PRESOLAR NEON-22 IN INDIVIDUAL GRAPHITIC SUPERNOVA SPHERULES FROM ORGUEIL

P. R. Heck[1,2], M. Jadhav[2], F. Gyngard[3], H. Busemann[4], C. Maden[4], R. Wieler[4]. [1]Field Museum, Chicago, IL, USA; [2]Univ. of Chicago, Chicago, IL, USA; [3]Washington Univ., St. Louis, MO, USA; [4]ETH Zurich, Zurich, Switzerland.

Introduction: Stellar sources of presolar graphitic spherules (hereafter called grains) from the CI chondrite Orgueil have been determined [1,2]. While high-density grains can have multiple stellar sources, low-density grains (LD; <2.0 g cm^{-3}) predominantly originate in supernovae (SN) [1,2]. In 2010, we presented the first noble gas data from Orgueil grains and found that 4 out of 15 LD grains contained presolar ^{22}Ne barely above detection limit [3]. While the fraction of grains with detectable ^{22}Ne was similar to the one found for grains from Murchison [4,5], the measured gas amounts were much lower. This could be due to significant erosion by ion beam sputtering during *extensive* NanoSIMS analyses (C, N, O, Al-Mg, Si, K, Ca, Ti isotopes) prior to noble gas extraction. In order to test whether LD grains from Orgueil and Murchison represent different populations, we analyzed for Ne in 7 Orgueil LD fraction grains of similar size that had not been exposed to an ion beam.

Methods: Grains were imaged in the SEM with short electron beam dwell times to minimize heating. Gases were extracted by melting individual grains with an IR laser, and He and Ne isotopes were analyzed in a high-sensitivity compressor noble gas mass spectrometer [6] by a method developed specifically for presolar grains [7]. Subsequently, melted grains were imaged with SEM and analyzed for C and O isotopes with the NanoSIMS.

Results & Discussion: Most (5 of 7) of the grains contain orders of magnitudes more ^{22}Ne than our previously analyzed LD grains [3]. This implies that grain erosion by extensive ion beam sputtering prior to noble gas analysis leads to loss of noble gases and can mislead interpretations of gas amounts. We detected neither ^{20}Ne nor ^{21}Ne. The pure ^{22}Ne is Ne-R ((^{20}Ne/^{22}Ne)$_{measured}$ < (^{20}Ne/^{22}Ne)$_G$) from the decay of the radioactive nuclide ^{22}Na ($t_{1/2}$=2.6 a) that was extant in the grains when they formed. Na-22 forms predominantly in SN [e.g., 8] and indicates that Ne-R containing grains originate in SN. Melt residues appear to be diluted with normal material and do not reveal large C and O isotopic anomalies except in one Ne-rich grain.

References: [1] Jadhav M. et al. 2006. *New Astronomy Reviews* 50:591–595 [2] Jadhav M. et al. 2013. *Geochimica et Cosmochimica Acta* 113:193–224 [3] Heck P. R. et al., 2010, *Meteoritics & Planetary Science*, Supplement, Abstract #5396 [4] Heck P. R. et al. 2009, *The Astrophysical Journal* 701:1415–1425 [5] Nichols R. H. Jr. et al., 1994, Meteoritics 29:510–511 [6] Baur H. 1999. *EOS Trans. AGU* 46:F1118. [7] Heck P. R. et al., 2007, *The Astrophysical Journal* 656:1208–1222. [8] Rauscher T. et al. 2002. *The Astrophysical Journal* 576: 323–348.