# Geodynamics Seminar

## 第319回ジオダイナミクスセミナー

# Elastic wave velocities of stishovite at high pressures and high temperatures

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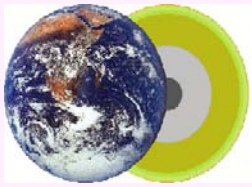
主催：愛媛大学地球深部ダイナミクス研究センター
日時：2/17（金）午後 4時30分～
場所：総合研究棟 4F 会議室



EHIME UNIVERSITY GRC GEODYNAMICS RESEARCH CENTER

**Abstract**

Simultaneous elastic wave velocity and in situ synchrotron X-ray measurements on sintered polycrystalline stishovite were carried out at a pressure between 8 GPa and 23 GPa, and temperature up to 1100 K by using ultrasonic technique in conjunction with synchrotron X-ray measurement. The polycrystalline stishovite sample was hot pressed at pressure ~16 GPa and temperature ~1470 K in a 3000-ton Kawai-type apparatus using $SiO_2$ glass rod as starting material. The bulk density measured by Archimedes method before high pressure experiment was 4.27(2) g/cm3, which was same density as that determined by X-ray diffraction measurement (4.280 g/cm3). Simultaneous ultrasonic and in situ X-ray measurements were carried out at BL0401 beamline in SPring-8. Ultrasonic elastic wave velocity measurements were conducted using the pulse reflection method. Sample lengths at high pressures were directly determined from the X-ray radiography image. Pressure was determined by self-consistent manner using obtained elastic wave velocity and volume of stishovite. We decided zero pressure isothermal bulk modulus ($K_{T0}$=297(7) GPa), pressure derivative of $K_{T0}$ ($K'_{T0}$=4.9(2)), zero pressure shear modulus ($G_0$=224.0(3) GPa), pressure derivative of $G_0$ ($G'_0$=1.46(1)), volume dependence of Gruneisen parameter at reference conditions ($q_0$=3.5(9)) and shear strain derivative of Gruneisen parameter at reference conditions ($\eta_{S0}$=1.20(6)) as thermal elastic parameters of stishovite from our experimentally $V_P$-$V_S$-$V$-$T$ data. In our analysis Gruneisen parameter at reference conditions ($\gamma_0$=1.68) and Debye temperature at reference conditions ($\theta_0$=1109 (K)) were fixed from heat capacity measurement of stishovite (Akaogi et al., 2011). Our results of pressure dependence of bulk and shear modulus are bigger than Brillouin scattering measurement on single-crystal stishovite up to 12 GPa at room temperature (Jiang et al., 2009). In contrast, our results are smaller than that of low pressure ultrasonic measurement to 3 GPa at room pressure (Li et al., 1996).

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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