[EE] Evening Poster | S (Solid Earth Sciences) | S-IT Science of the Earth's Interior & Tectonophysics

[S-IT27]Property and role of liquids inside the Earth

convener:Tatsuya Sakamaki(Department of Earth Science, Tohoku University), Yoichi Nakajima(Kumamoto University, Priority Organization for Innovation and Excellence)
Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Liquids of silicates and metals inside of the Earth have played important role in the physical, chemical, and thermal evolutions of our planet. This session aims at understanding the physical and chemical properties of liquids from shallower to deep parts of the Earth, which are strongly related to the long history of the Earth's from the planetary accretion to the present-day dynamics. In addition, we call for presentations by researchers from various backgrounds of geochemical, experimental, theoretical/computational, and seismic/geodynamical ones, who investigate the physical and chemical properties of liquids and the behaviors and roles inside of Earth. Relevant topics include, but are not limited to, partial melting and melt extraction, liquid-solid partitioning, high pressure experiments on melts, and seismic detections of mantle melts and outer core anomaly.

[SIT27-P03]Sound velocity of liquid Fe under high pressure

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The Earth has liquid outer and solid inner cores, which are composed predominantly of iron. Other terrestrial planets such as Mercury, Venus, and Mars also have metallic iron cores. Those planetary cores can be at least partially molten, as well as Earth’s core. Therefore, the physical property of liquid Fe is fundamental to understand the nature and dynamics of the cores in terrestrial planets. However, our knowledge of its physical properties such as its density, sound wave velocity, and elasticity are still poor especially under high-pressure conditions relevant to inside of those planets. Previously reported equation of state (EoS) on liquid Fe was constructed based on limited density and velocity data at 1 bar and only above 260 GPa by shock compression experiments (e.g. [1]). Recently, sound wave velocity measurements on liquid Fe were performed using a large volume press, however, the pressure range was still limited at below 6 GPa [2,3]. Here, we report new experimental data on P-wave velocity of liquid Fe under high pressures based on inelastic X-ray scattering (IXS) measurements with a laser-heated diamond-anvil cell (LH-DAC) at the beamline BL43LXU [4] of the RIKEN SPring-8 Center in Japan. We measured the dispersion relation of longitudinal acoustic phonon mode of liquid Fe, and then determined the P-wave velocity up to 45 GPa. The obtained pressure and velocity data show a good consistency with an EoS previously reported by Anderson and Ahrens [1].

References
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