[EJ] Evening Poster | P (Space and Planetary Sciences) | P-PS Planetary Sciences

[P-PS06]Formation and evolution of planetary materials in the Solar System

convener:Akira Yamaguchi(National Institute of Polar Research), Wataru Fujiya(Ibaraki University, College of Science), Yoko Kebukawa(横浜国立大学 大学院工学研究院, 共同), Masahiro KAYAMA(Department of Earth and Planetary Material Sciences, Faculty of Science, Tohoku University)
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
This session will focus on the evolution in the Solar System with interaction and co-evolution in minerals, water, organic matter, and noble gas in meteorites and interplanetary dust particles. New innovative analytical and theoretical techniques in various fields will be discussed. The developing methods are welcome to submit for the future mainstream of meteorite study. In order to explore the planetary materials and their evolution, both meteorite studies and experimental approaches are necessary. In this session, we will discuss these topics from extraterrestrial sample analyses and experimental works. Research works on undifferentiated and differentiated meteorites and parent body processes such as aqueous alteration, thermal metamorphism, shock metamorphism, volcanic activity, and core-mantle-crust differentiation are especially included in this session.

[PPS06-P07]The shock history of the Asuka LL breccias from the bulk chemical composition and petrology

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Meteorite breccias are significant materials to discuss the evolution of asteroidal bodies, especially shock histories on them. In ordinary chondrites, many breccias have been reported. Here we present our results on LL chondritic breccias, Asuka (A) 12011 and A 12389. The joint expedition party between Japan and Belgium (JARE-54 and BELARE 2012-2013) collected these meteorites from the Nancen Ice Field, Antarctica. The original weights of A 12011 and A 12389 are 113 g and 18.07 kg, respectively. A 12389 is the heaviest meteorite collected by this expedition party. We conducted chemical and petrological study on these breccias.

Both meteorites have been classified as LL breccias. These breccias consist of various kinds of clasts among matrices. The clasts mostly fall into petrologic types 3, 4, 5/6. However, others clasts are present (e.g., melt and darkened clasts). The type 5/6 clasts and the matrices are the most abundant components, 46 and 48 vol.% in A 12011, and 43 and 44 vol.% in A 12389, respectively. The constituent phases are olivine, low- and high-Ca pyroxene, feldspar, phosphates (Cl-apatite and merrillite), chromite, Fe-Ni metal, and troilite. Olivine is mostly homogeneous, with an average composition of Fo_{72} in both breccias. Low-Ca pyroxene is En_{76} in A 12011 and En_{75} in A 12389 on average.

The bulk analysis of these samples are performed by solution ICP-MS method. The measurements were conducted on the Thermo Element XR of NIPR. We analyzed 38 elements, including REE. For major, minor, and trace elements such as Mg, Al, Cu, Zn, Sr, and Ba, A12011 and A 12389 show similar elemental abundances to each other, indicative of ordinary chondritic. This is consistent with the petrological observations that both breccias are similar in texture and mineralogy, and they show LL chondritic features. REE pattern of A12011 and A12389 are also similar to LL chondrite. However, the A 12389 REE pattern is slightly enriched, compared with A 12011 and ordinary chondrites. Although many breccias include exotic

clasts such as carbonaceous chondritic, A 12011 and A12389 seem not to include these clasts from our petrological observation. This is also consistent with the bulk compositions. Thus, they are genomict breccias.

Our petrological and chemical data indicate that both Asuka breccias formed through extensive impact processes on LL parent body, and the interior materials consisting of type 5/6 were also excavated and reassembled into these breccias.