

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.

**Experiment title:**Real-time examination of the effects of H₂ and/or CO concentration on the nature and spatial distribution of metallic Co phases used in Fischer Tropsch synthesis**Experiment number:****CH-4312**

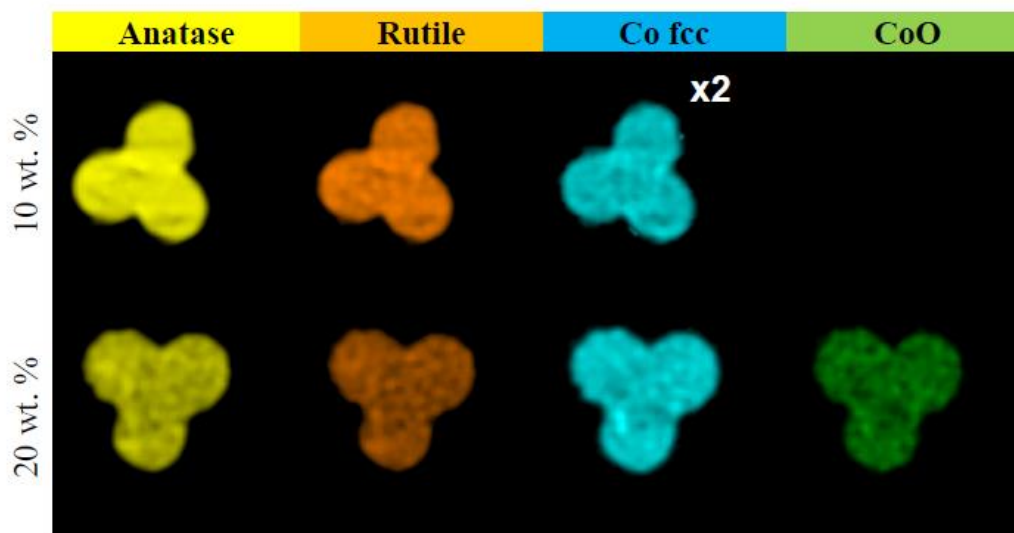
Beamline: ID11	Date of experiment: from: 28/10/2015 to: 03/11/2015	Date of report: 24/3/2017
Shifts: 15	Local contact(s): Jon Wright	<i>Received at ESRF:</i>

Names and affiliations of applicants (* indicates experimentalists):

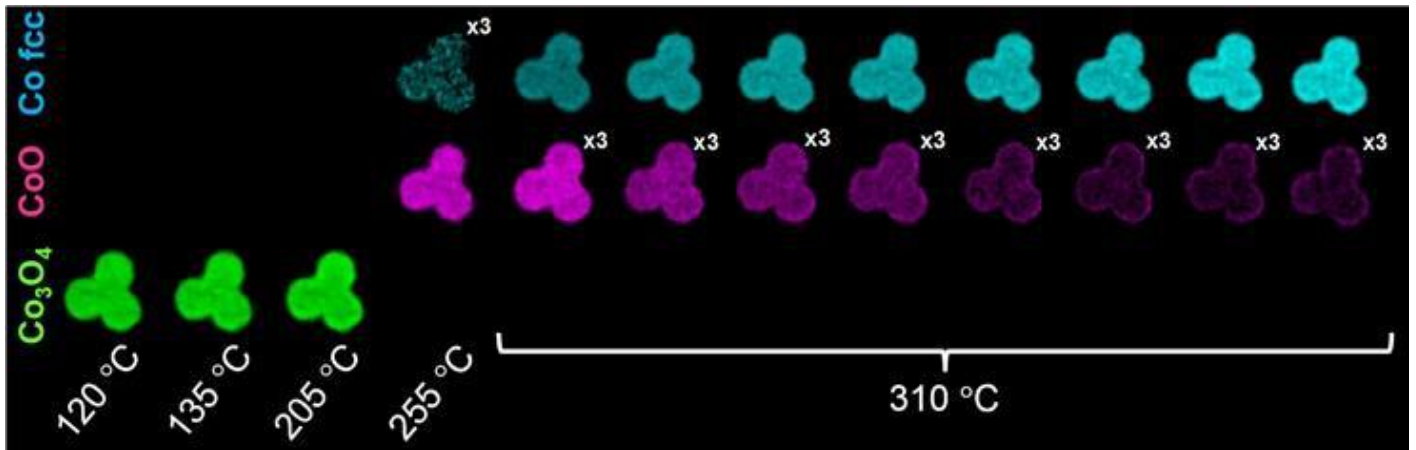
Andrew Beale*, Zaama Latif*, Pierre Senecal*, Antony Vamakeros* (UCL), Simon Jacques*, Dorota Matras* (UM)

Report:

Two groups of Co/TiO₂ catalysts have been characterised with XRD-CT; Co/TiO₂ catalysts containing different percentage weights of cobalt (10 % wt and 20 % wt). The 1.5 mm trilobe extrudates were characterized in a 2 mm Ø cell after using a similar reduction protocol as described in the proposal. The resultant XRD-CT images recorded can be seen below in the figure.



As previously observed for Co/Al₂O₃ sample, through the reduction on the Co/TiO₂ catalysts, the three cobalt phases Co₃O₄, CoO and Co fcc are observable. The second figure on page 2 shows the reconstructed images of those cobalt phases during reduction procedure of the 10%Co/TiO₂ catalyst.



At the beginning of the reduction process of 10%Co/TiO₂ (120 - 200 °C), the catalyst presents only one cobalt phase, Co₃O₄ is present homogeneously throughout the catalyst. Around 250 °C, we observe the complete reduction of Co₃O₄ and the formation of CoO. A very small Bragg reflection attributable to the metallic Co fcc phase is also present at this temperature with this phase becoming the most significant phase present around 310 °C. The Co fcc intensity continues to increase reaching a plateau after 5 h at this temperature. It is anticipated that a paper on this work will be submitted in very due course.