

Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Hugoniot and sound speed of alpha-Quartz in the 90-1200 GPa regime¹ MARCUS KNUDSON, MICHAEL DESJARLAIS, Sandia National Labs — The development of an ultra-high velocity flyer plate capability at the Sandia Z Machine has enabled multi-Mbar experiments with unprecedented accuracy. Here we present the results of both Hugoniot and sound speed measurements on z-cut, alpha-quartz in the 90-1200 GPa regime, inclusive of the pressure range over which silica transitions from a molecular to atomic fluid. Measurement of both the Hugoniot and the sound speed along the Hugoniot allows for extraction of the behavior of the thermodynamic gamma and provides an excellent test case for comparison with first principles calculations of melt and dissociation. Quantum molecular dynamics (QMD) calculations are in excellent agreement with the experimental data. These experimental and theoretical results provide a foundation for the use of quartz as an extremely accurate standard for use in multi-Mbar shock wave experiments.

¹Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Marcus Knudson
Sandia National Labs

Date submitted: 20 Feb 2009

Electronic form version 1.4