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# Development of multi-axis DAC oscillation system for x-ray powder diffraction

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Recent advanced experimental techniques of a laser-heated diamond anvil cell (DAC) provide wide P-T conditions in the earth's interior. Particularly, angular dispersive x-ray diffraction method combining with a high brilliance synchrotron radiation (SR) x-ray enables an access to the physical properties of the earth's constituent minerals. In this method, however, there is a significant quantitative problem to be solved. The spotty diffractions caused by coarse grains, which are likely generated during laser heating experiments, give an influence on the diffracted x-ray. In fact, the inhomogeneous x-ray profile leads to unreliable structure factors in Rietveld analyses. Thus, we hardly obtain ideal Debye rings being essential for the precise structural analyses due to the difficulty in acquiring sufficient particles satisfying Bragg condition. To improve this kind of statistical problem in the x-ray experiments using DAC, we have constructed the multi-axis oscillation system for x-ray powder diffraction measurements under high-pressure.

The oscillation system equipped a goniometer which was designed after the Gandolfi oscillation camera [1,2]. The goniometer has three oscillation axes, which are horizontal (theta), vertical swivel (omega), and rotating axes (phi) perpendicular to theta. The DAC with a large angular aperture (90 deg.), which is also newly developed for the oscillation system, is inserted into the holder on phi axis. The diffracted x-rays are detected with an imaging plate. This system has been installed in SR x-ray beam lines (BL04B2 or BL10XU) at SPring-8. In this presentation, we introduce details of the experimental set-up and a few experimental results using this system.

[1]G. Gandolfi, Miner. Petrogr. Acta, 13, 67-74 (1967)
[2]H.H. Otto, W. Hofmann, K. Schroder, J. Appl. Cryst., 35, 13-16 (2002)

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