

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: Velocity measurement in an electromagneticcally levitated droplet	Experiment number: MA-276
Beamline:	Date of experiment: from: 14-11-07 to: 15-11-07	Date of report: 01-02-08
Shifts:	Local contact(s): Dr Marco DI MICHEL	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Jacqueline ETAY – CNRS-SIMAP-EPM (France) Ivan EGRY – DLR-Koln (Germany) Marco DI MICHIEL – ESRF (France)		

Report:

Aims of the experiment and scientific background

Electrical conducting materials can be molten, held and stirred without material contact by using induction. These three effects are present in electromagnetic levitation. This processes has two principal applications : processing of materials with very high purity, such as metallic alloys or oxides, and measurement of thermophysical properties of overheated metallic alloys. In both cases, the validation of the numerical models runs up against the absence of experimental data relatives to the velocity measurements inside the levitated droplet. Until now these measurements were not possible because the medium is at a high temperature, preventing any material contact, and it is not transparent at the natural light preventing image velocimetry.

By using a technique of imagery by x-rays we want to measure velocities in an aluminum droplet.

Pre-work

In order to adpat the exprimental facily to the ESRF environment a preliminary visit was done on the 2d of April 2007. Following this visit, the exprimentalist were aware of

- the specificities of the beamline
- the specificities of the available power
- the specificities of the water supply
- the geometry of the room and the respective position of the beamline

The applicants modified the facility :

- the support of the facility has been adapted
- a specific power supply has been developed by a SEM (IP-partner)

- the power supply need an adpatation of the water supply
- a specific remote control of the power supply has been developed
- the size of the sample has been reduced

Experiments have been performed on 14 and 15th of November 2007.

First day has been mainly devoted to the arrangment of the facility (water connections, power supply connections, remote command of the power supply, gaz connections,...). A first levitation trial was performed allowoing to fix the X-ray beam. Solving the measurements acquisition was more difficult, but achieved.

Second day : 5 samples were molten in argon gaz and movies under X-Rays were registred.

After : All movies have been recover and are in the process of analysis.

Possible improvements have been stated. They consist on

- modification of the chosen alloy in order ot reduce oxidation problems
- modification of the making of sample (ingot shape)
- increase the power supply avalable and its remote control
- change the particules in order to improve the wetting of those particules by metallic alloy.

GENERAL REMARK ON ESRF ORGANISATION

Every think has been finely arranged and ESRF staff was very efficient to help. Nevertheless, the name of the main applicant of the proposal (Jacqueline Etay) was not on Form A. Therefore, she had to wait an half hour in order to solve this problem. This was performed smoothly.