LARGE NITROGEN ISOTOPIC ANOMALIES IN ANTARCTIC MICROMETEORITES. P. Haenecour[1,2], C. Floss[1], A. Wang[2], and T. Yada[3]. [1]Laboratory for Space Sciences and the Physics Department, Washington University in St. Louis, One Brookings Dr., St. Louis, MO 63130, USA. (haenecour@wustl.edu). [2]Department of Earth and Planetary Sciences, Washington University in St. Louis. [3]Japan Aerospace Exploration Agency, Institute of Space and Astronautical Science, Sagamihara, Kanagawa 252-5210, Japan.

Introduction: Antarctic micrometeorites (AMMs) are extraterrestrial dust particles collected in Antarctica, which are intermediate in size between IDPs and meteorites. As in CR chondrites and IDPs [1,2], isotopic anomalies in several elements (e.g., H, C, N, O, Si) have been reported in AMMs [3-6]. Many of these anomalies reflect the presence of presolar grains (e.g., SiC, silicates, oxides). However, the origin(s) of the nitrogen isotopic anomalies associated with insoluble organic matter (IOM) remain poorly understood. Using a multi-technique approach (e.g., NanoSIMS, Auger spectroscopy, Raman imaging), we are investigating the origin(s) of the nitrogen anomalies in AMMs, and their possible relationships to those observed in IDPs and/or carbonaceous chondrites.

Experimental methods: We carried out NanoSIMS raster ion imaging of C, N and O isotopes in multi-collection mode in three fine-grained AMMs (T98H5, T00Iba030, and T98G6) to identify isotopic anomalies. A focused Cs^+ primary beam of ~1 pA (~100 nm) was rastered over surface areas of 10×10 or 20×20 μm^2 (256^2 pixels). We mapped a total of 24,900 μm^2 for C and O isotopes and 28,200 μm^2 for C and N isotopes. The O isotopic compositions were normalized internally, assuming solar values for the bulk AMM, and the N and C isotopic compositions were normalized to synthetic Si_3N_4 and SiC standards, respectively.

Results and discussion: Nitrogen isotopic anomalies have been identified in a primitive AMM with high presolar grain abundances, T98G8 [5]. Previous studies have indicated a possible link between high presolar grain abundances and the presence of nitrogen isotopic hotspots in CR chondrites and IDPs [1,2].

We identified large ^{15}N-rich hotspots in another AMM, T98H5. Like T98G8, it also has a ^{15}N-rich bulk isotopic composition, with an average $^{14}N/^{15}N$ ratio of 215 ± 9 (terrestrial $^{14}N/^{15}N$ = 272). However, this AMM does not contain particularly high abundances of presolar grains (~39 ppm for O-anomalous grains). T98H5 contains one extremely anomalous hotspot with a $\delta^{15}N$ of 10,811 ‰. To the best of our knowledge, this is the largest ^{15}N excess identified so far in AMMs and is significantly higher than what it is generally observed in IOM [5, 7]. The nitrogen isotopic ratio of this hotspot is more consistent with those typically observed in presolar Si_3N_4 and some SiC grains [8]. However, the $^{12}C/^{13}C$ ratio is normal and the ^{28}Si image does not show an enrichment i silicon in the grain.

We will use the Auger Nanoprobe to characterize the carriers of this and other N anomalies in T98H5, and will also acquire carbon molecular maps using an inVia® Raman Imaging System (Renishaw) [9] to obtain molecular and structural information.

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