



	Experiment title: Measurement of ultra high pressure equation of state of iron in a diamond anvil cell	Experiment number:
Beamline: ID27	Date of experiment: from: 09/03/06 to: 13/03/06	Date of report: 30/08/06 <i>Received at ESRF:</i>
Shifts:12	Local contact(s): M. Mezouar	
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Report:

The compression curve of iron has been measured up to 205 GPa at 298K, under quasi-hydrostatic conditions in a diamond anvil cell.

In five experimental runs, an iron sample was embedded in a pressure transmitting medium (helium or neon) and put a few micrometers away from the pressure gauge in the high pressure chamber of a diamond anvil cell. The x-ray signal diffracted by the sample has been collected using monochromatic angle dispersive technique. The high flux and high focusing of x-ray beam of the ID27 beamline allowed collecting monochromatic x-ray diffracted signal in one minute, even for the smallest samples (3 μm size), and without any parasitic signal from the metallic gasket. It was then circularly integrated and d-spacings and corresponding lattice parameters of iron have been determined. The pressure was measured from the luminescence of a ruby gauge or from the measurement of atomic volume of a tungsten x-ray gauge.

Above 150 GPa, the compression of this metal is significantly higher than previously measured under non-hydrostatic conditions (see Fig. 1).

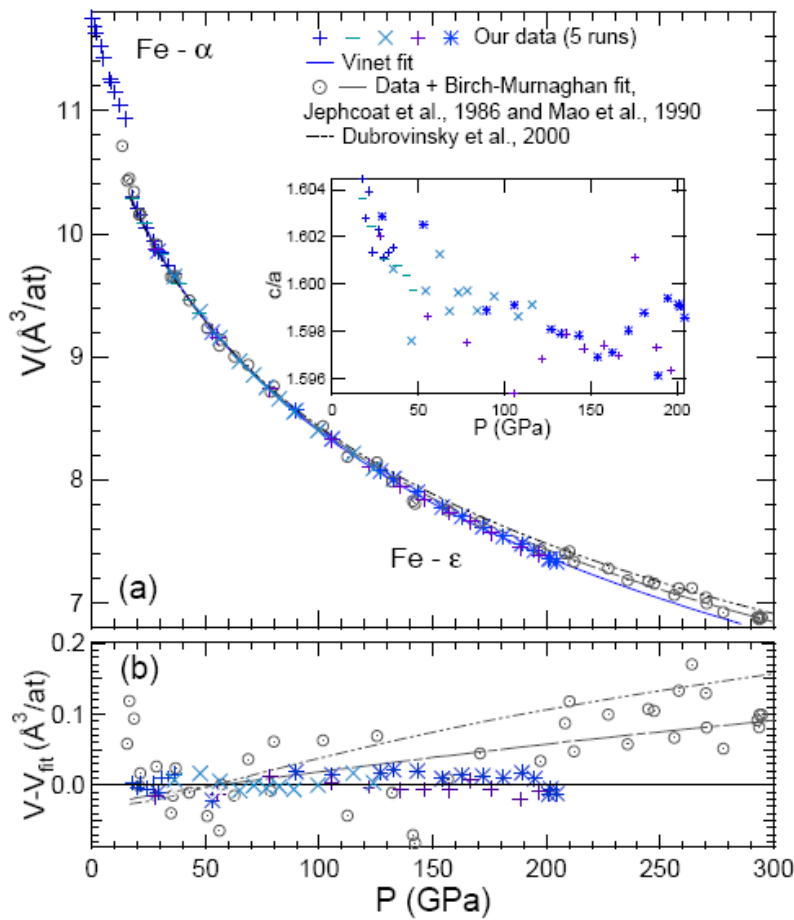


Figure 1: Evolution of atomic volume vs. pressure measured during this experiment (blue points), compared with literature data [1,2,3].

- [1] A. P. Jephcoat et al., J. Geophys Res. **91**, 4677, 1986
- [2] H.-K. Mao et al., J. Geophys Res. **95**, 21737, 1990
- [3] L. Dubrovinsky et al., Phys. Rev. Lett. **84**, 1720, 2000