

[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-P04]A new DIA-type multi-anvil apparatus dedicated to XRD and imaging at the PSICHE beamline, synchrotron SOLEIL

Nicolas Guignot¹, Geeth Manthilake², Denis Andrault², *Longjian Xie³, Daisuke Yamazaki³, Akira Yoneda³, Andrew King¹, Alain Prat⁴, Jean-Pierre Deslandes¹, Jean-Paul Itié¹ (1.Synchrotron SOLEIL, 2.LMV, 3.Institute for Planetary Materials, 4.Institut Néel)

Keywords:Multi-anvil, Synchrotron, High pressure, Silicate melts, Viscosity

The multi-anvil (MA) apparatus as proven to be invaluable for experiments where an excellent control over pressure and temperature conditions and a large sample volume are required. Access to *in-situ* X-ray diffraction (XRD) and imaging can be given by carefully integrating a MA on a synchrotron beamline. These techniques are used for the determination of many materials physical properties, e.g. thermoelastic properties, viscosity and electrical or thermal conductivity. XRD is also used in the study of phase diagrams of sometimes chemically complex materials or structural studies of crystalline solids and even liquids.

Here we present the full experimental station introduced to the users a couple of years ago at the French national synchrotron light source SOLEIL (PSICHE beamline). It consists of -1/ a 1200 tons load capacity MA press with a (100) DIA compression module operated in white and pink beam modes, focused in the vertical direction for a very high flux or parallel - 2/ a CAESAR (combined angle- and energy-dispersive structural analysis and refinement, Wang et al. in 2004) XRD setup, which is the ideal tool when accurate structural measurements are required, especially in the case of liquids and amorphous materials -3/ a high resolution imaging system, with framerates up to 2 kHz full-frame and beam sizes up to 10x4 mm² (HxV). This latter mode is illustrated with recent results obtained on viscosity measurements of forsterite and diopside liquid compositions up to 30 GPa.

Reference

Y. Wang et al., A new technique for angle-dispersive powder diffraction using an energy-dispersive setup and synchrotron radiation (2004), J. Appl. Cryst. (2004). 37, 947–956