

Title:

High pressure mineral phases in meteorites: trusty reporters of shock conditions?

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Description

Within the last decade, in a variety of meteorites including ordinary chondrites, martian, lunar, and other achondrites, and terrestrial impactites identified many high-pressure (HP) minerals, yielding constraints on shock conditions and hence parameters such as the size of colliding bodies, impact velocity, etc. The HP minerals which have been experimentally synthesized in the lab may provide robust constraints on P conditions based on static experiments. In contrast, there still HP minerals like jadeite and its relatives (albitic jadeite, lingunite, tissintite, etc.) which offer a promising set of shock pressure constraints but establishing their occurrence is challenging. There has been much confusion in the literature over the identity of jadeite in several meteorites and impactites. Are optical and Raman microscopy sufficient to establish the composition and structure of jadeite and related phases? Once established, what are the pressure constraints that can be inferred from these minerals and from other HP polymorphs? We cannot always assign a certain stability field and therefore we may never be able to separate thermodynamic from kinetic factors in determining what composition and ordering state is preserved. Also, the experiments may prove exceedingly difficult if static experiments fail to return some possibly metastable phases and dynamic experiments fail to recover high-pressure phases without back-transformation. We invite contributions reporting textural, chemical, and structural data on HP minerals in shocked meteorites, terrestrial impactites, experimental samples as well as related theoretical and computational efforts.