EUROPEAN SYNCHROTRON RADIATION FACILITY

INSTALLATION EUROPEENNE DE RAYONNEMENT SYNCHROTRON

ESRF

Report Form

Experiment

ESRF	**Experiment title:** **Understanding Earth's degassing: behavior of I and Xe in silicate melts at depth**	**Experiment number**: HS4726
Beamline: ID09A	**Date of experiment**: from: 13/02/2012 to: 19/02/2012	**Date of report**: Feb. 11, 2016
Shifts: 18	**Local contact(s)**: Lucille Bezacier	*Received at ESRF:*

Names and affiliations of applicants (* indicates experimentalists):

Clémence Leroy, IMPMC, Université Pierre and Marie Curie, Paris, France

Hélène Bureau, idem

Chrystèle Sanloup, CSEC, University of Edinburgh, UK

Burkhard Schmidt. Goettingen University, Germany

Report:

The purpose of this proposal was to identify the structural environment and speciation of I and Xe in magmas, i.e. what are the first Xe-X and I-X distances and corresponding coordination numbers, at high P-T conditions using a resistive-heating diamond-anvil cell (RH-DAC) X-ray diffraction set-up at 33 keV.

Experiments :
The starting haplogranitic glass has been synthetized previously in our institute and doped in xenon by gas-loading in a platinum capsule, further brought to 4 GPa and 1400C in a piston-cylinder press. 13 diamond-anvil cell loadings were run, half of them were unsuccessful due to recrystallisation of the sample upon reaching the glass transition temperature. In such cases, it was not possible to fully remelt the sample by further increasing the temperature. The other half was successful and x-ray diffraction data were collected. Pressure was obtained either by measuring the Raman signal from a piece of 13C diamond inserted in the sample chamber, or from the volume of platinum as measured from x-ray diffraction. Temperature was read on thermocouples. Data have been obtained for haplogranitic melts up to 5 GPa, with and without Xe, no data were obtained on I.

Results :
By Fourier transforming the scattered intensity once scaled into the structure factor, a putative Xe-X contribution can be seen by comparing the signal from melts with and without Xe (figure 1).

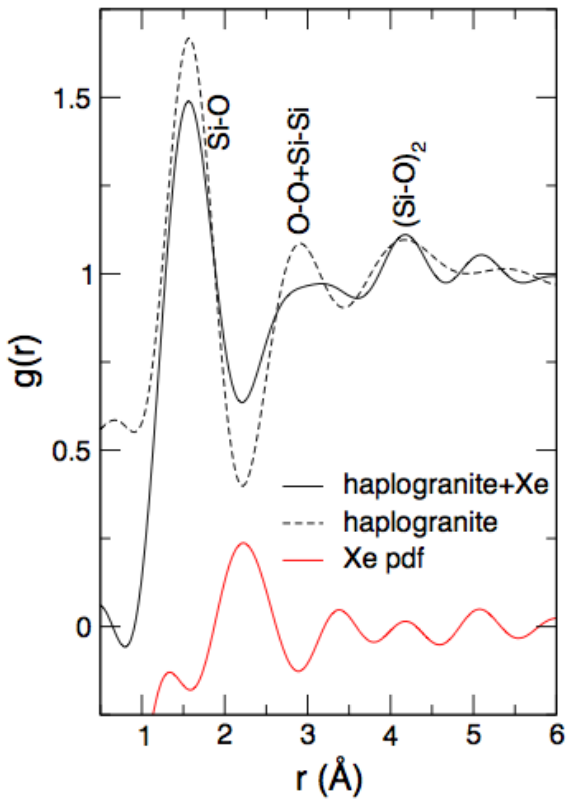

Figure 1: Radial distribution functions of molten haplogranite with and without Xe at 3 GPa. The Xe partial distribution function (in red) is obtained by subtracting the plain sample to the Xe-doped signal.

Conclusion :
These results are extremely promising, but might need to be confirmed by higher energy data in order to widen the accessible reciprocal space and consequently enhance the spatial resolution on g(r). This should help to quantatively resolve the Xe-O contribution that we observe here, but only by difference with the undoped sample.