ESRF	**Experiment title:** **Valence of iron in Fe_2O_3 at high pressure and the oxidation state of Earth's mantle**	**Experiment number**: HS-1633
Beamline: ID-24	**Date of experiment**: from: 05/09/2001 to: 08/09/2001	**Date of report**: 09/01/2002
Shifts: 9	**Local contact(s)**: Sakura Pascarelli	*Received at ESRF:*

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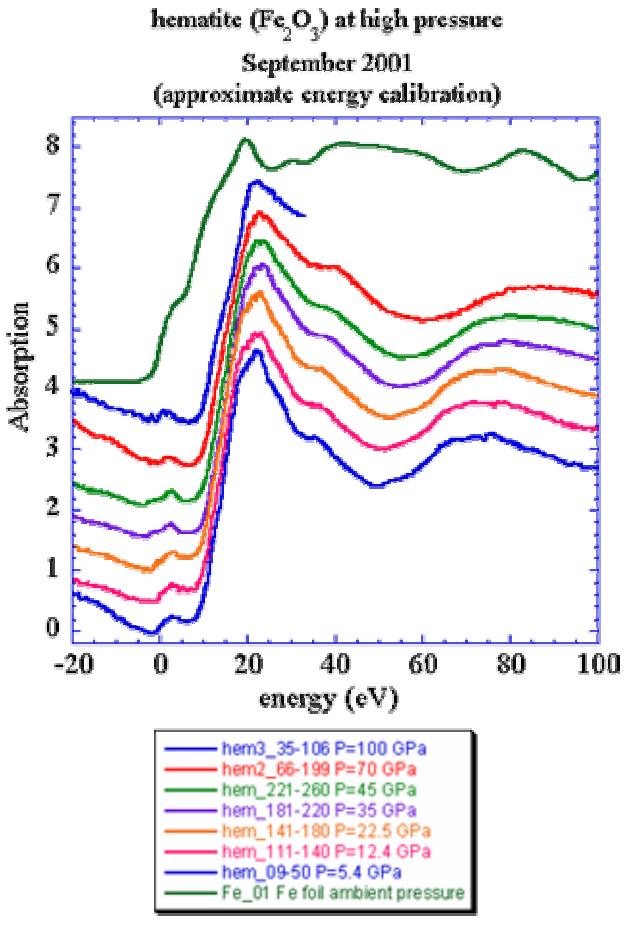
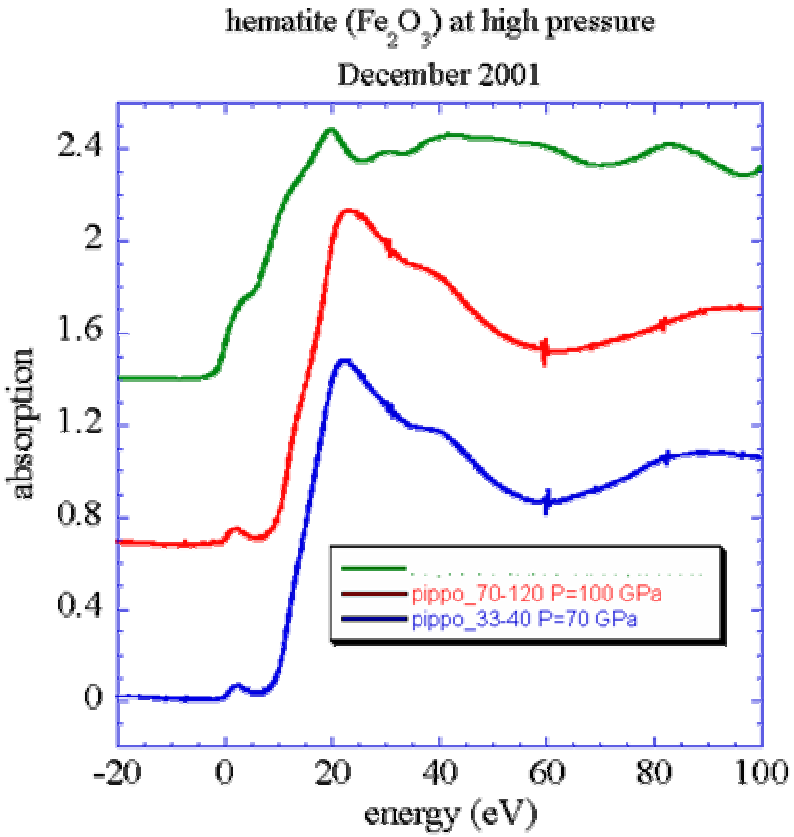
Report:

We measured the x-ray absoprtion spectrum of Fe2O3 at the Fe K edge between room pressure and 1 megabar. This is the first measurement of this kind at the K edge of iron at such pressures, and from this point of view (feasibility was one of the questions…) the experiment is a great success. Even though diamond absorbs a lot in this energy range, we measured the spectra through 2 mm height diamonds (4 mm total thickness). This opens the way for multi-megabar experiments on iron by XAS on ID-24.

On the other hand, we ran through some experimental problems related to the focusing mirror and beam stability. The focusing mirror was getting more and more damage by surface oxidation as time went by, and therefore the total flux went down at the same time that the available energy range was restrained (see right figure). Thus, we could only perform XANES measurements (no EXAFS) in the beginning (pressures up to 70 GPa) and only measure the edge at the end of the run (at 100 GPa).



Two diamond cells were left on the beamline with samples at 70 and 100 GPa, and after the mirror was replaced and some stability issues solved, the spectra were measured again during inhouse/comissioning time. The spectra are shown below, and the quality is by far more impressive, and will allow us to separate very subtle and fine effects.



It is obvious from the graph above that the signal-to-noise ratio is radically enhanced with respect to the figure on the last page. This project has obtained additional beamitme in may 2002. We hope this will enable us to finish the project.