

## 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:**

Effects of Co distribution and promoters such as Mn and Re on the reduction behaviour of single particle Co-based Fischer-Tropsch Synthesis Catalysts

**Experiment****number:****CH-4454**

<b>Beamline:</b> ID31	<b>Date of experiment:</b> from: 17/02/2016 to: 23/02/2016	<b>Date of report:</b> 24/3/2017
<b>Shifts:</b> 18	<b>Local contact(s):</b> Agnieszka Poulain	<i>Received at ESRF:</i>

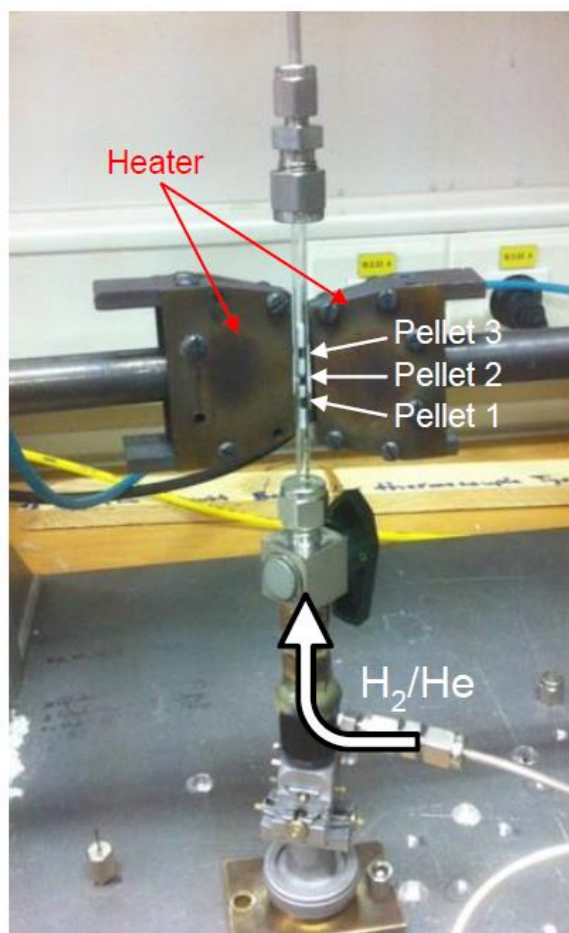
**Names and affiliations of applicants** (\* indicates experimentalists):

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

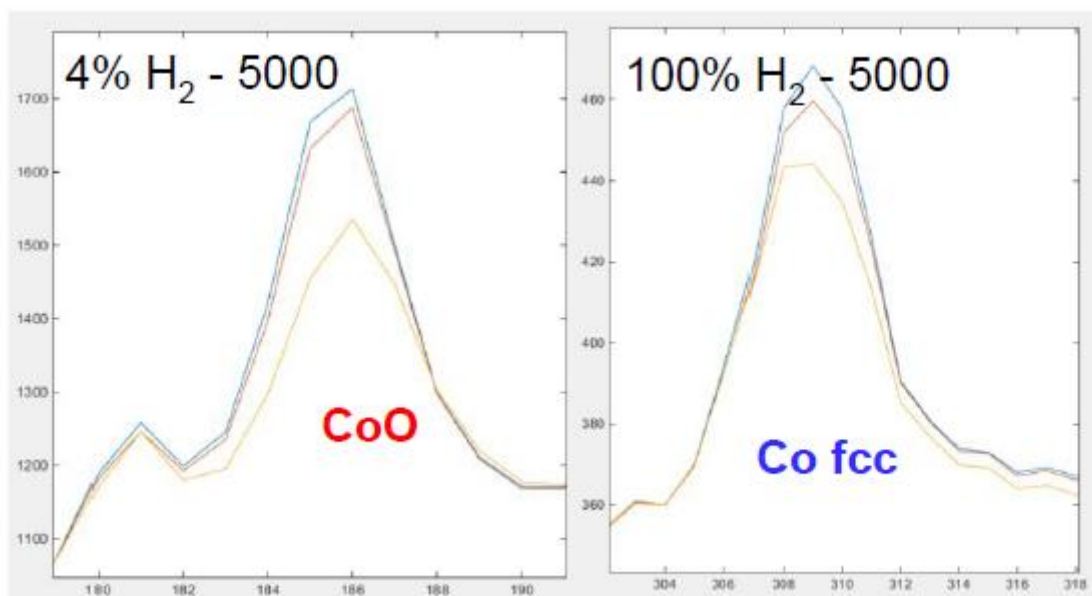
**Report:**

A series of reductions, presented in the table below, were carried out on **10%Co/(Mn)TiO<sub>2</sub>** samples on the ID31 beamline at the ESRF. For each experiment, three catalyst trilobes were mounted on top of each other in a capillary (see photography on page 2).

<b>Exp.#</b>	<b>Gas (H<sub>2</sub>)</b>	<b>GHSV (h<sup>-1</sup>)</b>	<b>Temperature programme</b>
<b>1</b>	100%	5000	RT to 300°C at 1°C/min. Hold at 300°C for 4h
<b>2</b>	25%	5000	RT to 300°C at 1°C/min. Hold at 300°C for 4h
<b>3</b>	25%	2000	RT to 300°C at 1°C/min. Hold at 300°C for 4h
<b>4</b>	4%	2000	RT to 300°C at 1°C/min. Hold at 300°C for 4h
<b>5</b>	4%	5000	RT to 300°C at 1°C/min. Hold at 300°C for 4h



The data shows a difference in reduction over the three extrudates placed in a single capillary. Even in such small amounts of catalysts, the Figure below shows this difference on the experiment at 4 % and 100 % of H<sub>2</sub> at the space velocity of 5000 h<sup>-1</sup>. The intensity of the most reduced species decrease with the increasing amount of extrudates. This difference of reduction could be explain by a gradual increase of H<sub>2</sub>O concentration along the reactor during the reduction.



**Figure:** Diffractograms of Co/TiO<sub>2</sub> after the experiment at 4% and 100% of H<sub>2</sub> at the space velocity of 5000 h<sup>-1</sup> of three extrudates of the catalyst 10%Co/(Mn)TiO<sub>2</sub> (C1313678); blue: top pellet, red: middle pellet, yellow: bottom pellet.

The work is currently being prepared for publication.