TANPOPO: A NEW MICROMETEOROID CAPTURE AND ASTROBIOLGY EXPOSURE IN LEO: ITS FIRST YEAR OPERATION AND POST-FLIGHT PLAN

H. Yano[1], A. Yamagishi[2], H. Hashimoto[1], S. Yokobori[2], Y. Kebukawa[3], Y. Kawaguchi[1], K. Kobayashi[3], H. Yabuta[4], M. Tabata[5], M. Higashide[6] and the Tanpopo Project Team. [1]JAXA/ISAS. [2]Tokyo Univ. of Pharmacy and Life Sciences. [3]Yokohama National Univ. [4]Osaka Univ. [5]Chiba Univ. [6]JAXA.

Introduction: The TANPOPO mission is Japan's first astrobiology space experiment for testing various aspects of the "quasi-panspermia" hypothesis, a theory for exogenesis origin of life precursors and their transports among celestial bodies [1]. It has been developed as a passive space exposure experiment at the ISS Kibo exposed facility. This three-year-long multiple sample return mission was successfully launched on April 15, 2015 by the Space-X CRS-6 and deployed on a small pallet called "Ex-HAM" of the Kibo exposed facility since the late May this year.

Instruments: The TANPOPO employs blocks of 0.01g/cc double-layered silica aerogels [2] on the Capture Panels to capture impacting solid microparticles such as organic-bearing micrometeoroids and possible terrestrial particles with less thermal alteration by impacts compared to past, denser aerogel experiments in the low Earth orbit (LEO). By analyzing captured micrometeoroids in the aerogels, one can learn what kinds of extraterrestrial organic compounds in the pristine states inside micrometeoroids can be transported from parent bodies and how they may be altered in outer space. Also by evaluating retrieved samples of exposed terrestrial microbes and astronomical organic analogs on the exposure panels, one can investigate their survivals and alterations in the duration of interplanetary transport.

Sub-Themes: The TANPOPO consists of six sub-themes to be performed in LEO: 1) capture of terrestrial aerosols possibly containing microbes, 2) terrestrial microbe exposure [3], 3) astronomical organics exposure[4], 4) capture of organic-bearing micrometeoroids, 5) evaluation of ultra low-density aerogel newly developed, and 6) capture of space debris in the ISS orbit. Each will utilize one or more capture or exposure panels from various pointing faces of the ISS. Regarding organic-bearing micrometeoroid capture, this sub-theme tries to detect organic compounds in micrometeoroids in order to discuss whether meteoroids containing prebiotic organic compounds can reach in pristine states by the LEO. Captured particles and their penetration tracks in the aerogels will be offered for various analyses after retrieval to the Earth in 2016, 2017 and 2018.

Initial Analysis and Curation: Its initial sample analysis and curation will be conducted by its Preliminary Examination Team. Its plan covers the receipt of retrieved samples, their initial inspection and documentation, processing and distribution of the samples for detailed analyses of each sub-theme, cataloging for data archiving and sample storage. They will map and measure aerogel penetration tracks and captured particles (e.g., incoming angle, track depth and track volume) and process "aerogel keystones" containing microparticles inside and their penetration tracks for allocation to respective sub-theme researchers, in accordance with their requests for the subsequent detailed analyses.

References: [1] Yamagishi A. et al. 2009. *Trans. JSASS Space Tech. Jpn.* 7: Tk 49-Tk 55. [2] Tabata M. et al. 2011. *Biol. Sci. Space*. 25: 7-12. [3] Yokobori S. et al. 2009. *Life Evol. Biosph*. 39: 377-378. [4] Kobayashi K. et al. 2009. *Orig. Life Evol. Biosph*. 39: 4.