ISOTOPIC ANALYSIS OF PRESOLAR SIC GRAINS OF POSSIBLE NOVA ORIGIN.

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Introduction: Very low $^{12}C/^{13}C$ and $^{14}N/^{15}N$ ratios are the most diagnostic in linking presolar grains to a nova origin [1]. The isotopic compositions of some nova grain candidates, however, can also be explained by mixing of different supernova regions. The origin of most of the ^{13}C- and ^{15}N-rich SiC grains is thus ambiguous without isotopic data for more trace elements [2]. It is highly desirable to find additional nova grain candidates and measure their isotopic compositions for a number of elements.

Samples and Methods: The SiC grains in this study were extracted from the Murchison meteorite by means of the isolation method of [3], dispersed on a high purity Au foil, and pressed into the foil with a sapphire disk. We simultaneously analyzed the C, N and Si isotopic compositions of these grains with the Carnegie NanoSIMS 50L ion microprobe using a Cs^+ beam and standard methods.

Results & Discussion: The C, N and Si isotope data of five nova candidates and one ungrouped grain are summarized in the Table. Four of the five grains (AG1, AG2_1, AG2_6, G270) have higher $^{12}C/^{13}C$ and $^{14}N/^{15}N$ ratios than those of previous nova grains, most likely due to contribution from organic contamination on the sample mount, while their Si isotope ratios agree with nucleosynthetic model predictions for ONe novae. Interestingly, although GAB has extremely low $^{12}C/^{13}C$ and $^{14}N/^{15}N$ ratios, it has excesses in both $\delta^{29}Si$ and $\delta^{30}Si$. The $^{29,30}Si$ excesses are comparable to type C grains, which probably formed in supernovae [4]. In addition, G489 meets all the isotopic characteristics of the unusual grain reported in [5] and therefore might have a supernova origin.

We also measured S isotopes on GAB because the nova model with the best determined $^{33}S(p,\gamma)^{34}Cl$ rate predicts positive $\delta^{33}S$, while recent type II supernova models predict negative $\delta^{33}S$ [6]. However, the S concentration of GAB is extremely low (<0.03 wt.%) and its S isotope ratios are normal within uncertainties, which may be caused by contamination. Sulfur isotopes will be measured in the other grains soon. We also plan to measure the Al-Mg and Ti isotopes of these grains to better constrain the nucleosynthetic and mixing processes that occurred in their parent stars.

Grains	$^{12}C/^{13}C$	$^{14}N/^{15}N$	$\delta^{29}Si$ (‰)	$\delta^{30}Si$ (‰)
GAB	1.6±0.02	12.7±0.3	230±6	426±7
AG1	25±0.6	34±1	-262±49	33±61
AG2_1	22±0.5	67±3	-304±26	319±38
AG2_6	30±0.7	23±1	-340±57	263±82
G270	16±0.2	23±1	-282±101	-3±131
G489	92±2	195±13	377±34	55±31

References: [1] Amari et al. 2001. *The Astrophysical Journal* 551:1065-1072. [2] Nittler & Hoppe 2005. *The Astrophysical Journal* 631:L89-L92. [3] Alexander & Nittler 1999. *The Astrophysical Journal* 519:222-235. [4] Pignatari et al. 2013. *The Astrophysical Journal Letters* 771:L7. [5] Hoppe et al. 2009. *The Astrophysical Journal* 691:L20-L23. [6] Parikh et al. 2014. *Physics Letter B* 737:314-319.