

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: Preliminary evaluation of small angle elastic scattering and amorphous character of metallic glass-forming alloys	Experiment number: 16-01-702
Beamline: BM16	Date of experiment: from: 6 March 2008 to: 7 March 2008	Date of report:
Shifts: 3	Local contact(s): A. Labrador	<i>Received at ESRF:</i>
Names and affiliations of applicants (* indicates experimentalists): Dr. Eloi PINEDA * / Dpt. Física i Enginyeria Nuclear, Univ. Politècnica de Catalunya, Spain Dr. Pere BRUNA * / Dpt. Física Aplicada, Univ. Politècnica de Catalunya, Spain Dr. Daniel CRESPO * / Dpt. Física Aplicada, Univ. Politècnica de Catalunya, Spain Dr. Trinitat PRADELL * / Dpt. Física i Enginyeria Nuclear, Univ. Politècnica de Catalunya, Spain Dr. Jorge SERRANO * / Institució Catalana de Recerca i Estudis Avançats, Catalonia, Spain		

Report:

We realized X-ray scattering measurements of several metallic glass compositions in order to evaluate the amorphicity of the sample and the elastic response at relatively small scattering angles. The results allowed us to select the most appropriate samples for IXS measurements which were realized in ID28 beamline at ESRF from 13th to 20th May 2008 (experiment HD-248).

The samples were prepared by ultra-rapid quenching with a Melt-spinner apparatus in our facilities. Two separate dates of measurements were scheduled, 3 shifts on the 6th of March and 3 shifts on the 3rd of May, this would allow us to change the production method or prepare new different compositions in case the samples examined during the first 3 shifts were seen to have undesirable features.

A total of 15 samples were examined during the 6 shifts of the project. The compositions of the alloys analyzed during the experiment are

First 3 shifts (march 2008):

1. Pd₁₆Ni₆₄P₂₀
2. Pd₇₇Si_{16.5}Cu_{6.5}
3. Pd₄₀Ni₄₀P₂₀
4. Fe_{71.2-x}C_{7.0}Si_{3.3}B_{5.5}P_{8.7}Cr_{2.3}Al_{2.0}Mo_x (x=0%)
5. Fe_{71.2-x}C_{7.0}Si_{3.3}B_{5.5}P_{8.7}Cr_{2.3}Al_{2.0}Mo_x (x=4.5%)
6. Fe_{71.2-x}C_{7.0}Si_{3.3}B_{5.5}P_{8.7}Cr_{2.3}Al_{2.0}Mo_x (x=6.5%)
7. Cu₅₀Zr₅₀

Second 3 shifts (may 2008):

1. Ce₇₀Al₁₀Ni₁₀Cu₁₀
2. La₅₅Al₂₅Co₂₀
3. Pr₆₀Al₁₀Ni₁₀Cu₂₀
4. Zr₆₇Ni₃₃
5. Pd₁₆Ni₆₄P₂₀ (sample b)
6. Pd₄₀Ni₄₀P₂₀ (sample b)
7. Pd₇₇Si_{16.5}Cu_{6.5} (sample b)
8. Pd_{77.5}Si_{16.5}Cu₆

Different spots of each sample were analyzed in order to ensure complete amorphicity and homogeneity. The X-ray scattering was performed at different distances and the beam-stop position changed during the measurements. This allowed us to obtain the diffracted intensity at different intervals of angle of diffraction. The experiment was realized with an energy of 16 KeV, which is close to the energy used subsequently in the IXS experiment. The diffraction spectra were collected using a 2D detector with transmission geometry.

The measurements allowed us to chose two compositions for the IXS experiments, which proved to be good candidates as the IXS measurements were developed satisfactorily. Fig 1 shows the scattered intensity collected for the two alloys posteriorly used in the inelastic X-ray scattering measurements.

Some results have already been presented in an international conference:

ISMANAM 2008. 15th International Symposium on Metastable and Nano Materials, Buenos Aires, Argentina, 6-10 july 2008.

13th International Conference on Rapidly Quenched & Metastable Materials RQ13, Dresden, Germany, 24-29 august 2008

One paper containing partial results has been submitted:

“Mechanical properties of BMG determined by Synchrotron Radiation: a microscopic picture”

Jorge Serrano, Eloi Pineda, Pere Bruna, Ana Labrador, Mathieu le Tacon, Michael Krisch, Giulio Monaco, Daniel Crespo

Journal of Non-Crystalline Solids (submitted)

Complete results of the BM16 and ID28 experiment are still being analyzed, and a manuscript is in preparation.

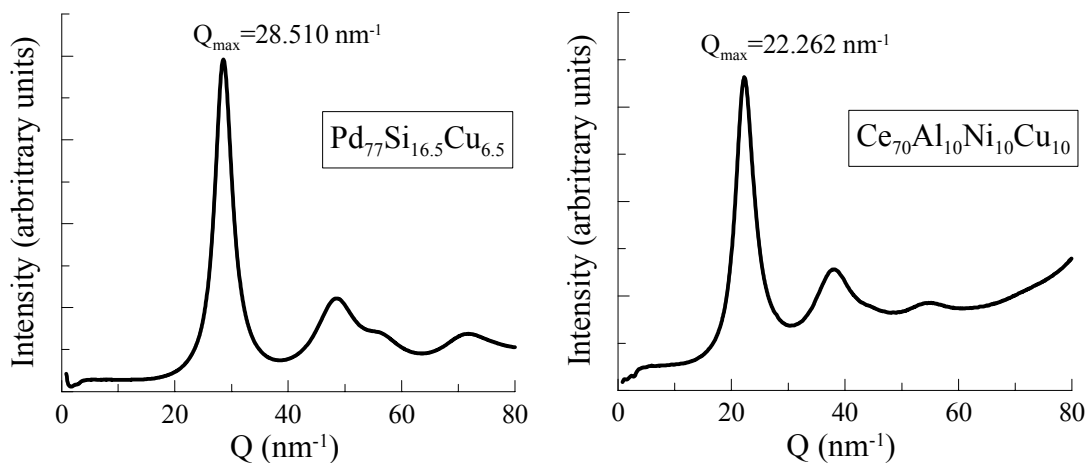


Figure 1