POSSIBLE LATE AND/OR PROLONGED AQUEOUS ALTERATION IN CR CHONDRITES PARENT BODY. O. Pravdivtseva, A. Meshik, C. M. Hohenberg, McDonnell Center for the Space Sciences, CB 1105, One Brookings Drive, Washington University, Saint Louis, MO 63130, USA (olga@physics.wustl edu).

Introduction: CR chondrites are among the most primitive meteorites. The detailed mineralogical and oxygen isotopic studies of CAI's and AOA's, suggested that CR meteorites escaped even mild thermal metamorphism [1, 2, 3, 4, 5]. This conclusion is supported by presence of primitive FeNi- metal which in CR chondrites did not experience exsolution into taenite and kamasite [3]. The general absence of secondary minerals in CAI's and AOAs in Antarctic CR chondrites is consistent with a low degree of aqueous alteration at temperatures below 100 ° to 150 °C [3]. The Pb-Pb isochron age of chondrules in the CR chondrite Acfer 059 is 4364.7 ± 0.6 Ma [6]. The age difference of 2.5 ± 1.2 Ma between formation of CV CAIs and the Acfer chondrules suggests that CAI- and chondrule- forming events must have lasted for at least 1.3 Ma [6].

Results: The U-Pb and I-Xe isotopic pairs are rarely reside in the same mineral phases in the meteorites, making intercallibration of these two chronometers challenging. In case of chondrules, different potential mineral carriers for these two chronometers could be present, and resulting closure times may provide insight into formation and post formational history of chondrules. Here, we attempt to measure I-Xe ages of two Acfer 059 chondrule fragments which were a part of previous Pb-Pb studies [6]. In this work acid-washed and untreated Acfer 059 chondrules, Acfer 059 matrix and acid leachates demonstrated a range of U and Pb concentrations of 2.5–35 ppb and 6–44 ppb, respectively [6]. The measured $^{206}Pb/^{204}Pb$ ratios differ by almost two orders of magnitude (23.3–2198). Chondrules #8 and #9 studied here had intermediate $^{206}Pb/^{204}Pb$ values, 192.9 and 228.0 respectively [6].

Samples for I-Xe dating were sealed under vacuum in fused quartz ampoules and irradiated with thermal neutrons in Missouri University Research Reactor, receiving $\approx 2\times10^{19}$ n/cm^2. The I-Xe reference standard, Shallowater, was irradiated along with the samples. After irradiation the Xe was extracted by stepwise pyrolysis and its isotopic composition measured by ion counting mass-spectrometry.

Both analyzed chondrule fragments were metal rich with chondrule #9 being highly magnetic and both contained n-induced fission xenon, indicative of U. Chondrule #9 contained 9.79×10^{-10} ccSTP/g of radiogenic $^{128*}Xe$, 99% of it was released at initial temperature steps below 1200 °C, but not even traces of radiogenic $^{129*}Xe$ could be found. The presence of radiogenic $^{128*}Xe$ is not easily explained by the iodine contamination since, although 99% of the $^{128*}Xe$ was released below 1200 °C, it was still present up to the melting point of the sample with a small release peak at 1500 °C. The concentration of radiogenic $^{128*}Xe$ in chondrule #8 was higher, 18.8×10^{-10} ccSTP/g, with 98% of it released below 1200 °C. This sample also contained 0.57×10^{-12} ccSTP/g of radiogenic $^{129*}Xe$, all of it in 1300–1400 °C temperature steps. If presented as a three isotope plot as $^{129}Xe/^{132}Xe$ versus $^{128}Xe/^{132}Xe$, these two extraction steps suggest that I-Xe system in Acfer 059 chondrule #8 may have been reset about 55 Ma after formation of CAI's at 4567.2 ± 0.6 Ma [6], possibly by aqueous alteration.

I-Xe system is a known chronometer for secondary processes and iodine host phases are more easily emplaced by aqueous alteration than reset by thermal events [7, 8, 9]. Although the degree of aqueous alteration varies among CR meteorites, Acfer 059 is considered to be one of the most pristine among CRs since CAIs and the chondrules in Acfer are virtually phyllosilicate-free [3, 4, 5, 10, 11]. Nevertheless, if the high temperature release of ^{128}Xe in chondrule #8 from Acfer 059 is not a result of contamination, the I-Xe system in these chondrules may indicate alteration that reset I-Xe system about 55 Ma after CAI formation.

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