I-XE AND AR-AR DATING OF ENSTATITE METEORITES.

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Introduction: The decay of short-lived ^{129}I into ^{129}Xe ($t_{1/2}$=15.7 Ma) allows resolution of small timescales during early formation history of meteorite parent bodies. Few available data suggest enstatite meteorites are promising candidates to apply this chronometer, thus improving our understanding of the chronology of enstatite meteorite parent body formation and metamorphism. We report first results of a still ongoing I-Xe and Ar-Ar dating study of a suite of aubrites and enstatite chondrites (EH and EL groups, different petrological types).

Results: We focussed on meteorites with low weathering stages. In addition we measured some meteorites for which data already exist, because these are the first I-Xe results obtained at Institute of Geosciences, Heidelberg. So far we analysed whole rock samples (80-250 µm) of the aubrites ALH 84024, Bishopville, Cumberland Falls, Mayo Belwa, Norton County and Pena Blanca Spring. Because of low xenon and iodine concentrations, observed low ^{129}Xe/ ^{132}Xe excess from ^{129}I-decay and problems with ^{128}Xe-'memory' precision was lowered and hence, most aubrites revealed no significant age information except for Pena Blanca Spring. For this meteorite we yielded a relatively well-defined isochron (1040°-1300°C) in ^{129}Xe/^{132}Xe vs ^{128}Xe/^{132}Xe space of about 4.2±4.5 (2σ) Ma younger than the enstatite achondrite Shallowater which was used as age reference (4562.3±0.4 (1σ) Ma, [2]). This age is similar though less precise to a previously reported (recalculated) I-Xe age of Pena Blanca Spring [1]. Analyses of enstatite separates from some of the aubrites with a higher sensitivity mass spectrometer at Washington University, St. Louis, are in progress.

Because of their much higher xenon and iodine concentrations measurements of chondrites are more significant. Up to now we analysed mm-sized chips of the enstatite chondrites Abee (EH4) and EET 96135 (EH4/5) and for both obtained well-defined isochrons. Abee is calculated to be 0.7±0.9 (2σ) Ma younger than EET 96135 and 0.2±0.7 (2σ) Ma younger than Shallowater. The latter age difference again agrees with previous data [1]. The observed range in ^{129}Xe/^{132}Xe ratios of extractions defining the isochrons of both meteorites are very different (2.7-7.8, Abee; 1.37-1.86, EET 96135). EET 96135 shows a much higher concentration of trapped ^{132}Xe (2.4E-9 cm^3 STP/g) than Abee (8.5E-10 cm^3 STP/g) explaining its lower ^{129}Xe excess.

Before measurement Xe is routinely separated from Ar at a cold trap (about 10 % Ar remaining in Xe fraction). For both chondrites this argon fraction was used for simultaneous Ar-Ar dating. Absolute age evaluation still await standard measurements, but results indicate an approx. 0.3 Ga lower partial 'plateau' age for Abee compared with EET 96135.

References: [1] Podosek F. A. 1970. *Geochimica et Cosmochimica Acta* 34:341–365. [2] Gilmour J. D. et al. 2009. *Meteoritics & Planetary Science* 44:573-580.