

**Quest for the Compositional identification and  
Chemical evolutionary understanding of the interstellar carbonaceous dust  
based on the experiment using JEM/ExHAM on the ISS**

I. Sakon,<sup>1</sup> T. Onaka,<sup>1</sup> Y. Kimura,<sup>2</sup> S. Kimura,<sup>3</sup> M. Nakamura,<sup>4</sup> A. Ichimura,<sup>5</sup> and S. Wada<sup>3</sup>

<sup>1</sup>*Department of Astronomy, Graduate School of Science, University of Tokyo, Japan*

<sup>2</sup>*Institute of Low Temperature Science, Hokkaido University, Japan*

<sup>3</sup>*Coordinated Center for UEC Research Facilities, The University of Electro-Communication,  
Japan*

<sup>4</sup>*Collage of Science and Technology, Nihon University, Japan*

<sup>5</sup>*Institute of Space and Astronautical Science, JAXA, Japan*

The primordial form of cosmic solid is produced as a result of the dust/molecular nucleation in the stellar gas wind ejected from the evolved stars and is denatured in the circumstellar environment to become the member of the interstellar dust. However, the true compositional identification of cosmic carbonaceous dust grains has not been made successfully and, as a consequence, the evolutionary processes of interstellar dust in galaxies are not fully understood. Laboratory approaches have played an important role in providing observational astronomers accurate knowledge to derive the compositional, chemical, and physical properties of interstellar dust from the observed infrared spectrum of various astrophysical sources. In many cases, however, the dust particles that we treat in the laboratory are not always identical to the actual interstellar dust and, therefore, the attempts to identify the physical/chemical processes that associate the laboratory-synthesized dust with the actual interstellar dust are highly in demand.

We have proposed an experimental investigation program using JEM/ExHAM on the International Space Station (ISS) aiming to obtain accurate knowledge on the compositional, chemical and physical properties of interstellar dust. In this program, several laboratory-synthesized carbonaceous compounds including quenched carbonaceous composites (QCCs; Sakata et al. 1983) and nitrogen-bearing hydrocarbons, which are the valid candidates of primordial carbonaceous dust condensed in the AGB stellar ejecta, are planned to be brought and exposed to the cosmic environment at ISS orbit for ~1 year by means of JEM/ExHAM. The primary goal of this project is to identify the true carriers of the unidentified infrared (UIR) bands (e.g., Gillett et al. 1973) and those of the 2175Å interstellar extinction bump (Stecher 1965). In this presentation, we introduce the current status of our exposure experiment program titled "Quest for the Compositional identification and Chemical evolutionary understanding of the Interstellar Carbonaceous Dust based on the experiment using JEM/ExHAM on the ISS".

## References

- [1] A. Sakata et al. 1983, Nature, 301, 493
- [2] F.C.Gillett, W.J.Forrest, and K.M.Merrill 1973, The Astrophysical Journal, 183, 87-93
- [3] T. P. Stecher, 1965, The Astrophysical Journal, 142, 1683