

Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Studies on the Mg hcp-bcc phase boundary through shock and release MATTHEW T BEASON, ANIRBAN MANDAL, BRIAN J JENSEN, Los Alamos National Laboratory — Despite its relatively simple electronic structure, the phase diagram of Mg is not well understood. It has been shown that the hcp-bcc transition occurs near 50 GPa at room temperature; however, both hcp and bcc Mg are observed from 46-56 GPa. This stems from small free energy differences between the hcp and bcc phases and has resulted in a range of reported phase boundaries for the hcp-bcc transition. As a result, the location of the bcc phase boundary is uncertain. The Mg phase diagram has been examined through a series of shock experiments and dynamic X-ray diffraction performed at the Dynamic Compression Sector (Argonne, IL) and front surface impact (FSI) experiments performed using the 2-stage gas gun at Los Alamos National Laboratory. The results indicate formation of bcc Mg on the ns timescale under shock loading. The shock-release profile observed in the FSI experiments show signs of a phase transition occurring on release from pressures above 30 GPa, providing a method for locating the bcc phase boundary as it approaches the melt boundary. The experimental results and analysis will be presented along with our path forward for studying the dynamic response of Mg. LA-UR-19-21417

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Date submitted: 25 Feb 2019

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