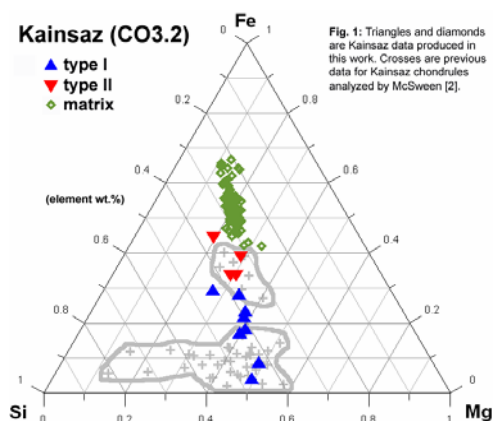


DISENTANGLING THE DIVERSITY OF BULK CHONDRULE COMPOSITIONS: DID CO CHONDRITES SAMPLE TWO VERY DISTINCT CHONDRULE POPULATIONS?

J. Berlin, R. H. Jones, and A. J. Brearley. Department of Earth and Planetary Sciences, University of New Mexico, Albuquerque, NM 87131, U.S.A. E-mail: jberlin@unm.edu

Introduction: Isotopic, chemical, and petrographic differences recorded in the major components of chondrites imply that they must have formed under very different conditions in different regions of the solar nebula, and/or at different times, before they mixed and accreted to asteroidal bodies [1]. We want to address the question of whether or not primitive chondrites sampled distinct chondrule populations that were later recycled. Available datasets for bulk chemical compositions of chondrules show a continuum in compositions for ordinary chondrites [2], but a noticeable gap between Fe-rich and Fe-poor compositions in CO chondrites ([2]; Fig. 1). We are studying a suite of Kainsaz (CO3.2) chondrules and, so far, determined 12 bulk compositions by electron microprobe using modal recombination (see [3] for details). We also conducted broad beam (10 μm) EPMA analyses of Kainsaz matrix in order to examine the question of chemical complementarity between chondrules and matrix [4].



Results and discussion: Our data for Kainsaz chondrules (Fig. 1) show a continuum of compositions, rather than the bimodality seen in previous data sets. Type II chondrules are at the Fe-rich end of the continuous trend, and matrix compositions lie on an extension of the chondrule trend. For type I chondrules, a correlation between Fe content of the chondrule, which varies from 2 to 16 vol%, and metal/sulfide abundance is evident. Differences in Fe content among type I chondrules could be largely the result of physical metal loss, e.g. while the chondrule was spinning. We have not yet studied the Si-rich group of RP chondrules included in Fig. 1. If we only consider the silicate portion of the chondrules, there are two distinct populations: FeO-rich type II chondrules and FeO-poor type I chondrules. Therefore, two chondrule populations were indeed sampled in CO chondrites, but the bimodality is in oxidation states (oxidized type II vs. reduced type I chondrules) rather than in bulk Fe content.

References: [1] Zanda & Hewins 2006. 37th Lunar & Planet. Sci. Conf. Abstract # 2199. [2] Jones et al. 2005. In: *Chondrites and the Protoplanetary Disk*. pp. 251-285. [3] Berlin et al. 2006. 37th Lunar & Planet. Sci. Conf. Abstract # 2370. [4] Huss et al. 2005. In: *Chondrites and the Protoplanetary Disk*. pp. 701-731.