

## Study of the presolar history and solar system formation using isotopic measurements

Hisayoshi Yurimoto

( Division of Earth and Planetary Sciences, Hokkaido University, Professor )

### 【Outline of survey】

Recently a group of principal researcher discovered original materials for terrestrial planets in the solar system (Nature 428, 921; 2004), new theory of oxygen isotope heterogeneity in the solar system (Science 305, 1763; 2004), and new formation sequence of primitive solids in the solar nebula (Nature 423, 728; 2003). These results are inconsistent with the conventional scenario of the solar system formation. In order to rebuild the scenario it is necessary to collect further evidence occurred in the early solar and pre-solar events from primitive meteorites. In this project we systematically determine mineral species of presolar grains and the relative abundances in many meteorite types. We specify origin and evolution of oxygen isotope anomaly in the solar system. We also study precise chronology of formation and evolution of dust materials in the solar nebula. These measurements will be compared with numerical simulation of element synthesis and dust evolution in the space. Based on these results, we will propose a novel self-consistent model of solar system formation. The model will be generalized to formation scenario of extra-solar planetary system.

### 【Expected results】

The present work will determine spatial and temporal isotopic structure of the solar nebula and the evolution, and also show sources of nuclides of the solar system materials. These results cannot be expected by conventional studies. Therefore, these results pioneer a new field in cosmochemistry and develop a new interface to astrophysics. The concept of the solar system formation proposed in this study will be directly applied to extra-solar planetary system, which will be found another life.

### 【References by the principal researcher】

Nagashima, K., Krot, A. N. and Yurimoto, H. (2004) Stardust silicates from primitive meteorites. Nature 428, 921-924.

Yurimoto H. and Kuramoto K. (2004) Molecular cloud origin for the oxygen isotope heterogeneity in the solar system. Science 305, 1763-1766

【Term of project】 FY 2005 - 2009

【Budget allocation】 86,100,000 yen

【Homepage address】 <http://www.geo.titech.ac.jp/yurimotolab/>