

The 4th Global-COE International Frontier Seminar

January 20th, 2009, from 17:00, at the room #101

Experimental investigation of plastic properties of high pressure minerals

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In the last few years, new techniques have been developed for the study of plastic properties of minerals under high pressure and temperature. They involve the use of high pressures devices such as the diamond anvil cell used in the radial geometry, the rotation-Drickamer, or the deformation-DIA. In all cases, x-ray diffraction is used to probe for stress and lattice preferred orientations in the sample.

Results from those studies include

- the identification of deformation mechanisms controlling the plastic behavior of high pressure materials,
- measurements of strength and rheological laws,
- understanding of the development of lattice preferred orientation and seismic anisotropy,
- etc.

In this presentation, I will describe the technique of radial diffraction in the diamond anvil cell, including new development allowing measurements at high temperature. I will show results obtained from deformation studies on the post-perovskite phase, which is believed to be the main component of the core-mantle boundary, and discuss comparison with results of other techniques. Finally, I will also discuss new development for the analysis and processing of x-ray diffraction data used for stress analysis. Those new models are based on self-consistent calculations and replace the elastic model of Singh et al by properly accounting for effects of active plastic deformation mechanisms on the measured diffraction data.

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