NITROGEN ISOTOPIC ANOMALIES IN ALHA77307. M. Bose, C. Floss and F. J. Stadermann. Laboratory for Space Sciences and Physics Dept., Washington University, St. Louis, MO 63130. E-mail: mbose@physics.wustl.edu.

Introduction: Nitrogen isotopic anomalies have been associated with high presolar grain abundances in interplanetary dust particles (IDPs) [e.g., 1] and in the CR3 chondrites, QUE 99177 and MET 00426 [2]. The presence of N anomalies indicates the primitive nature of these extraterrestrial materials. The CO3 meteorite ALHA77307 has experienced minimal degrees of processing, evident from the abundance of O-anomalous grains [3, 4]. Here, we report on the N isotopic distributions in this meteorite.

Experimental: The NanoSIMS 50 was used to search for N anomalies in a thin-section of ALHA77307 by rastering a primary Cs^+ beam of ~1 pA over 10×10 μm^2 areas of matrix material, and collecting $^{12}C^-$, $^{13}C^-$, $^{12}C^{14}N^-$, $^{12}C^{15}N^-$ and $^{28}Si^-$ secondary ions and secondary electrons in multi-collection mode. The Auger Nanoprobe was used to obtain compositional information from areas with anomalous N isotopic compositions.

Results and Discussion: Isotopic imaging of 6700 μm^2 of matrix area led to the identification of areas with ^{15}N excesses that are heterogeneously distributed in the matrix. The N isotopic anomalies are present as discrete localized hotspots that have $\delta^{15}N$ excesses up to ~1000‰, relative to the terrestrial $^{14}N/^{15}N$ ratio of 272. The mean $^{14}N/^{15}N$ ratio of the N-anomalous areas is 175±2. Carbon isotopic compositions of most of the N-anomalous hotspots are normal within 2σ. However, two hotspots show enrichments in ^{13}C (70.0±0.8‰ and 43.9±0.3‰; relative to $^{12}C/^{13}C$ = 89), as well as ^{15}N (441.7±25.3‰ and 453.9±8.2‰, respectively).

Auger Nanoprobe analyses of the N-anomalous hotspots with an average size of about 0.6×0.6 μm^2, show predominantly C, suggesting that the carrier is probably carbonaceous matter, which may have formed through low-temperature ion-molecule reactions in cold molecular clouds [e.g., 5]. Presolar SiC can be ruled out as the carrier of the correlated ^{13}C and ^{15}N excesses in the two C-anomalous hotspots based on the high $^{12}C^-/^{28}Si^-$ ratios (25–38) and presence of only a C peak in their Auger spectra. However, we cannot rule out low-density graphite as a possible carrier.

The abundant N anomalies (about 370 ppm) suggest that interstellar components have been preserved in the matrix of ALHA77307. However, the normal bulk N isotopic composition of its insoluble organic matter [6] and the absence of diffuse N anomalies may suggest some alteration or destruction of pristine organics.

References: [1] Floss C. et al. (2006) *GCA*, 70, 2371. [2] Floss C. and Stadermann F. J. (2009) *ApJ*, 697, 1242. [3] Nguyen A. N. et al. (2008) *LPSC 39*, #2142. [4] Bose M. et al. (2009) *M&PS 72*, 5341. [5] Charnley S. B. and Rodgers S. D. (2002) *ApJ*, 569, L133. [6] Alexander C. M. O'D. et al. (2007) *GCA*, 71, 4380.