

Deforming chondrules as natural analogs for dynamic metal segregation: Analyses from 3D synchrotron imaging

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Chondrules allow for the study of the early solar system and were formed ~2-3 My after the CAIs. We have collected 3D textural data on chondrules by synchrotron-based high resolution hard x-ray microtomography imaging to characterize them for experimental deformation studies on metal – silicate systems. We are using the Bjurböle chondrules from the olivine-hypersthene bearing chondrite (L/LL4). Bjurböle has been used in several previous studies as it is abundant and has a range of chondrule sizes. In this study we have now performed initial characterization of 12 chondrules and they fall into two main types; (1) cryptocrystalline where the chondrules are mainly quench silicate glass with fine crystals of plagioclase and olivine and (2) coarser crystalline, more slowly cooled samples with porphyritic olivine and pyroxene. Once characterized, we will deform them and re-image them for chemical and textural analyses. The 3D images are also made into movies using the program “Fiji”. We will present the before and after image analyses and movies from the 1 GPa deformation experiments. The results allow both chemical and textural data from the early solar system to be evaluated in terms of the role they play in formation of the terrestrial planets.