

## Accepted Manuscript

Back-transformation of high-pressure minerals in shocked chondrites: low-pressure mineral evidence for strong shock

Jinping Hu, Thomas G. Sharp

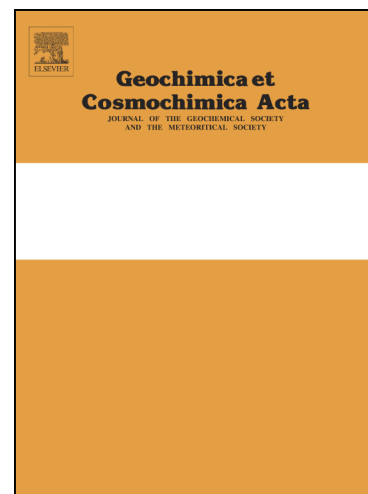
PII: S0016-7037(17)30426-X  
DOI: <http://dx.doi.org/10.1016/j.gca.2017.07.018>  
Reference: GCA 10380

To appear in: *Geochimica et Cosmochimica Acta*

Received Date: 27 August 2016  
Revised Date: 6 July 2017  
Accepted Date: 11 July 2017

Please cite this article as: Hu, J., Sharp, T.G., Back-transformation of high-pressure minerals in shocked chondrites: low-pressure mineral evidence for strong shock, *Geochimica et Cosmochimica Acta* (2017), doi: <http://dx.doi.org/10.1016/j.gca.2017.07.018>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Back-transformation of high-pressure minerals in shocked chondrites: low-pressure mineral evidence for strong shock

Jinping Hu\* and Thomas G. Sharp

School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85287-1404, USA

\*Corresponding author: currently at Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, CA 91125, USA [jinping@caltech.edu](mailto:jinping@caltech.edu)

**Abstract:**

Post-shock annealing of meteorites can destroy their shock-induced features, particularly high-pressure minerals, and complicate the estimation of impact pressure-temperature conditions. However, distinguishing post-shock annealing features from thermal metamorphism effects can be practically difficult. Here we report results from Mbale, a highly shocked L chondrite, to investigate the mechanisms, kinetics and identification criteria for post-shock annealing of high-pressure signatures. Olivine fragments within shock-melt veins in Mbale occur as chemically heterogeneous nanocrystalline aggregates that contain trace wadsleyite and ringwoodite. Their strong variation in fayalite content provides evidence of iron partitioning during transformation of olivine to wadsleyite, followed by back-transformation to olivine after decompression. Experimental studies of transformation kinetics show that wadsleyite transforms to olivine in seconds at temperatures above ~1200 K and in hours at temperatures between 900 and 1200 K. Thermal models of shock-melt cooling show that shock veins in Mbale cooled to 1200 K in 1 s. The shock pulse must have been shorter than ~1 s to provide the

Download English Version:

<https://daneshyari.com/en/article/5783245>

Download Persian Version:

<https://daneshyari.com/article/5783245>

[Daneshyari.com](https://daneshyari.com)