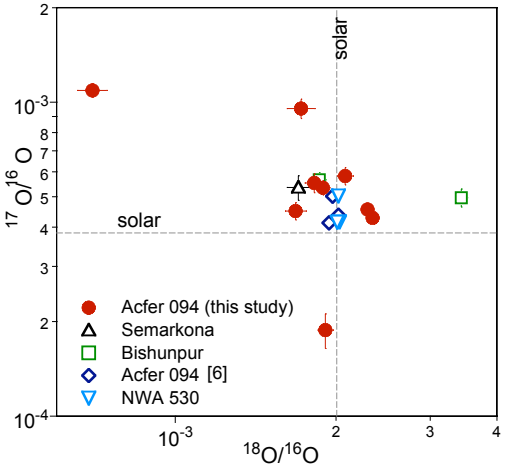
SURVEY OF PRESOLAR SILICATES IN PRIMITIVE CHONDRITES. A. N. Nguyen and E. Zinner. Laboratory for Space Sciences and the Physics Department, Washington University, St. Louis, MO 63130, USA. E-mail: nguyen@wustl.edu.

Introduction: Circumstellar silicate grains are observed in abundance around young stars and evolved O-rich stars [1], the main source of presolar oxide grains. In addition, they have been isolated in IDPs [2, 3] where their abundance is ~890ppm, much greater than any presolar phase in meteorites. These presolar silicates have diameters of a micron or less, making them difficult to spatially resolve. Most solar system minerals are oxides and silicates, which necessitates the measurement of a large number of grains in meteorites to find any isotopically anomalous silicate grain. The NanoSIMS ion probe is well-suited for presolar silicate searches because it can resolve submicron grains and efficiently measure many grains via raster ion imaging [4]. We analyzed 0.1-0.5μm matrix grains from the primitive carbonaceous chondrite Acfer 094, and the ordinary chondrites Semarkona and Bishunpur.

Experimental: Meteorites were disaggregated by freeze-thaw, and grains were size separated by centrifugation. Grains ≤0.5μm were dispensed onto a gold foil, and dense grain areas were chosen for analysis. A Cs^+ primary ion beam was rastered over 20x20μm^2 areas and the three O isotopes, ^{24}MgO, and ^{28}Si were measured simultaneously as negative secondary ions. Isotopic anomalies in the $^{17}O/^{16}O$ and $^{18}O/^{16}O$ ratio images identify presolar grain candidates, while the ^{24}MgO and ^{28}Si images aid in silicate grain identification.

Results: We identified nine anomalous silicate grains in Acfer 094 [5] in 16 images, resulting in an abundance of ~40ppm relative to the matrix, higher than the abundance of most other presolar phases. Nagashima et al. [6] calculated an abundance of 30ppm for Acfer 094 and 3ppm for NWA 530. In contrast, we found no anomalous grains in Semarkona or Bishunpur in 14 and 11 images acquired, respectively. We estimate an abundance of 240ppb and 7ppm for these meteorites. Mostefaoui et al. [7, 8] found three presolar silicates in these two meteorites, however, for a combined abundance of ~15ppm.

One presolar silicate from Acfer 094 was found to be enriched in ^{26}Mg by 119±15‰. We also relocated 6 of the anomalous grains in the SEM to acquire images and EDX spectra for preliminary mineralogical identification. Two appear to be pyroxenes, two are olivines, one is rich in Al, and one could be a GEMS. Further studies are required to confirm these results.



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