[EE] Evening Poster | B (Biogeosciences) | B-AO Astrobiology & the Origin of Life

[B-AO01]Astrobiology

convener:Hikaru Yabuta(Hiroshima University, Department of Earth and Planetary Systems Science), Seiji Sugita(Department of Earth and Planetary Science, Graduate School of Science Sciece, The University of Tokyo), Misato Fukagawa(名古屋大学, 共同), Fujishima Kosuke(Tokyo Institute of Technology, Earth-Life Science Institute)

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

Twenty years have passed since when the field of Astrobiology, which aims to unveil the origins, evolution, and habitability of life by integrating multidisciplinary fields, was established. Origins of Life are currently being re-conceptualized via expansion of prebiotic chemistry to systems chemistry and chemical space. Besides their relationship to life's building blocks, it is expected to demonstrate the significant roles of organic molecules in the history of planetary formation. The linkages among the variations in chemical compositions of deep-sea hydrothermal environments, geological settings, and ecological systems were systematically investigated. Cassini, which accomplished in the long-term explorations of the planets bearing liquid, had "Grand Finale" this year. Discoveries of extrasolar planets have been dramatically increased to date.
Originally, Astrobiology does not need a specific science category. We therefore aim to make this session so that Earth and Planetary scientists from all the categories join for discussing 'where we came from and where we are going' and for making novel integrated researches.
For the next stage of Astrobiology, presentations on the instrument development in space explorations, comparative studies of solar system and exoplanets, etc, will be very much welcome.

[BAO01-P10]Ground-based simulation of Enceladus fly-through plume sampling and analysis using ultra-low density aerogel

*Fujishima Kosuke[1], Wataru Takahagi[2,4], Kaito Seo[4], Hiroki Saito[4], yayoi Hongo[1], Makoto Tabata[5], Takazo Shibuya[2], Ken Takai[2], Yoshinori Takano[2], Hajime Yano[3] (1.Tokyo Institute of Technology, Earth-Life Science Institute, 2.Japan Agency for Marine-Earth Science and Technology, 3.Japan Aerospace Exploration Agency, Institute of Space and Astronautic Science, 4.Keio Univ., 5.Graduate School of Science, Chiba University)

Keywords:life detection, hypervelocity impact, organic molecules, peptide, silica aerogel, spaceflight mission

Understanding the variety and the distribution of the building blocks of life in space is one of the important scientific themes for Astrobiology. *In situ* detection of organic molecules from extraterrestrial bodies thus provide insight into ongoing chemical evolution of building blocks of life, and possibly the detection of extraterrestrial life itself. Here we conducted a ground-based simulation of Enceladus fly-through plume sampling, extraction and analysis of two simple organic molecules, Glycine (Gly) and Glycyl-L-alanine (GlyAla) dipeptide. Hypervelocity impact experiment was carried out at JAXA/ISAS using pure Gly and GlyAla crystal as well as freeze-dried sample of 10% w/w organic-NaCl mixture. Approximately 5 mg of powder samples are placed into sabot projectile and accelerated to a speed of 4-6 km/sec and captured by ultra-low density (10 mg/cc) hydrophobic and hydrophilic silica aerogels. Aerogels with impact tracks are transferred to order-made aerogel container made of space compatible material polyetheretherketone (PEEK) and soaked by 5 ml 75% acetonitrile water solution for sufficient diffusion of organic molecules. Extracted solution was freeze-dried and resuspended in 100 μl water and analyzed using LC-QTOF-MS. So far, we have obtained LC profile/MS spectra

corresponding to intact GlyAla from both hydrophobic and hydrophilic aerogel with sample recovery rate of approximately 0.1%. Ongoing analysis will further provide information on Glycine as well as degree of impact-driven organic alteration to demonstrate the capability ultra-low density aerogel for analysis of astrobiologically-relevant organic molecules in future spaceflight missions.