Zr AND Ba ISOTOPIC COMPOSITIONS OF HIGH-DENSITY GRAPHITE GRAINS FROM ORGUEIL. M. Jadhav[1], M. R. Savina[2], S. Jokela[3], J. Elam[3], G. R. Huss[1], E. Zinner[4]. [1]Hawai'i Institute of Geophysics and Planetology, University of Hawai'i at Mānoa, Honolulu, HI 96822. E-mail: manavi@higp.hawaii.edu. [2]Materials Science Division and [3]Energy Sciences Division, Argonne National Laboratory, Argonne, IL, 60439. [4]Laboratory for Space Sciences and the Physics Department, Washington University in St. Louis, St. Louis, MO 63130.

Introduction: In order to better constrain stellar sources of presolar grains, it is important to obtain coordinated, light- *and* heavy-element isotopic analyses of individual grains. We report successful measurements of Zr and Ba isotopes by resonance ionization mass spectrometry (RIMS) on high-density (HD) graphite grains from Orgueil that have been previously measured for C, N, O, Al-Mg, Si, K, Ca, and Ti isotopes with the NanoSIMS [1,2]. Previous RIMS studies (Zr and Mo) of HD grains from Murchison [3] lacked light-element information that is essential for establishing the nucleosynthetic source of a grain. We report the first Ba measurements on presolar graphite grains.

Experimental: Graphite grains from two previously measured mounts from the Orgueil HD fraction OR1f ($\rho \sim 2.02$-2.04 g cm^{-3}) were analyzed. Our previous attempts to measure heavy-element isotopic compositions of graphite grains by RIMS [4] were hampered by the fact that the grains hopped off the mount when the analysis laser was focused on the grain. To prevent similar grain loss during this study, we coated the mounts with 70-100 nm of ZnO by the Atomic Layer Deposition (ALD) technique at Argonne National Lab. This technique successfully glued the grains to the gold mount. The RIMS method has been discussed in detail elsewhere [5]; this method was modified to measure Zr and Ba isotopes simultaneously with CHARISMA at Argonne. The ^{134,135}Ba signals were contaminated by a large tail from ^{133}Cs implanted during NanoSIMS measurements. This tail was corrected for after the measurements.

Results: We obtained Zr and/or Ba counts on 12 of the 18 attempted graphites. We attribute the lack of counts on the remaining grains to a combination of two facts: not enough material was left after the NanoSIMS analyses and HD graphites have inherently low trace-element concentrations. As expected for HD graphites, we observe signatures of AGB nucleosynthesis in a majority of the grains. Six grains exhibit strong *s*-process signatures in the Zr isotopes, as indicated by large depletions in ^{96}Zr, which is mainly produced by the *r*-process. The ^{96}Zr/^{94}Zr ratios vary from 0.02 to 2.84 times the solar value of 0.161 with one grain having the very high ratio. This would normally be considered an *r*-process signature, but the same grain also has a very high ^{134}Ba/^{136}Ba ratio, not indicative of the *r*-process. Two grains that show *s*-process signatures in Zr have low ^{135,137,138}Ba/^{136}Ba ratios, indicating *s*-process nucleosynthesis. Four grains have low ^{137,138}Ba/^{136}Ba ratios but are normal in ^{135}Ba/^{136}Ba. Two of these four grains have very large ^{134}Ba/^{136}Ba ratios that cannot be explained at this time; an unknown isobaric interference cannot be ruled out. Contamination by solar Ba might be responsible for the solar ^{135}Ba/^{136}Ba values.

HD graphite grains from Orgueil are known to originate from low metallicity AGB stars, supernovae, and, possibly, post-AGB stars [4]. We will compare the light- and heavy- element isotopic data now available for these grains with nucleosynthesis models of various stellar sources.

References: [1] Jadhav M. et al. 2008 *Astrophysical Journal*, 682, 1479-1485. [2] Jadhav M. et al. 2012 *Geochimica et Cosmochimica Acta*, under revision. [3] Nicolussi G. K. et al. 1998 *Astrophysical Journal*, 504, 492. [4] Jadhav M. et al. 2007 *Meteoritics & Planetary Science* 42:A76 [5] Savina M. R. et al. 2003. *Geochimica et Cosmochimica Acta* 67: 3215-3225.