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Molecular Response of Liquid Nitrogen Multiply Shocked to 40 GPa DAVID LACINA[1], Y.M. GUPTA, Washington State University — Liquid nitrogen was subjected to multiple shock compression to examine its response to pressures (15-40 GPa) and temperatures (1800-4000K) previously unexplored in static and shock compression. Raman spectroscopy measurements (of the 2330 cm^{-1} mode) were used to characterize the molecular bond response and to experimentally determine temperature in the peak P-T state. By extending our analysis of the measured Raman shifts to include Raman spectroscopy measurements from previous studies[2,3], an empirical relation was developed that describes the pressure and temperature dependence of the Raman shifts for both static and shock compression. Examining the P-T dependence of all measured Raman shifts showed that the molecular response of liquid nitrogen is both pressure and temperature dependent, and that the molecular response is best understood by considering three temperature regimes (below 1500K, 1500-4000K, above 4000K). Multiply shocked liquid nitrogen remained a molecular fluid at the pressures and temperatures accessed in our work, and became a greybody emitter at the highest pressures.

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