SULFUR ISOTOPIC COMPOSITIONS OF INTERPLANETARY DUST PARTICLES. S. Mukhopadhyay,[1] L. R. Nittler[1], S. Messenger,[2,3] D. E. Brownlee,[4] D. J. Joswiak[4] and L. P. Keller[3], [1]Dept. of Terrestrial Magnetism, Carnegie Institution of Washington, 5241 Broad Branch Rd NW, Washington DC 20015, [2]Dept. of Physics, Washington University, St. Louis, MO 63130, [3]NASA Johnson Space Center, Houston, TX 77058, [4]Dept. of Astronomy, University of Washington, Seattle, WA 98195.

Introduction: Interplanetary Dust Particles (IDPs) are amongst the most primitive material available for laboratory studies of astrophysical processes. The high abundance of presolar silicates, including S-rich GEMS grains, in IDPs [1] suggests that presolar S-isotope anomalies could be present in IDPs. We previously reported the first S measurements of five large (>~10μm) sulfide-rich IDPs [2]. We report additional isotope data here for ~130 S-rich grains of size 0.1-15μm from nine IDPs. We have found no evidence for large S isotopic anomalies, though we identified an ^{17}O rich presolar grain, similar to those reported by [1].

Experimental: Seven 10-15 μm sulfide grains were measured with the Carnegie ims-6f ion probe for $^{33,34}S/^{32}S$ ratios. Two of these were pressed into Au foils and five were polished thick sections embedded in epoxy. Measurements of standards indicate a reproducibility of 5-10‰ (1σ). Five ultramicrotomed sections of two IDPs were analyzed by multi-collection scanning ion imaging (~100nm resolution) with the Washington University NanoSIMS. All five were analyzed for $^{17}O/^{16}O$ and $^{34}S/^{32}S$, two of the five were also analyzed for $^{18}O/^{16}O$, and $^{33}S/^{32}S$ was determined for the other three. Isotopic ratios were determined for 125 individual S-rich subgrains defined in the images. Instrumental fractionation was corrected for by normalizing isotopic ratios to the average of all subgrains within a given image.

Results and Discussion: Repeat analysis did not confirm a previously-reported [2] marginal anomaly in one IDP. In fact, there is no hint of $\delta^{33}S$ or $\delta^{34}S$ values outside of ±50‰ for the ~130 grains we have measured. One S-rich grain (probably GEMS) was found to have a large ^{17}O excess ($\delta^{17}O$~500‰) indicating a presolar origin. Both the $^{18}O/^{16}O$ and $^{34}S/^{32}S$ ratios were within error of normal in this grain.

The lack of large S isotopic anomalies in IDPs is perhaps not surprising given the high degree of homogeneity of this element in bulk meteorites [3] and CAIs [4]. Unlike the presolar GEMS reported by [1], the grain reported here is rich in ^{17}O. Oxygen-17-rich compositions of refractory oxides are taken to indicate condensation in a red giant star's atmosphere. However, it is not clear that grains with the physical and chemical properties of GEMS would condense in circumstellar outflows. Perhaps the ^{17}O is a vestige of a larger initial anomaly, which has been diluted, but not erased, by processing in the interstellar medium. In such a case, any original S-isotopic anomaly might have been completely erased. Alternatively, S isotopes might be very uniform in different stellar sources so that circumstellar grains would not exhibit anomalous S. Nucleosynthetic considerations suggest that the largest anomalies in Galactic S would be expected in ^{36}S [5], but the low abundance of this isotope has thus far precluded its measurement in IDPs.

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