^{60}Fe AND ^{26}Al RECORDS IN UOC CHONDRULES: EVIDENCE FOR THEIR CONTEMPORANEOUS INJECTION INTO EARLY SOLAR SYSTEM. R. K. Mishra and J. N. Goswami. Physical Research Laboratory, Ahmedabad 380009, India. E-mail: ritesh@prl.res.in

Introduction: Fossil records of short-lived now-extinct nuclides (SLN) present in primitive meteorites provide important clues for understanding the early evolution of the solar system. Some of the SLN, such as ^{60}Fe, are distinct product of stellar nucleosynthesis and can serve as marker nuclides to infer the stellar source and its contribution towards the inventory of the other SLN present in the early solar system. Previous Fe-Ni isotope studies of sulphide and oxide phases in UOC matrix and silicate phases in UOC chondrules yielded initial ^{60}Fe/^{56}Fe values in the range of (1-3.7)×10^{-7} [1,2] and ~9×10^{-7} [3] at the time of their formation. Assuming a plausible time difference of 1-2Ma for the formation of the analyzed objects, relative to CAIs, solar system initial (SSI) ^{60}Fe/^{56}Fe values in the range of (2-16)×10^{-7} were inferred. We have initiated a combined study of Fe-Ni and Al-Mg isotope systematics in UOC chondrules to obtain a more precise value of (SSI) ^{60}Fe/^{56}Fe. ^{26}Al data are used to obtain the time of formation of the chondrules to remove the ambiguity present in previous studies. Such an approach also allows us to check the validity of the proposed delayed injection of ^{60}Fe into the early solar system, relative to ^{26}Al, from the same stellar source [4].

Samples: Semarkona and LEW 86134, UOCs belonging to the lowest petrologic grade (3.0), were chosen for this study. Chondrules from these UOCs are expected to preserve pristine isotope records. Silicate phases with high Fe/Ni and Al-rich mesostasis were analyzed for their Fe-Ni and Al-Mg isotope records, respectively, following procedures described earlier [5-6]. Some initial results were reported previously [6]**.** We have now analyzed another more than a dozen chondrules to increase the data base.

Results and Discussion: The initial ^{60}Fe/^{56}Fe values at the time of formation of the analyzed chondrules vary from 2.3 to 5.2 (×10^{-7}); the corresponding initial ^{26}Al/^{27}Al values range from 0.7 to 1.6 (×10^{-5}). Although the inferred initial values have relatively large errors, primarily due to low counting statistics, a clear trend between initial ^{60}Fe/^{56}Fe and ^{26}Al/^{27}Al is seen, if we use ^{26}Al records for inferring the time of formation of the chondrules. This argues against the proposal for a late injection of ^{60}Fe, relative to ^{26}Al, by more than a million year, into the early solar system from the same stellar source [4]. The observed trend suggests a SSI ^{60}Fe/^{56}Fe value of >5×10^{-7}. This will rule out a TP-AGB star and argues for a high mass supernova as the most probable source of ^{60}Fe and several other SLN present in the early solar system. Our data also strengthen the role of ^{60}Fe as an important heat source, following ^{26}Al, during the early evolution of planetesimals.

References: [1] Tachibana S. and Huss G. R. 2003. *The Astrophysical Journal* 588: L41-L44. [2] Tachibana S. et al. 2006. *The Astrophysical Journal* 639: L87-L90. [3] Mostefaoui S. et al. 2005. *The Astrophysical Journal* 625:271-277. [4] Bizzarro M. et al. 2007. *Science* 316:1178-1181. [5] Mishra R. K. and Goswami J. N. 2008. *Meteoritics & Planetary Science* 43:A99. [6] Mishra R. K. et al. 2009. Abstract #1689. 40th Lunar & Planetary Science Conference.