compounds, and relate it with the magnetic properties. One example of such a simulation is depicted in the fig 3. This simulation have been performed with the FDMNES simulation package.

To simulate accurately the XANES spectra, a precise knowledge of the position of the atoms in the crystallographic structure is required for the input of the simulation. As the detailed structure of several of the the compounds studied in this experiment haven't been determined yet, also powder diffraction experiments have been performed. In figure 4 is depicted one example of such powder diffractograms, concretely of $LuCrO_3$. Both the diffractogram and the fit obtained by Rietveld refinement are shown.

Finally one word to explain the reason for not measuring thin film samples in this experiment. For performing good measurements in thin films a good fluorescence detector (as the one available in the BM25A beamline) is needed. However, in the date of this experiment the fluorescence detector wasn't working due to technical problems, so we measured powder samples in transmission mode. XAS measurements in those compounds (in powder or thin film form) hadn't been published yet, and so this XAS measurements have their own interest.

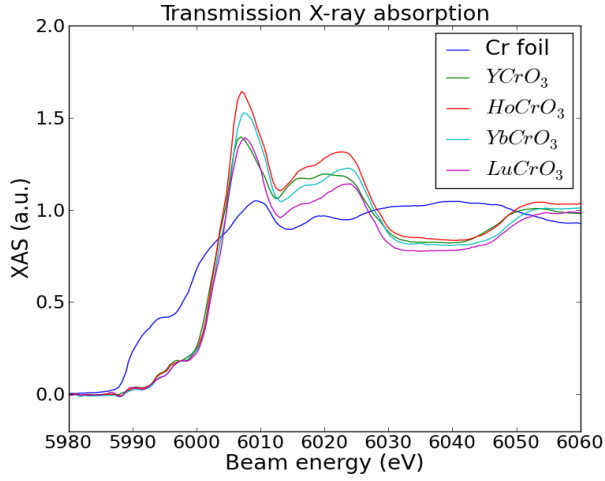


Figure 1: XANES spectra of a Cr foil (as a standard), YCrO₃, HoCrO₃, YbCrO₃ and LuCrO₃ in Cr K edge.

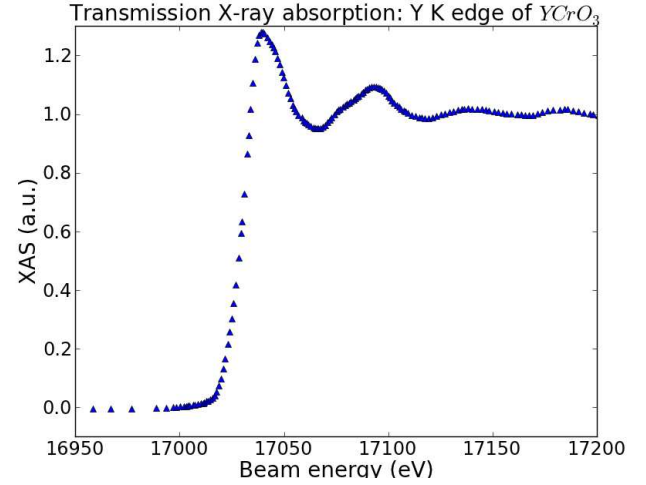


Figure 2: XANES spectra of YcrO₃ in the Y K edge.

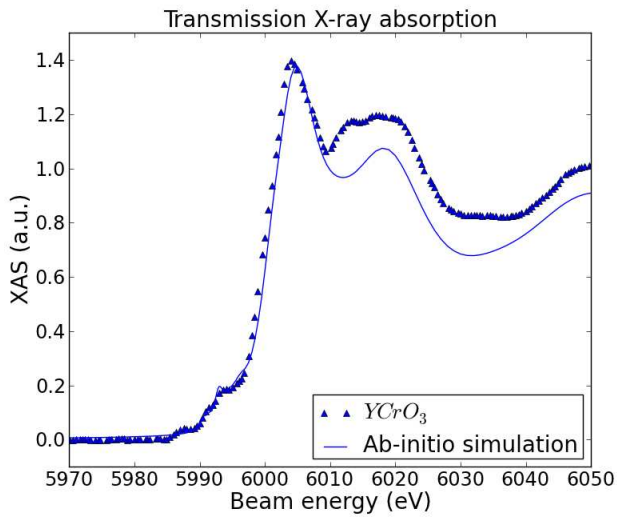


Figure 3: XANES spectrum of YCrO₃ and its simulation

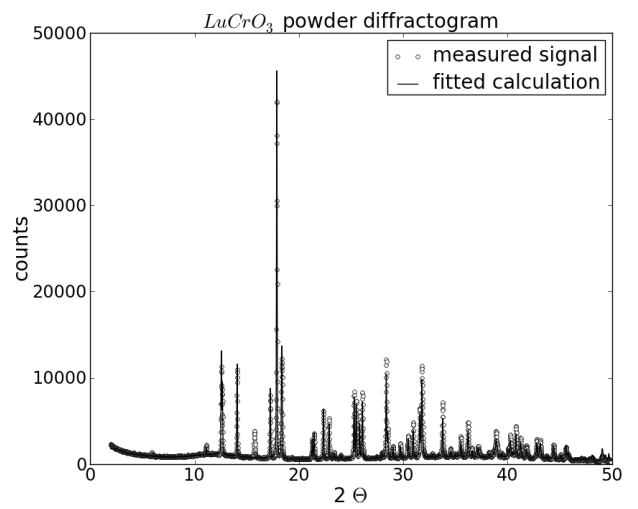


Figure 4: diffractogram of LuCrO₃.