**ZINC ISOTOPE ANOMALIES IN BULK CHONDRITES**

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**Introduction:** Identification of isotope anomalies in primitive meteorites can provide important information concerning the nucleosynthetic history and chemical evolution of the early solar nebula. Of particular interest are the iron peak elements (Ca, Ti, Cr, Ni, Zn), whose heaviest isotopes are thought to be co-produced in a neutron-rich supernova environment. Early investigations measured significant (and often correlated) $^{48}$Ca, $^{50}$Ti, $^{54}$Cr, $^{64}$Ni and $^{66}$Zn isotope anomalies in refractory inclusions [1 and refs therein] although none were found in bulk meteorites. However, improved precision has allowed the detection of $^{54}$Cr, $^{48}$Ca and $^{50}$Ti excesses and deficits on the bulk meteorite scale, implying large-scale early solar system heterogeneity of these elements [2, 3, 4]. Here we extend these observations to include Zn isotopes.

**Methods and Results:** Zinc isotope analysis was performed on a Neptune Plus MC-ICPMS running in high resolution mode; long-term precision on $\varepsilon^{66}$Zn is $\pm$ 0.12 (2sd, n=66), which is ~3x better than a previous MC-ICPMS study on Zn isotope anomalies [5]. With such high precision, carbonaceous chondrites display resolvable $^{66}$Zn excesses of $\varepsilon^{66}\text{Zn} \approx 0.4$ compared to terrestrial, as well as smaller $^{68}$Zn excesses. There is also a suggestion that bulk enstatite chondrites have a small $^{66}$Zn deficit, which is consistent with the minor deficits in $^{48}$Ca and $^{50}$Ti observed in such meteorites [2, 3]. Sequential leaching experiments imply that the same Zn isotope anomaly pattern observed in a bulk meteorite is present in most (if not all) components of that meteorite, and is not limited to one phase (e.g CAIs, hibonite grains).

**Discussion:** This study is the first to demonstrate that Zn isotope anomalies are present in bulk primitive meteorites, consistent with the injection into the solar nebula of material derived from a neutron-rich supernova source. There is still debate, however, over the specific progenitor for these isotopes, whether it be type I or type II supernovae [6, 7], or an AGB star [8]. The presence, therefore, of coupled $^{66}$Zn-$^{68}$Zn excesses is interesting, as this is specifically predicted by the “multiple zone mixing” models of [6], which requires formation close to the Type II supernova mass cut. The sequential leaching results imply large-scale Zn isotope heterogeneity in the early solar nebula.

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