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

[S-IT22]Interaction and Coevolution of the Core and Mantle in the Earth and Planets

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Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)

Recent observational and experimental investigations have significantly advanced our understanding of the structure and constituent materials of the deep Earth. Yet, even fundamental properties intimately linked with formation and evolution of the planet, such as details of the chemical heterogeneity in the mantle and light elements dissolved in the core, remained unclear. Seismological evidence has suggested a vigorous convection in the lower mantle, whereas geochemistry has suggested the presence of stable regions there that hold ancient chemical signatures. The amounts of radioactive isotopes that act as heat sources and drive dynamic behaviors of the deep Earth are also still largely unknown. We provide an opportunity to exchange the achievements and ideas, and encourage persons who try to elucidate these unsolved issues of the core-mantle evolution using various methods, including high-pressure and high-temperature experiments, high-precision geochemical and paleomagnetic analyses, high-resolution geophysical observations, geo-neutrino observations, and large-scale numerical simulations. Since this session is co-sponsored by geomagnetism, paleomagnetism and rock magnetism division of the SGEPSS, contributions in geomagnetism and geodynamo simulation are also encouraged.

[SIT22-P08]Development of electric furnace designed for density measurement of metals

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Keywords:Density, Iron alloys, High temperature

The empirical linear relationship between density and sound velocity, the Birch's law, is well studied for solid Fe-alloys but it has not been well examined for liquid Fe-alloys yet. Even at ambient pressures, the relation between density and sound velocity can be studied by varying temperatures, especially for liquids. Although density and sound velocity of some liquid Fe-alloys have been reported at ambient pressures, the data-set is not enough and simultaneous measurements of density and sound velocity have not been performed. Thus, we developed an electric furnace designed for measurement of density and sound velocity to study the relationship between density and sound velocity of solid and liquid Fe-alloys. The density and sound velocity are measured using volume measurement and pulse-echo overlap method, respectively.

In this study, we report set-up of the furnace and results of density measurement of solid Fe and Ni up to 1923 K. The measured densities of solid fcc-Fe and fcc-Ni are consistent with previous results with the accuracy of ~1.5 % and ~0.5 %, respectively. The thermal expansion coefficient of fcc-Fe was estimated to be (6.87 ± 0.47)x10^{-5} [K^{-1}], which was close to the previously reported value of 6.4x10^{-5} [K^{-1}] (Komabayashi et al. 2010).