

**ADDITIONAL EVIDENCE FOR THE PRESENCE OF**

**CHONDRULES IN COMET 81P/WILD 2.** T. Nakamura<sup>1</sup>, T. Noguchi<sup>2</sup>, A. Tsuchiyama<sup>3</sup>, T. Ushikubo<sup>4</sup>, N. T. Kita<sup>4</sup>, J. W. Valley<sup>4</sup>, N. Takahata<sup>5</sup>, Y. Sano<sup>5</sup>, M. E. Zolensky<sup>6</sup>, Y. Kakazu<sup>1</sup>, K. Uesugi<sup>7</sup>, and T. Nakano<sup>8</sup>. <sup>1</sup>Kyushu University, Fukuoka 812-8581, Japan (tomoki@geo.kyushu-u.ac.jp), <sup>2</sup>Ibaraki University, Mito 310-8512, Japan, <sup>3</sup>Osaka University, Toyonaka 560-0043, Japan, <sup>4</sup>University of Wisconsin-Madison, WI 53706-1692, USA, <sup>5</sup>University of Tokyo, Tokyo 164-8639, Japan, <sup>6</sup>NASA/JSC Houston, TX 77058, USA, <sup>7</sup>Japan Synchrotron Radiation Research Institute, SPring-8, Hyogo 679-5198, Japan, <sup>8</sup>Geological Survey of Japan, Tsukuba 305-8567, Japan.

Wild 2 particles include a variety of crystalline particles and show a wide range of oxygen isotope ratios [e. g., 1-4]. These facts suggest that individual crystals might have formed from multiple oxygen reservoirs at high temperatures. The high-temperature components in Wild 2 are similar to CAIs and chondrules in chondrites [1,5], which indicates material continuum between asteroids and Kuiper-belt objects [6]. We found two Wild 2 particles, in addition to four particles already reported [5], that are similar to chondrules.

C2081,1,108,2,0 and C2081,1,108,3,0 are terminal particles of a large 1.3 mm long track. Synchrotron XRD and CT analysis indicates that C2081,1,108,2,0 consists of two different fabrics: the poikilitic portion made of olivine, low-Ca pyroxene, and FeNi metal and the dendritic portion made of high-Ca pyroxene, plagioclase, and SiO<sub>2</sub>-rich glass. Polishing of this particle allows the poikilitic portion to appear on the flat surface and the dendritic portion remains below the surface. Electron microscopy of the poikilitic portion reveals that it contains rounded olivines in low-Ca pyroxene and both have similar Mg/(Mg+Fe) ratios at Fo96 and En 97. FeNi metal is kamacite. Oxygen isotope measurement using an approximately 2 micron Cs<sup>+</sup> diameter beam shows that isotope ratios of olivine and pyroxene make a cluster at around +2 permil in  $\delta^{18}\text{O}$  slightly above CCAM line but below TF line in the oxygen three isotope diagram. C2081,1,108,3,0 shows internal structure and mineral composition similar to C2081,1,108,2,0, but the former contains a smaller dendritic portion. Oxygen isotope ratios of olivine and low-Ca pyroxene also similar to those in C2081,1,108,2,0.

Oxygen isotope ratios of silicates in C2081,1,108,2,0 and C2081,1,108,3,0 and those of three other chondrule-like objects in Wild 2 [5] distribute within the compositional field of carbonaceous chondrite (CC) chondrules, suggesting a similarity between Wild-2 and CC chondrules. Some olivine and pyroxene in the other particles seem to have oxygen composition above TF line, although 2 sigma error bars encompass the field of CC chondrules [3]. If the Wild-2 chondrules are really similar only to CC chondrules, it is suggested that transportation of chondrules in the protoplanetary disk was spatially or temporally limited.

**References:** [1] Brownlee D.E. et al. (2006) *Science* 314, 1716-1716. [2] McKeegan K. D. et al (2006) *Science*, 314, 1724-1728. [3] Messenger S. et al. (2008) *Met. Planet. Sci.*, 43, #5308. [4] Leroux H. et al. (2008) *Met. Planet. Sci.*, 43, 97-120.[5] Nakamura T. et al. (2008) *Science*, 321,1664-1667. [6] Ishii H. et al. (2008) *Science*, 319, 447-450.