ESRF	**Experiment title:** **High-accuracy phase caracterisation of Fe_2O_3 at high pressure**	**Experiment number**: HS-1215
Beamline: ID-30	**Date of experiment**: from: 23/02/2000 to: 28/02/2000	**Date of report**: 13/07/2001
Shifts: 15	**Local contact(s)**: Tristan Le Bihan	*Received at ESRF:*

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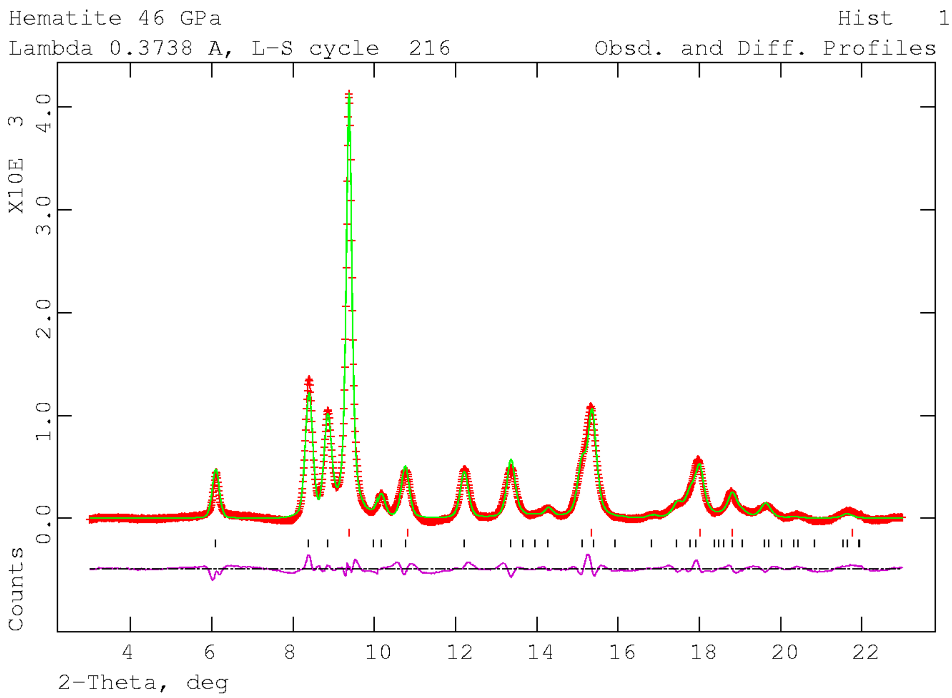
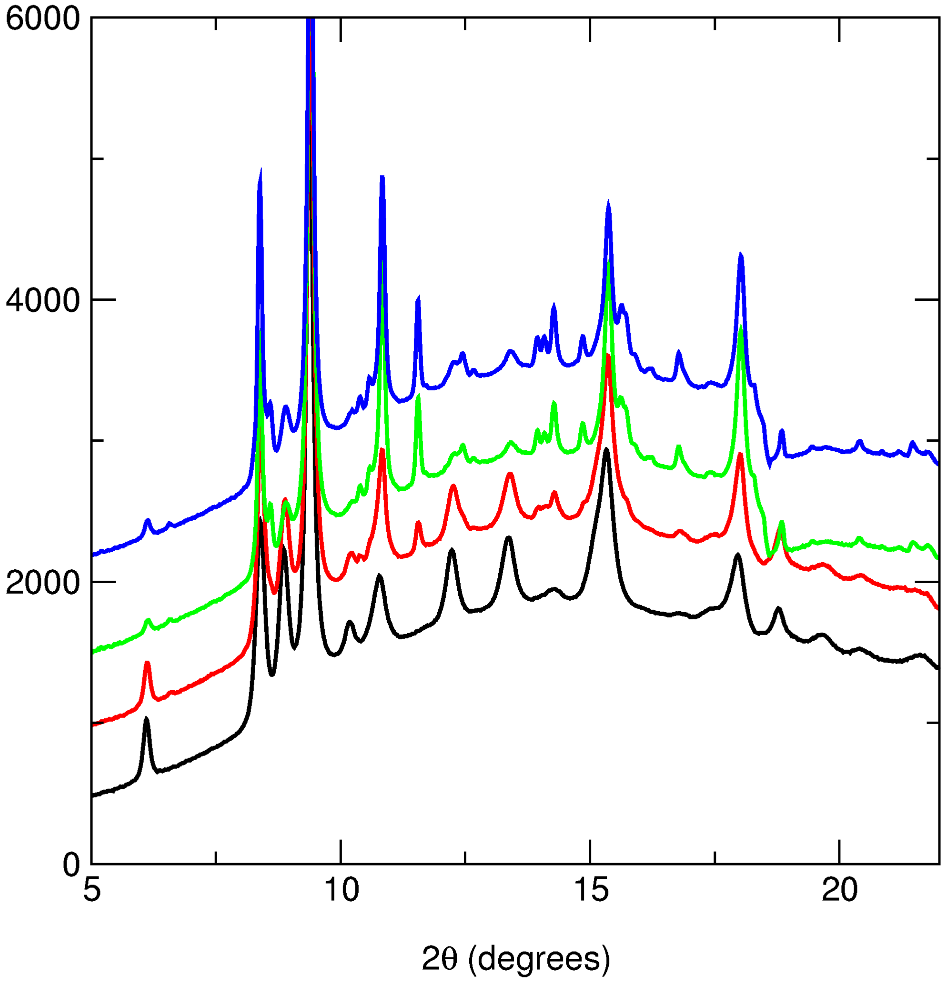
Report:

We measured the equation of state of Fe_2O_3 hematite at room pressure up to the pahse transition at 50 GPa with a very high accuracy. The samples were loaded in helium in order to obtain the best possible pressure conditions whicle minimising non-hydrostatic stresses. A typical pattern is shown in the figure below.



Full structural refinments were obtained by applying the riedvelt method, and the interanl coordinates were measured (see above).

Above the transition, we tried to find the structure of the high-pressure phase, but with no success (this has been a problem for high-pressure mineralogy since the mid-80's). The transition is kinetically hindered and the high-pressure phase is badly crystallised. We then laser-heated the sample offline, in order to enhance the kinetics, and found indeed that the crystallographic structure becomes better constrained, as the peaks sharpen and some appear/dissapear.



The figure above shows four spectra recorded at a given pressure (46 GPa) and for four subsequent heating procedures, each time with a higher laser power, that corresponds to a higher temperature. The bottom spectrum (in black) is unheated, the red, green and blue spectra are heated at low, moderate and high power, respectively. Unfortunately, the texturing in the sample did not allow us to determine the structure once again, and this is due to the temperature quenching. Therefore, the HP structure could not be obtained.

In conclusion, one part of the work was successfully accomplished, and the other part needs to be performed *in situ* (*i.e.* at high pressure and high temperature) with the online laser heating, which is now being commisiioned at ESRF beamline ID-30. The first part will be published along with the second part if we can get beamtime in 2002. Otherwise, it can be published alone as a structural work paper.