

[B-AO01_28AM2]Astrobiology: Origins, Evolution, Distribution of Life

Convener:*Kensei Kobayashi(Department of Chemistry and Biotechnology, Faculty of Engineering, Yokohama National University), Akihiko Yamagishi(Tokyo University of Pharmacy and Life Science, Department of Molecular Biology), Masatoshi Ohishi(Astronomy Data Center, National Astronomical Observatory of Japan), Eiichi Tajika(Department of Complexity Science and Engineering, Graduate School of Frontier Sciences, The University of Tokyo), Takeshi Kakegawa(Graduate School of Science, Tohoku University), Shigeru Ida(Department of Earth and Planetary Science, Graduate School of Science and Technology, Tokyo Institute of Technology), Chair:Kensei Kobayashi(Department of Chemistry and Biotechnology, Faculty of Engineering, Yokohama National University), Eiichi Tajika(Department of Complexity Science and Engineering, Graduate School of Frontier Sciences, The University of Tokyo)

Mon. Apr 28, 2014 11:00 AM - 12:41 PM 502 (5F)

Astrobiology is a new interdisciplinary science field that intends to address the origins, evolution, distribution and destiny of life on Earth and elsewhere in the universe. In this session, every topic of Astrobiology will be discussed, including cosmic evolution, primitive Earth environments and origins of life, coevolution of life and Earth, life in extreme environments, etc.

12:20 PM - 12:35 PM

[BAO01-P07_PG]Fluorescence imaging of microbe-containing micro-particles that had been shot from a two-stage light-gas gun into an ult

3-min talk in an oral session

*Yuko KAWAGUCHI¹, Tomohiro SUGINO², Makoto TABATA¹, Kyoko OKUDAIRA³, Eiichi IMAI⁴, Hajime YANO¹, Sunao HASEGAWA¹, Hikaru YABUTA⁵, Kensei KOBAYASHI⁶, Hideyuki KAWAI⁷, Hajime MITA⁸, Hirofumi HASHIMOTO¹, Shin-ichi YOKOBORI², Akihiko YAMAGISHI² (1.ISAS/JAXA, 2.Tokyo University of Pharmacy and Life Sciences, 3.University of Aizu, 4.Nagaoka University of Technology, 5.Osaka University, 6.Yokohama National University, 7.Chiba University, 8.Fukuoka Institute of Technology)

Keywords:Aerogel, Space experiment, Hypervelocity impact experiment, DNA-specific fluorescence dye

We previously proposed an experiment (the Tanpopo mission) to capture microbes and organic compounds on the Japan Experimental Module of the International Space Station. An ultra low-density silica aerogel will be exposed to space for one year. After retrieving the aerogel, particle tracks and particles found in it will be visualized by fluorescence microscopy after staining it with a DNA-specific fluorescence dye. In preparation for this study, we simulated particle trapping in the aerogel so that methods could be developed to visualize the particles and their tracks. During the Tanpopo mission, particles that have an orbital velocity of about 8 km/s are expected to collide with the aerogel. To simulate these collisions, we shot *Deinococcus radiodurans*-containing Lucentite particles into an aerogel from a two-stage light-gas gun (acceleration 4.2 km/s). The shapes of the captured particles and their tracks and entrance holes were recorded with a microscope/camera system for further analysis. The size distribution of the captured particles was smaller than the original distribution, suggesting that the particles had fragmented. We were able to distinguish between microbial DNA and inorganic compounds after staining the aerogel with the DNA-specific fluorescence dye SYBR green I as the fluorescence of the stained DNA and the autofluorescence of the inorganic particles decay at different rates. The developed methods are

suitable to determine if microbes exist at the International Space Station altitude. Keywords: Aerogel, Space experiment, Hypervelocity impact experiment, DNA-specific fluorescence dye.