

A MICRO-SPECTROSCOPIC RESEARCH FOR SEVERAL STONY AND CATEGORY 3 (ORGANIC) PARTICLES.

F. Kitajima¹, M. Kotsugi², T. Ohkochi², H. Naraoka¹, Y. Ishibashi³, M. Uesugi³, Y. Karouji³, M. Abe³, A. Fujimura³, T. Yada³, R. Okazaki¹, T. Nakamura⁴, T. Noguchi⁵, K. Nagao⁶, A. Tsuchiyama⁷, H. Yurimoto⁸, M. Ebihara⁹, M. Ito¹⁰, H. Yabuta¹¹, H. Mita¹², Y. Takano¹⁰, T. Mukai³, S. A. Sandford¹³, T. Okada³, K. Shirai³, M. Ueno³, M. Yoshikawa³, and J. Kawaguchi³. ¹Dept. Earth Planet. Sci., Kyushu Univ. E-mail: kitajima@geo.kyushu-u.ac.jp. ²Spring-8/JASRI ³ISAS/JAXA ⁴Dept. Earth Planet. Mater. Sci., Tohoku Univ. ⁵Coll. Sci., Ibaraki Univ. ⁶Geochem. Res. Center, Univ. Tokyo ⁷Dept. Geol. and Mineral., Kyoto Univ. ⁸Natl Hist. Sci., Hokkaido Univ. ⁹Grad. School Sci. Engineer. Tokyo Metropol. Univ. ¹⁰JAMSTEC ¹¹Dept. Earth Space Sci., Osaka Univ. ¹²Dept. Life Environ. Mater. Sci., Fukuoka Inst. Tech. ¹³NASA/ARC.

Introduction: Several stony and Category 3 (organic) particles returned by the HAYABUSA mission were analyzed in search of chondritic insoluble organic matter (IOM). IOM is the major fraction of the chondritic carbonaceous matter [1], and it suggests that to what extent thermal metamorphism has proceeded [2-6]. We report here the Raman and IR results of two stony particles from the room B and three Category 3 particles, together with the results of photoemission electron microscopy (PEEM) analysis of several stony particles.

Samples and methods: Two particles from the room B (RB-QD04-0025 and RB-QD04-0049) and two Category 3 particles (RA-QD02-0008 and RB-QD04-0001) were analyzed by micro-Raman and FTIR techniques as intact as possible using a sample holder made from diamond plates [7-8]. Two Category 3 particles (RB-QD04-0047-02 and RB-QD04-0001) pressed onto gold plates were also analyzed. Four stony particles (RA-QD02-0010, RA-QD02-0031, RA-QD02-0068, and RB-QD04-0025) prepared as potted butt were investigated by PEEM at the end-station of BL17SU in SPring-8.

Results and Discussion: The Raman bands from RB-QD04-0049 can be assigned to olivine as its major mineral. The bands from RB-QD04-0025 can be assigned to pyroxene and merrillite. However the spectra of these two particles lack in any Raman bands relating to carbonaceous matter. A PEEM image of RA-QD02-0068 showed one carbon-rich phase in this particle, however, the estimated peak metamorphic temperature of this phase by Raman spectrum (248.0°C) seems too low for this particle. The IR spectrum of the Category 3 particle RA-QD02-0008 is characterized by broad O-H stretching, however, unlike chondritic IOM, aliphatic C-H stretching was not observed. The IR spectra of RB-QD04-0047-02 and RB-QD04-0001 also lack in aliphatic C-H stretching. The spectral features are different from that of chondritic IOM.

References: [1] Sephton M. A. 2002 *Nat. Prod. Rep.* 19:292-311. [2] Kitajima F. et al. 2002 *GCA* 66:163-172. [3] Quirico E. et al. 2005 *Planetary and Space Science*, 53:1443-1448. [4] Sandford S. A. et al. 2006 *Science* 314:1720-1724. [5] Cody G. D. et al., 2008 *Earth Planet. Sci. Lett.* 272:446-455. [6] Kebukawa Y. et al. 2010 *Meteoritics & Planetary Science* 45:99-113. [7] Kitajima F. et al. 2011 *42th Lunar & Planetary Science Conference*. Abstract #1855. [8] Kitajima F. et al. 2011 *74th Annual Meeting of the Meteoritical Society*. Abstract #5341.