

Composition and fraction of processed non-carbonaceous material in carbonaceous chondrites

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Systematic differences in mass-independent isotopic compositions between carbonaceous (CC) and non-carbonaceous (NC) meteorites suggest that these two groups formed in distinct regions of the protoplanetary disk and presumably at different times [e.g., 1, 2]. Previous $\epsilon^{50}\text{Ti}$ - $\epsilon^{54}\text{Cr}$ data exhibiting a negative correlation for CC meteorites, are interpreted to reflect mixing of components with different thermal and chemical processing histories. Isotopic compositions of chondrules in CC and $\mu^{54}\text{Fe}$ of CC bulk rocks reveal that CC bulk composition may be controlled by three main mixing end members: CI-like dust, refractory inclusions and a NC meteorite-like component from the inner solar system [3-8].

New mass-independent Cr and Ti isotopic data on bulk CC, combined with major element ratios and literature data extend CC's compositions towards the NC end member(s), particularly in the triangular data distribution observed in $\epsilon^{50}\text{Ti}$ (or $\epsilon^{54}\text{Cr}$) versus Fe/Mg and Fe/Ti diagrams. Including the new data into revised mixing models implies that some CV, CL and CR chondrites may contain up to 30-50% of metal-depleted dust component(s) derived from the NC domain. The required major element composition of the putative NC mixing end member is similar to chemical compositions ranging from chondrules to LL chondrite bulk rocks. Implications for models of the evolution of the protoplanetary disk will be discussed.

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