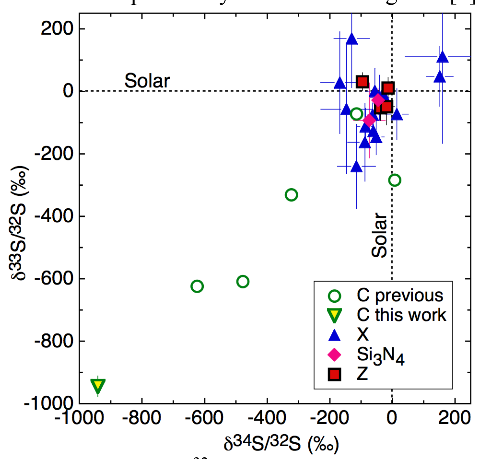
ISOTOPIC MEASUREMENTS OF RARE SUBMICROMETER-SIZED SiC GRAINS FROM THE MURCHISON METEORITE Y. C. Xu[1,2], S. Amari[1], F. Gyngard[1], E. Zinner[1] and Y. Lin[3] [1]Laboratory for Space Sciences and Physics Department, Washington University, St. Louis, MO, USA. (yxu32@wustl.edu). [2]Institute of Geochemistry, Chinese Academy of Sciences, Guiyang 550002, China. [3]Key Laboratory of Earth's Deep Interior, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China.

Introduction: Presolar SiC grains have been divided into subtypes based on their C and Si isotopic compositions [1]. The search for rare types of grains has been facilitated by the development of an automatic grain mode analysis program for the NanoSIMS [2]. We report results from the automatic analysis of SiC grains of sizes 0.5–0.8 µm from the KJE size separate of the Murchison meteorite [3].

Experimental: For the automatic grain analysis the C and Si isotopes were measured in multidetection by rastering a primary Cs^+ beam over 40 x 40 um^2 large areas. After identification of different grain types, N and S isotopic measurements were made on selected grains in imaging mode in order to assess possible S contamination. This was followed by Al-Mg and Ca-Ti isotopic analyses to look for the initial presence of ^{26}Al and ^{44}Ti.

Results and Discussion: Among 1118 analyzed grains we found 63 SiC AB grains (5.7%), one C grain (0.1%), 17 X grains (1.5%), 64 Y grains (5.8%), 55 Z grains (5.0%), 5 nova candidates (0.5%) and 5 X-type Si_3N_4 grains (0.5%). These abundances are similar to those previously found in somewhat smaller grains [4]. The C grain has $^{12}C/^{13}C$ = 192, $^{14}N/^{15}N$ = 58, δ^{29}Si = 1345±19‰, δ^{30}Si = 1272±19‰. It has an enormous ^{32}S excess (δ^{33}S = –944±33‰, δ^{34}S = –941±14‰; see figure). This is the largest ^{32}S excess ever observed. The S isotopic composition is almost that calculated for the Si/S zone in a 15$M_\odot$ SNII model [5]. The C grains has δ^{26}Mg = 2625±394‰ and δ^{44}Ca = 974±213‰, with initial $^{26}Al/^{27}Al$ and $^{44}Ti/^{48}Ti$ ratios of 1.7×10^{-3} and 4.2×10^{-2}, respectively, the first somewhat smaller, the second comparable to values previously found in two C grains [6].



Type X grains tend to have ^{32}S excesses but errors are large. Still, two grains have ^{33,34}S deficits of more than 2σ and another five grains ^{34}S deficits of more than 2σ. One grain has a ^{34}S excess of more than 2σ. One Si_3N_4 grain has extreme C and N ratios ($^{12}C/^{13}C$=7.9, $^{14}N/^{15}N$=4.5), usually indicating a nova origin. However, its Si isotopic ratios are that of an X grain (δ^{29}Si = –434±6‰, δ^{30}Si = –317±6‰), thus a SN origin is more likely. It has marginal $^{33.34}$S deficits, which however, within the errors, are consistent with normal S.

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