

Tuesday, March 20, 2012
SOLAR NEBULA MIXING AND CAIs
8:30 a.m. Waterway Ballroom 5

Chairs: Justin Simon
Hiroko Nagahara

- 8:30 a.m. Boss A. P. * Alexander C. M. O'D. Podolak M. Ebel D. S.
[Particle Trajectories During FU Orionis Outbursts by the Protosun](#) [#1249]
Marginally gravitationally unstable disks lead to FU Orionis outbursts while simultaneously forcing particles on trajectories that loop around much of the solar nebula, leading to extensive mineralogical and isotopic alteration, as seen in some CAIs.
- 8:45 a.m. Wozniakiewicz P. J. * Ishii H. A. Bradley J. P. Kearsley A. T. Burchell M. Price M. C.
[Grain Size Sorting in the Outer Nebula Accretion Disk](#) [#2392]
We report that rp relations indicative of aerodynamic sorting are found in cometary CP IDPs and Comet 81P/Wild 2, demonstrating that efficient, nebula-wide aerodynamic sorting of crystalline grains occurred prior to accretion of asteroids and comets.
- 9:00 a.m. Simon J. I. * Matzel J. E. P. Simon S. B. Weber P. K. Grossman L.
Ross D. K. Hutcheon I. D.
[Coordinated Oxygen Isotopic and Petrologic Studies of CAIs Record Varying Composition of Protosolar Gas](#) [#1340]
High-resolution O-isotopic zoning profiles obtained by NanoSIMS indicate a progressive and cyclic record of exchange between CAIs and distinct nebular gases. Numerical models are used to constrain conditions and duration of these exchange events.
- 9:15 a.m. MacPherson G. J. * Nagashima K. Ivanova M. A. Krot A. N.
[Primary Reverse Oxygen-Isotope Evolution of Pyroxene in Compact Type A CAIs from the Efremovka and NWA-3118 CV3 Chondrites: Insights into Internal CAI Mixing Lines](#) [#2415]
¹⁶O-depleted Ti-Al-rich pyroxenes in compact Type A CAIs reflect the composition of the perovsites from which they first formed. Perovsite apparently exchanged oxygen very early, prior to melilite exchange and to initial melting of the CAIs.
- 9:30 a.m. Young E. D. * Shahar A.
[Magnesium, Silicon, and Oxygen Isotopic Consequences of CAI Evaporation and Inversion for Primordial Melt Compositions](#) [#1693]
We show how realistic activity-composition relationships in CMAS melts can be used to invert silicon- and magnesium-isotope ratios for evaporation histories of CAIs. Results suggest igneous CAIs were indeed condensates from a solar gas.
- 9:45 a.m. Nagahara H. * Ozawa K.
[The Role of Isotopic Exchange Reaction in Oxygen Isotope Evolution in the Protosolar Disk](#) [#1277]
We quantitatively examine the role of exchange reactions in mass-dependent oxygen isotope fractionation during evaporation and recondensation of silicate melt. The results are applied to the CCAM line, FUN inclusions, and chondrules.
- 10:00 a.m. Marin-Carbonne J. McKeegan K. D. * Davis A. D. MacPherson G. J.
Mendybaev R. A. Richter F. M.
[O, Si and Mg Isotopic Compositions of FUN Inclusion Vigarano 1623-5](#) [#1687]
FUN inclusion Vigarano 1623-5 shows the first unequivocal correlated petrologic and isotopic evidence for volatilization. O-, Si-, and Mg-isotopic compositions reveal that 1623-5 has experienced several evaporation events and an isotopic exchange of O.

- 10:15 a.m. Zhang J. * Huang S. Davis A. M. Dauphas N. Jacobsen S. B. Hashimoto A.
[Calcium and Titanium Mass-Dependent Isotope Fractionation During Evaporation of CaTiO₃](#) [#2132]
We study evaporation effects on highly refractory elements, Ca and Ti, during evaporation of perovskite. Our results suggest that some CAIs experienced evaporation at such high temperature that even highly refractory elements evaporated.
- 10:30 a.m. Krot A. N. * Makide K. Nagashima K. Huss G. R. Hellebrand E. Petaev M. I.
[Heterogeneous Distribution of ²⁶Al at the Birth of the Solar System: Evidence from Corundum-Bearing Refractory Inclusions](#) [#2255]
Corundum-bearing CAIs recorded heterogeneous distribution of ²⁶Al at the birth of the solar system. We suggest that ²⁶Al was injected into the protosolar molecular cloud core by a wind from a massive star and was later homogenized through the disk.
- 10:45 a.m. Mishra R. * Chaussidon M.
[Mg Isotopic Study of CA-, Al-Rich Inclusions from Carbonaceous Chondrites: Constraints on ²⁶Al Distribution in the Accretion Disk and Accretion Processes](#) [#1942]
Variations in ²⁶Al/²⁷Al ratios and Mg-isotopic compositions of CV CAIs, AOAs, and chondrules constrain the level of homogeneity of ²⁶Al and Mg isotopes in the accretion disk and/or the timing of formation of the first condensates.
- 11:00 a.m. Brennecka G. A. * Borg L. E. Wadhwa M.
[Combined Stable Isotope Signatures in Allende CAIs: The Nucleosynthetic Conundrum](#) [#2006]
We report isotope compositions of Sr and Mo in Allende CAIs for which the isotopics of Ba, Nd, and Sm were previously obtained. We show that the combined isotopic signatures of normal CAIs requires a more complicated scenario beyond *r*-process addition.
- 11:15 a.m. Steele R. C. J. * Elliott T. Coath C. D. Regelous M. Russell S. S.
[Neutron-Poor Ni Isotope Anomalies in Bulk Meteorites and Their Nucleosynthetic Significance](#) [#2354]
Study of isotope anomalies in meteorites can yield information about the nucleosynthetic origins of the solar system. Neutron-poor Ni-isotope anomalies in bulk meteorites show evidence of input from the Si/S zone of an SNII to the early solar system.
- 11:30 a.m. Fischer-Gödde M. * Burkhardt C. Kleine T.
[Ruthenium Isotope Anomalies in Meteorites and the Cosmic Mo-Ru Correlation](#) [#2492]
Ruthenium-isotope anomalies obtained for IVB iron meteorites, the ungrouped iron meteorite Chinga, and the CB chondrite Gujba fall on the cosmic Mo-Ru correlation and indicate a deficit in *s*-process isotopes.