

**Importance of amorphous silicates as source material of the solid planets
and its initial evolution**

Akira Tsuchiyama

(Osaka University, Graduate School of Science, Professor)

【Outline of survey】

Amorphous silicate dust (~0.1 μm in size) in interstellar region is the source material for solids in the Solar system. However, a role of the amorphous dust had not been understood well. Silicates, which are main constituent of solid planets, are basically present as crystalline minerals in primitive meteorites, and researches on these minerals have been developed. In contrast, it has been known that primitive amorphous silicates are present in anhydrous cosmic dust of possible cometary origin as GEMS and in unique carbonaceous chondrites as amorphous silicate matrix. Moreover, cosmic dust was collected by Stardust mission in January 2006, and evidences for the cometary origin of the anhydrous cosmic dust have been extensively proposed. In the present research project, experiments and mineralogical studies on primitive extra-terrestrial materials (Stardust samples, cosmic dust and primitive meteorites) are combined together to elucidate a role of amorphous silicates in the Solar system formation as the source material and their evolution.

【Expected results】

It is expected that amorphous silicates as the source material for primitive solid planetesimals will be proved in the light of material science and their structures, physical properties and chemical reactivity will be characterized. It is also expected that the evolutions of the amorphous silicates in comets and in primitive asteroids (crystallization and hydrothermal alternation) will be understood, and pre-biotic evolution by interaction between organic materials and the amorphous silicates will be discussed. Moreover, the evolution of amorphous silicates in circum- and inter-stellar regions before the Solar system formation will be understood.

【References by the principal investigator】

- G. J. Flynn et al. (2006) Elemental Compositions of Comet 81P/Wild 2 Samples Collected by Stardust, *Science*, **314**, 1731-1735.
- M. E. Zolensky et al. (2006) Mineralogy and Petrology of Comet 81P/Wild 2 Nucleus Samples, *Science*, **314**, 1735-1739.

【Term of project】 FY2007—2011

【Budget allocation】 52,900,000 yen

(2007 direct cost)

【Homepage address】

<http://astrogranma.ess.sci.osaka-u.ac.jp/>