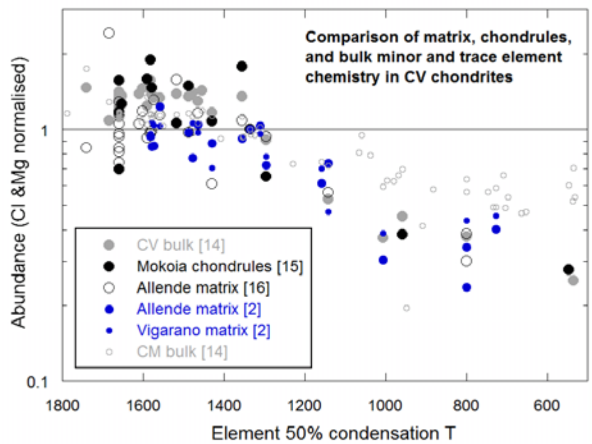
CHARACTERISTICS OF PRIMITIVE CHONDRITE MATRICES AND CONNECTION TO CHONDRULE FORMATION. P. A. Bland[1], D. C. Hezel[2], H. Palme[3] and J. N. Bigolski[4], [1]Department of Applied Geology, Curtin University, GPO Box U1987, Perth, WA 6845, Australia, p.a.bland@curtin.edu.au; [2]Institut für Geologie und Mineralogie, Universität zu Köln, Zülpicherstrasse 49b, D-50674 Köln, Germany, dominik.hezel@uni-koeln.de; [3]Senckenberg Forschungsinstitut und Naturmuseum, 60325 Frankfurt am Main, Germany; [4]Department of Earth and Environmental Sciences, CUNY Graduate Center, New York, NY, USA.

The degree to which the components of chondritic meteorites (chondrules and matrix) sampled a common source informs models of protoplanetary disk formation and evolution. Were chondrules transported large distances to mix with matrix, or did both form in the same region, affected by common processes?

Several authors have noted a chemical [1-8] and isotopic [9,10] complementarity between chondrules and matrix within a chondrite group, discussed in detail in a companion paper [11]. For it to have significance as a constraint on chondrule formation (and disk models), it must be a product of chondrule formation (and not, for instance, a result of redistribution during hydrothermal alteration). The details of the chemical relationship (e.g. elements related to open system behavious in chondrule melts, rather than soluble elements), and the observation of complementary nucleosynthetic Mo isotope [9] and ^{183}W anomalies [8,10], would tend to argue for the former. Others have suggested carbonaceous chondrites are mixtures of two components, volatile free chondrules enriched in refractory elements and volatile rich matrix (CI-like material). Both components could have formed independently at different heliocentric distances [e.g. 12], a model originally proposed by Anders [13]. In this scenario complementarity would simply be a function of exchange during aqueous alteration in the parent body [e.g. 12].

Is there additional chemical evidence linking chondrules and matrix? Most chondrites show a monotonic depletion in volatile and moderately volatile elements. The degree of depletion varies amongst chondrite groups. If chondrules formed from a matrix-like precursor, one would expect to see the bulk depletion signature translate to these components. There is evidence that it does. In the case of CVs, matrix, chondrules and bulk follow a similar trend (see figure) that is clearly distinct from other chondrite groups (e. g. CM).

Other components can offer insights. Microchondrules (≤ 40 μm) [17], potentially establish a generational gap between chondrules and matrix. Coarse-grained rims are found to be more similar to the mean chondrule composition than to that of the specific chondrule with which they are associated [18]. Matrix compositions were also found to be similar to coarse grained rims, suggesting that all three components were related. The relation between type I and II chondrules and enclosing rim types is also informative [19].



In summary, multiple lines of evidence indicate that CV chondrules and matrix formed in the same, chemically distinct nebula region, and exchanged elements during chondrule formation. Together with geochronological evidence for multiple generations of chondrules within a chondrite group which can be separated by 1-2 Myr (e.g. based on U-Pb chronology) [20,21]), this presents interesting constraints on disk models. We discuss the situation with respect to other chondrite groups, and mechanisms that would allow a feeding zone to remain (at least partially) chemical isolated in the disk for extended periods, at the conference.

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