PRESOLAR SiC GRAINS OF TYPE A+B.

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We report C-, N-, Mg-Al, Si-, and Ti-isotopic ratios in 64 type A and B grains from the Murchison KJG SiC fraction [1]. Type A and B grains have low ^{12}C/^{13}C ratios (<3.5 for A grains, 3.5-10 for B grains) [2]. The grains of this study had previously been located by high-mass-resolution ion imaging [3].

^{14}N/^{15}N ratios range from 14 to 5800. Grain KJGM4C-311-6, whose ^{14}N/^{15}N ratio is 13.7±0.1, has a lower limit of 0.08 for ^{26}Al/^{27}Al, the highest ratio measured in SiC except type X grains. The Si-isotopic ratios of most A+B grains are similar to those of mainstream SiC grains, as previously observed [2,4,5]. However, 3 grains show significant enrichment of ^{30}Si relative to the mainstream trend (Fig. 1). Interestingly, the two grains with the highest ^{30}Si enrichments (KJGM4C-100-3 and KJGM4C-311-6) have the lowest ^{14}N/^{15}N and the highest ^{26}Al/^{27}Al ratios among the A+B grains of this study.

J-type carbon stars and CH stars have been proposed as stellar sources of A+B grains [2,6]. Hoppe *et al.* [5] explained the C- and N-isotopic ratios of A+B grains by mixing of two nucleosynthetic products, that of Cool Bottom Processing (or extra mixing) [7,8] and that of hot CNO burning. Extra mixing is believed to occur in low-mass stars ($M<2M_{\odot}$) when they ascend the red giant branch, resulting in low ^{12}C/^{13}C (~4) and high ^{14}N/^{15}N ratios. The C- and N-isotopic ratios of A+B grains with ^{14}N/^{15}N>1300 (highest ratio expected without extra mixing [2]) can be explained by this process.

The stellar sources of A+B grains with low ^{14}N/^{15}N ratios (<~500-800) are not well established. Low ^{12}C/^{13}C ratios, the (very rough) inverse correlation between ^{14}N/^{15}N and ^{26}Al/^{27}Al ratios seen in many grains, and ^{30}Si enrichments relative to the main trend in some grains point toward hot H burning. For Si to be affected by hot H burning, Starrfield *et al.* [9] assumed a peak temperature of 2-4¥10^{8}K in ONeMg novae, where huge ^{30}Si enrichments (d^{30}Si/^{28}Si ~ 5000‰) are produced. The types of stars and evolutionary stages in which such hot H-burning could operate are uncertain. Hoppe *et al.* [5] suggested that J-type stars may experience a violent core-He flash and that hot ^{12}C can be mixed into the H-rich region [10]. Recently, Cassisi *et al.* [11] reported that metal-deficient low-mass stars experience an unusually strong He-shell flash during the double-shell burning phase and that a large number of protons are injected into the high-temperature He-burning region, resulting in the complete burning of H at a very high temperature in a very short time. However, such a process occurs in stars of extremely low metallicity ($Z=10^{-10}$; $Z_{\odot}=0.02$) and it is highly unlikely that A+B grains in meteorites originated from such low-metallicity stars 4.5 billion years ago. It remains to be seen whether any stars experience hot H burning during their evolution.

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