IDENTIFICATION OF SMALL PRESOLAR OXIDE GRAINS BY MULTI-DETECTION ISOTOPIC RASTER IMAGING. A. Nguyen[1], E. Zinner[1], and R. S. Lewis[2], [1]Laboratory for Space Sciences and the Physics Department, Washington University, St. Louis, MO 63130, USA. [2]Enrico Fermi Institute, University of Chicago, Chicago, IL 60637, USA. (nguyen@levee.wustl.edu)

Introduction: Oxygen isotopic analysis of individual grains from the spinel-rich Murray CG (average size 0.45 m) and CF (average size 0.15 m) residues with the NanoSIMS revealed a higher abundance of presolar spinel in the smaller size fraction CF (15/628 vs. 9/753 in CG) [1]. We applied another method of grain analysis, multi-detection raster ion imaging, to tightly packed regions of the same Murray CG and CF grain dispersion mounts. This led to the identification of 81 presolar spinel and 3 presolar corundum grains among ~51,700 grains in the CF residue, and 171 presolar spinel and 29 presolar corundum grains among ~21,500 CG grains.

Experimental: Isotopic analyses were made by rastering a ~100 nm large Cs^+ primary beam over 15x15 or 20x20μm^2 areas on the sample mount. Negative secondary ions of the three oxygen isotopes as well as MgO^- and AlO^- were counted in five different electron multipliers. $^{17}O/^{16}O$ and $^{18}O/^{16}O$ isotopic ratio images were produced from O secondary ion images (Fig. 1).

Results: Although presolar spinel has been believed to be extremely rare [e.g., 2], single grain analysis of small spinel grains from the Murray CG and CF residues led to the discovery of 26 presolar spinel grains [1]. Through raster ion imaging, we discovered 252 additional presolar spinel and 32 corundum grains in a shorter amount of time. The isotopic compositions and the abundance of CG presolar spinel agree with previous results (Fig. 2). The abundance of CF presolar spinel grains found in this study is comparatively smaller because, due to their small size, their anomalies are diluted by surrounding isotopically normal grains. Still, we are able to identify anomalous grains from CF. Thus, ion imaging is effective in detecting rare presolar grain types down to ~200nm. It has already led to the discovery of presolar silicates in IDPs [3] and will be employed in the search for presolar silicates in meteorites.

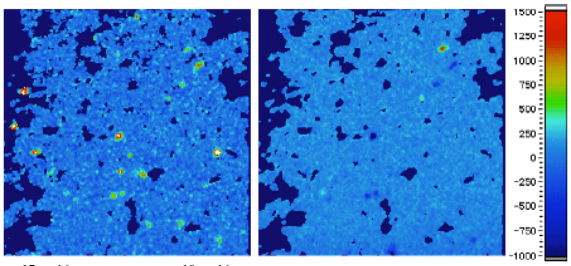
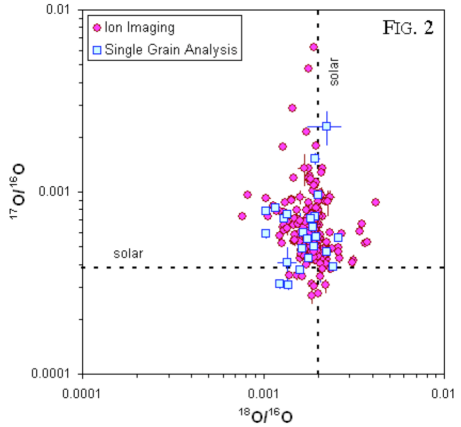


FIG. 1. $^{17}O/^{16}O$ (left) and $^{18}O/^{16}O$ (right) images displaying deviations from normal isotopic ratios in permil. Presolar grains have large anomalies.



References: [1] Zinner E. et al. (2003) *GCA,* in press. [2] Nittler L. R. (1997) In *Astrophysical Implications of the Laboratory Study of Presolar Materials,* (T. J. Bernatowicz and E. Zinner) 59. [3] Messenger S. et al. (2003) *Science* 300, 105.