

Preliminary experiments for capture of cosmic dusts in Earth orbit and analysis of amino acids in them

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Did life come from space? Did organic compounds for the first life come from space? In order to verify such panspermia (or chemo-panspermia) hypothesis, we are planning the Tanpopo mission by using the exposed facility of Japanese experimental module (JEM) of the international space station (ISS). Here we report our preliminary experiments to catch high-velocity particles with low-density aerogel, and to analyze ultratrace level of amino acids in the captured particles. Exposure of organic compounds and microorganisms are also planned.

Since cosmic dusts are moving in space at very high speed (*ca.* 8 km/s), we are planning to use ultra-low density (*ca.* 0.01 g/cm³) aerogel to catch them. In order to analyze amino acids in captured dusts, aerogel fragments with impact tracks should be analyzed after acid hydrolysis. It was proved that conventional aerogel gave a high amino acid background. We are trying to make cleaner aerogel to reduce the background. We are now examining the possibility to catch organic compounds and microorganisms in dusts by ground simulation experiments with a two-stage light gas gun equipped at ISAS/JAXA.

In the exposure experiments, metal substrates with holes will be used. It is necessary to find the way to recover organic compounds from the holes with high recovery ratio. In order to simulate the exposure experiments in space, we are now performing / planning X-ray irradiation, heavy ions irradiation and atomic oxygen irradiation of target molecules and organisms.