The 450th Geodynamics Seminar

In situ high *P-T* X-ray computed laminography and its applications

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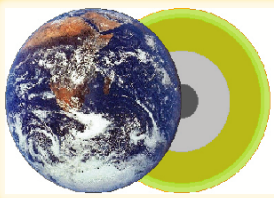

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Abstract

The diamond anvil cell (DAC) is a powerful tool to reproduce high-pressure (*P*) and high-temperature (*T*) conditions, corresponding to those of the deep Earth interior, in a laboratory (Tateno *et al.*, 2010 *Science*). Various types of measurements such as *in situ* high-*P*–*T* spectroscopic measurements and *ex situ* chemical analysis have been conducted using DACs to understand the structure and evolution of the Earth's interior.

Among these techniques, 3D visualization and textural/ chemical characterization of the internal structure of samples at high-*P*–*T* is of great importance. Recently, we developed a high-pressure *in situ* X-ray laminography using DAC (Nomura and Uesugi, 2016 *RSI*). In this technique, X-rays can avoid the gasket and pass through the diamonds with the shortest path, which is quite advantageous for dual X-ray energy chemical imaging technique using relatively low X-ray energies (7, 8 keV) (Tsuchiyama *et al.*, 2013 *GCA*) and for ultra-high pressure experiments because it is no longer necessary to use a light metal (for example, Be) as a gasket. In addition, X-ray laminography gives the reconstructed image more consistent with the original one than that by X-ray CT when the projection data are incomplete due to limited rotational angle, the situation DAC experiments faced with due to load-supporting pillars.

In this study, we applied this technique to high-*P* rotational deformation experiments using DAC. Using the MgO sample with Pt strain marker, we have succeed in large-strain deformation experiments to 135 GPa. In addition, we have developed high-pressure and "high-temperature" *in situ* X-ray laminography technique by introducing a laser-heating system. In this presentation, we will show our results and future prospects.

詳細は当センターホームページ: http://www.grc.ehime-u.ac.jp/をご覧ください
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