

Biological contamination control for silica aerogels in the Tanpopo mission

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The capture and exposure panels of the Tanpopo mission, in which the panspermia hypothesis and chemical evolution are investigated, are onboard the Japanese Experimental Module (JEM) of International Space Station at about 400 km altitude since this spring. Micrometeoroid space debris and possible terrestrial aerosols are expected to be captured by ultra low-density silica aerogels that would be exposed in space at least one year. After returning back to the earth, the aerogels with "carrot-shaped" tracks formed by hypervelocity impacts of these microparticles should be documented, dissected and delivered to scientists for detailed analysis as soon as possible. During this process, biological contamination as well as chemical one must be avoided (Kiyonaga et al., 2013). Thus, in this study - (1) fabrication of aerogel processing machine called "Yokan Machine", (2) novel evaluation method for biological contamination, and (3) a procedure for pre-flight aerogel surface observation - will be reported from pre-flight simulation in the Tanpopo clean room at ISAS. Time required for the processing of aerogels was estimated from (1). Microbial contamination possibly from human skin during the period was evaluated using several methods including conventional particle counting and chemiluminescence. A novel method using model microbes was also performed. Methods for biological contamination control will be discussed.

Reference

Y. Kiyonaga et al. (2013) Method for Biological Contamination Monitoring During Aerogel Cutting Process in Tanpopo Project Using Bioluminescent Bacteria *Photobacterium kishitani*. In International Astrobiology Workshop 2013, p. 33. LPI Contribution No. 1766, Lunar and Planetary Institute, Houston.

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