International Session (Oral) | Symbol S (Solid Earth Sciences) | S-MP Mineralogy & Petrology

[S-MP06_28PM2] Impact of volatiles on the processes of formation and evolution of the Earth's interior

Convener:*Bjorn Mysen(Geophysical Laboratory, Carnegie Inst. Washington), Eiji OHTANI(Graduate School of Science Tohoku University 6-3 Aoba, Aramaki, Aoba-ku Sendai 980-8578), Tatsuhiko KAWAMOTO(Univ. Kyoto Kyoto, 606-8502, JAPAN), Chair:Eiji Ohtani(Department of Earth and Planetary Materials Science, Graduate School of Science, Tohoku University)
Mon. Apr 28, 2014 4:15 PM - 5:45 PM  411 (4F)

Characterization of the processes that govern the behavior, budget, and recycling of volatiles in the Earth's interior is fundamental to our understanding of the formation and evolution of the solid Earth, its oceans, and atmosphere. In the proposed session, we will focus on theoretical, experimental, and observational characterization of solubility and solution mechanisms of C-O-H-N-S volatiles in molten and crystalline materials and of oxide components in C-O-H-N-S fluid in the pressure, temperature, composition and redox range of Earth's past and current interior. The major session foci will be:

- Modeling the impact of C-O-H-N-S fluids on composition and evolution of the Earth via metasomatic and magmatic processes.
- Characterization of structure and properties in silicate- C-O-H-N-S melt, mineral, and fluid systems via theoretical modeling and high-temperature/-pressure experimental studies.
- Experimental characterization, at high temperature and pressure, of fractionation of components, compounds and isotopes in the C-O-H-N-S system between minerals, melts, and fluids.
- Element complexing in individual phases, interaction between silicate and trace and minor elements in fluids and melts at high temperature and pressure.
- Examine the principles on which to quantify property behavior and its application to natural processes that include fluids and melts.

5:30 PM - 5:45 PM

△[SMP06-P03_PG] Partitioning of carbon between metallic- and silicate-liquids in carbonaceous chondrite compositions at high pressure

3-min talk in an oral session

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Major volatile elements in the terrestrial planets are oxygen, sulfur, carbon, hydrogen, and nitrogen. They are also candidates for light components in the earth's core which were incorporated into the core at terrestrial magma ocean stage. Partitioning behavior of carbon has not been determined well though it is one of the strong candidates for light elements in the earth's core. We investigated partitioning of carbon with sulfur and oxygen between metallic- and silicate liquids at 6 GPa and 2073 K in carbonaceous chondrite composition (Allende meteorite; CV3). Effect of nitrogen and water as accessory components were also examined. High pressure experiments were conducted with multi-anvil high pressure apparatus. Graphite was used as capsule material. Composition of coexisting metallic- and silicate liquids were measured by electron microprobe with wavelength dispersion type spectrometer except for carbon in silicate liquid. Carbon concentration of bulk recovered sample was measured by elemental analyzer. Then, carbon concentration in silicate liquid was obtained by subtraction of carbon amounts in metallic phase which obtained by electron microprobe and SEM image analyses. Present result suggests that in oxidized carbonaceous chondrite composition, partitioning coefficient of carbon \[ D_{Metallic \ liquid/Silicate \ liquid} = \frac{C_{Metallic \ liquid}}{C_{Silicate \ liquid}} \] is close to 1, and it may increase with increasing the Fe^{metal}/Fe^{oxide} ratio in the carbonaceous chondrite composition.