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Iron-60 in primitive meteorites: New in situ data.

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The abundance of ^{60}Fe ($t_{½} \approx 2.6 \times 10^6$ years) at the birth of our solar system (SS) is an important clue to the source(s) of early SS radioactivity [1]. Estimates of the SS's initial ^{60}Fe/^{56}Fe ratio (^{60}Fe/^{56}Fe$_{initial}$) based on bulk and in situ Fe-Ni isotope data differ by more than an order of magnitude [2,3]. To understand this discrepancy, we are measuring the ^{60}Ni/^{62}Ni and ^{54}Fe/^{62}Ni ratios of high Fe/Ni phases in primitive ordinary and carbonaceous chondrites. We perform our analyses in situ, with the NanoSIMS, and plan to verify our data with CHILI [4]. So far, we have not found any significant ^{60}Ni enrichment due to ^{60}Fe decay, not even in Semarkona (LL3) where previous in situ data suggested the highest ^{60}Fe/^{56}Fe$_{initial}$ ratios ($>7.3 \pm 0.9 \times 10^{-7}$ [3,5]). The maximum ^{60}Fe/^{56}Fe$_{initial}$ ratios allowed by the uncertainties of our measurements are 9.8×10^{-7}, 1.1×10^{-7}, and 3.4×10^{-7} for Semarkona, DOM08006 (CO3), and ALHA77307 (CO3), respectively (95% confidence level).

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