

TOWARDS AN ATLAS OF CHONDRULE TEXTURES.

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Introduction: Chondrites of all kinds are a major class of meteorites whose detailed provenance is poorly understood and complex. They are classified and named based in part upon their structure, mineralogy and texture, and in part upon their bulk chemistry and mineral chemistry. Understanding their origin is critically dependent on understanding the origin of their chondrules and other constituents, how these have become associated, and what processes are documented by their lithology and petrology. Few studies examine the internal textures of chondrules with a view to interpreting their origin and that of the chondrites that contain them, or to compare chondrules from different groups and petrologic grades. The textures of Earth rocks and minerals, along with their chemistry, are studied to determine their origins; meteorite studies favor chemistry almost exclusively to derive the origins and classification of extraterrestrial rocks.

Current Situation: Recent books [1,2,3] and articles [4,5] have published photomicrographs or back-scattered electron (BSE) images of chondrules, or of thin sections of chondrites [6]. In research papers [cf. 5] the illustrations support detailed mineral or isotope chemistry, and conclusions from those analyses, even though variations in chondrule texture along with chemistry are observable. Elsewhere the images support conclusions about classification without definitive textural details being compiled. Others are detailed pictures with no accompanying interpretation.

Data Needed: Textural interpretation down to the scale of the mineral and chondrule matrix analyses (a few microns), or comparative textural documentation of different chondrules from the same meteorite, is usually missing. Chemical and isotopic data need to be interpreted in the context of the textural and mineralogical characteristics of the analyzed objects within the meteorites, not independent of those characteristics. This requires a more rigorous textural documentation and classification of chondrites and chondrules than is currently common practice. In particular it requires imaging and interpretation of chondrite structures and chondrule textures at all appropriate scales where information about their origin may be gleaned, and it requires reference materials. An atlas of chondrule textures is required.

Advances: The proposal to focus a community effort among researchers interested in systematic textural studies of chondrules and chondrites, through a dedicated web site and list [7], is moving towards implementation later this year. A host for the web site and other resources have been obtained. We have many of our own images and interpretations to start the compilation. Potential contributors and collaborators are invited to contact us.

References: [1] Norton O.R. 2002. *The Cambridge Encyclopedia of Meteorites*. [2] Hutchison R. 2004. *Meteorites: A Petrologic, Chemical and Isotopic Synthesis*. [3] Sears D. W. G. 2004. *The Origin of Chondrules and Chondrites*. [4] Grossman J.N. and Brearley, A.J. 2005. *Meteoritics & Planetary Science* 40:87-122. [5] Norton O.R. 2005. *Meteorite* 11(2): 21-23. [6] Lauretta D.S. and Killgore M. 2005. *A Color Atlas of Meteorites in Thin Section*. [7] Herd R.K. et al. 2005. Abstract #2241, 36th Lunar & Planetary Science Conference.