Abstract Submitted
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A photoacoustic technique to measure speeds of sound from high-pressure fluids and solids: On the detonation chemistry of boron[1] JOSEPH M. ZAUG, SORIN BASTEA, JONATHAN CROWHURST, NICK TESLICH, LLNL — We predict detonation, propellant, and combustion chemistry using a thermochemical computational model derived from interatomic potentials constructed from shockwave, thermodynamic, and speeds of sound (SoS) data from highly compressed reaction product fluids and mixtures, e.g., H2O, CO2, NH3, simple hydrocarbons, etc. Typically we employ impulsive stimulated light scattering to measure SoS. Here we discuss how an acoustic wave can be launched from a thin platinum film by absorption of a focused 1064 nm laser pulse. (Platinum lines were deposited onto diamond anvil culets using a focused ion beam.) Light scattered from a time-delayed probe pulse is phase modulated by a traveling acoustic pulse and collected using a PMT. Fourier transformations of measured time-domain series yield the frequency of acoustic waves. We demonstrate the utility of this technique applied to metaboric acid (HBO2). Corresponding predictions of extreme condition boron chemistry are given on the basis of our HBO2 equation of state.

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