TOF-SIMS, NANOSIMS, AND TEM ANALYSIS OF ANHYDROUS CLUSTER IDPs.

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Introduction: Anhydrous interplanetary dust particles (IDPs) represent probably the most primitive solar system material available for laboratory analysis. Due to their high porosity, they are extremely fragile and have the tendency to break apart. Therefore, they are often found as so-called cluster IDPs, particles that disintegrate into numerous fragments upon collection in the stratosphere. Several cluster IDPs were identified as carriers of presolar silicates [1], corroborating their primitive nature.

In continuation of our previous study [2, 3], we selected two new cluster IDP fragments for TOF-SIMS, NanoSIMS, and TEM analysis in order to further characterize primitive IDPs and possibly their presolar inventory. The selected analytical techniques allow obtaining information on chemical, isotopic, and mineralogical properties of the samples on a sub-micrometer scale.

Samples and Experimental Procedures: Samples investigated in this study are fragments O2 from cluster L2021#5 and AM4 from cluster L2005#18. Both samples were hexane-rinsed, embedded in epoxy, and ultra-microtomed. Residual epoxy stubs, after slicing approximately one half of the respective particle, were used for TOF-SIMS, while sections were selected for NanoSIMS and TEM investigations [2].

Results and Discussion: TOF-SIMS and TEM studies show grain sizes lower than 1 µm within these very heterogeneous samples. Chemical analysis by TOF-SIMS yield CI-like bulk concentrations for most elements (Fig. 1). L2021#5 O2 is dominated by Mg-rich olivine and pyroxene, Fe-sulfide, and feldspar, L2005#18 AM4 by olivine, pyroxene, and some Fe-oxide (wüstite). These differences indicate that AM4 was formed under more oxidizing conditions than O2. Both samples are C-rich. Also alkali enrichments are observed for both samples. Na in AM4 is clearly associated with Cl that appeared in a ring-shaped distribution surrounding the particle section. Such surface correlated halogens are usually attributed to contamination [4, 5].

Outlook: Isotope data from ongoing NanoSIMS investigation will be presented at the meeting.

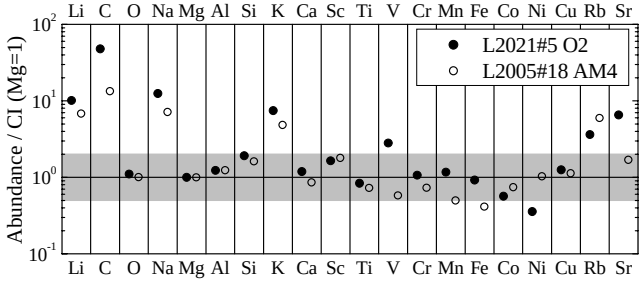

Fig. 1. Element ratios relative to Mg and normalized to CI.

References: [1] Messenger S. et al. 2003. *Science* 300:105–108. [2] Stephan T. et al. 2005. Abstract #1645. 36th Lunar & Planetary Science Conference. [3] Hoppe P. et al. 2005. Abstract #1301. 36th Lunar & Planetary Science Conference. [4] Stephan T. et al. 1994. 25th Lunar & Planetary Science Conference. pp. 1341–1342. [5] Rost D. et al. 1999. *Meteoritics & Planetary Science* 34:A99.