

Presolar materials and isotope anomalies in the unique carbonaceous chondrite Miller Range 07687

J. DAVIDSON^{1*}, L. R. NITTLER¹
AND C. M. O'D. ALEXANDER¹

¹DTM, Carnegie Institution of Washington, Washington, DC
20015 (correspondence: j davidson@dtm.ciw.edu)

Introduction

We report the results of a NanoSIMS 50L ion imaging study of the unique ungrouped Antarctic carbonaceous chondrite Miller Range (MIL) 07687. MIL 07687 has an estimated subtype of 3.00 [1] and exhibits an unusual type of partial and localized aqueous alteration that has resulted in two apparent matrix lithologies [2].

Results and Discussion

A total of 29 presolar O-anomalous (124 ppm) and 20 presolar SiC grains (63 ± 17 ppm) were identified, as well as other C-anomalies (not associated with Si). Abundant carbonaceous regions with anomalous N-isotopic compositions were seen with $\delta^{15}\text{N}$ values of up to $\sim 2,000$ ‰. O-anomalous grains have a silicate/oxide ratio of ~ 5 and O-isotopic compositions similar to those previously reported [3]. The presolar O-anomalous grain abundance of MIL 07687 is slightly lower than abundances determined for other primitive chondrites, such as the ungrouped chondrite Acfer 094 (145–190 ppm [4,5]), but is significantly lower than that of CO3.00 DOM 08006 (338 ppm [6]). A presolar SiC abundance of 63 ± 17 ppm agrees with those reported in other primitive chondrites [e.g., 7].

Summary

High presolar grain abundances and the presence of ¹⁵N anomalous carbonaceous material indicate that this chondrite is of low petrographic type, in agreement with petrographic observations [1].

[1] Davidson J. *et al* (2014) *LPSC XLV*, #1384. [2] Brearley (2012) *LPSC XLIII*, #1233. [3] Hynes and Gyngard (2009) *LPSC XL*, #1198. [4] Nguyen and Zinner (2004) *Science* **303**, 1496-1499. [5] Vollmer *et al* (2009) *GCA* **73**, 7127-7149. [6] Nittler *et al* (2013) *LPSC XLIV*, #2367. [7] Davidson *et al* (2009) *LPSC XL*, #1853.