Geodynamics Seminar

第333回ジオダイナミクスセミナー

Development of 6-6 type compression for the high pressure neutron diffraction

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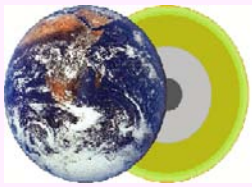
主催：愛媛大学地球深部ダイナミクス研究センター
日時：7/6（金）午後 4時30分～
場所：総合研究棟 4F 会議室



EHIME UNIVERSITY GRC GEODYNAMICS RESEARCH CENTER

Abstract

Japan Proton Accelerator Research Complex(J-PARC) is a newly constructed institute which provides the most intense neutron beam in the world(still not got to maximum intensity). Recently, A six-axis type press, ATSUHIME, has been installed at BL11 (PLANET) and is now setting up for high pressure and temperature neutron diffraction experiment. A neutron source provides us different information from x-ray diffraction because the scattering and absorption crosssection are fairly different from each other. Specifically, the information about hydrogen can be directly obtained from neutron diffraction, which is almost impossible to be seen by x-ray diffraction. The interest for the field of Earth science is how hydrogen (water) behaves in the mantle minerals and the melted phases at high pressure and temperature such as deep Earth's interior. In order to investigate it *in situ*, high-pressure and temperature technique with neutron source must be developed. To cover the Earth's mantle P-T condition, the 6-6-type compression, which has been originally developed by Chicago University and GRC groups, is a promising technique for the high-pressure experiment using a cubic-anvil apparatus in terms of access to the sample, switching of anvils and the alignment. Hence, in the high-pressure neutron diffraction experiment at PLANET, the 6-6-type technique is thought to be one of the most powerful tool as well as 6-8-type compression. Although the use of the 6-6-type technique for the synchrotron x-ray diffraction is spreading to many users, it cannot be used for the experiment using neutron source with no modifications of the assembly because of the large difference in the property of the sources such as the beam intensity, interaction with materials, issue of radioactivaion and so on. In particular, large-volume sample is essential for the achievement of high-quality neutron diffraction due to the weak scattering intensity of the sample. In order to make the sample volume larger, large 6-6 type assembly (anvils and the guide) has been developed. So far, we have achieved the generation of P-T condition upto <~10 GPa and 1500 K with adequate volume of sample using DIA type press MADONNA II. The details on the technical developments of large 6-6-type compression for high-pressure neutron diffraction will be introduced. In addition, the preliminary results of the high-pressure experiment with ATSUHIME and diffractometory of glass sample in the 6-6 assembly at PLANET will be briefly presented.

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