

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

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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  $^{12}\text{C}/^{13}\text{C}$  ratios of  $\leq 10$ . This population of presolar SiC grains appears to originate from multiple types of stellar sources, namely, supernovae (SNe) for grains with isotopically heavy N ( $^{14}\text{N}/^{15}\text{N} < 440$ ) [2], and born-again AGB stars [3] and in particular J-type carbon stars for grains with isotopically light N ( $^{14}\text{N}/^{15}\text{N} \geq 440$ ) [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  $^{12}\text{C}/^{13}\text{C}$  ratio we find good correlations between  $^{12}\text{C}/^{13}\text{C}$ ,  $^{14}\text{N}/^{15}\text{N}$ , and  $^{26}\text{Al}/^{27}\text{Al}$ . 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  $^{26}\text{Mg}$  from  $^{26}\text{Al}$  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  $^{14}\text{N}/^{15}\text{N}$  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  $^{12}\text{C}/^{13}\text{C}$  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.

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[4] N. Liu et al., *ApJL* 844(2017)L12

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