Contribution ID: **246** Type: **Poster**

Presolar SiC grains of Type AB with isotopically light nitrogen: Contributions from supernovae?

Tuesday, 26 June 2018 19:00 (1h 30m)

Primitive solar system materials contain small concentrations of presolar grains that formed in the winds of evolved stars and in the ejecta of stellar explosions [1]. Presolar SiC is the best studied presolar mineral. Among them are so-called Type AB grains which have low 12C/13C ratios of <= 10. This population of presolar SiC grains appears to originate from multiple types of stellar sources, namely, supernovae (SNe) for grains with isotopically heavy N (14N/15N < 440) [2], and born-again AGB stars [3] and in particular J-type carbon stars for grains with isotopically light N (14N/15N >= 440) [4].
Here, we report on high resolution (< 100 nm) measurements of C-, N-, Mg-Al-, Si-, and S-isotopic compositions of 10 SiC AB grains from Murchison separate KJD (median size 0.81 micrometer) [5] conducted with the NanoSIMS ion probe at MPI for Chemistry with Cs and Hyperion O ion sources. Except for one grain with the highest 12C/13C ratio we find good correlations between 12C/13C, 14N/15N, and 26Al/27Al. There is an almost perfect 1:1 correlation between Al and N concentrations, suggestive of AlN and low levels of contamination. Magnesium is essentially monoisotopic 26Mg from 26Al decay (half life: 0.72 Myr). Sulfur isotope anomalies are generally small and Si-isotopic compositions plot along the SiC mainstream line. Four of our AB grains have light N with 14N/15N up to 1000. The correlations between C-, N-, and Al-isotopic ratios are well explained by the 25 Msun SN model 25T-H of [6] when matter from the O/nova zone, which experienced explosive H burning, and above (6.847-13.3 Msun) is mixed with matter that experienced only partial H burning, taken from the outer layers in the 12 Msun model of [7], as suggested by [2], and if the 12C/13C ratio in the 25T-H model is decreased by a factor of 3. The comparison of our data with model 25T-H suggests that SNe might have contributed not only AB grains with heavy N but also some of those with light N.

[1] E. Zinner, in Treatise on Geochemistry, ed. A. M. Davis, Vol. 1(2014)181.
[2] N. Liu et al., ApJL 842(2017)L1
[3] S. Amari et al., ApJ 559(2001)463
[4] N. Liu et al., ApJL 844(2017)L12
[5] S. Amari et al., GCA 58(1994)459
[6] M. Pignatari et al., ApJL 808(2015)L43
[7] S. Woosley & A. Heger, PhR 442(2007)269

Primary author: HOPPE, Peter (Max Planck Institute for Chemistry)

Co-authors: PIGNATARI, Marco (University of Hull); AMARI, Sachiko (Washington University, St. Louis)

Presenter: HOPPE, Peter (Max Planck Institute for Chemistry)

Session Classification: Poster session