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Ultrafast vibrational spectroscopy of shock compression with molecular resolution: energetic material simulants DANA DLOTT, AARON LOZANO, ALEXEI A. LAGUTCHEV, University of Illinois — This project focuses on understanding the properties of molecules immediately behind a shock front using a femtosecond laser to generate a shock wave in a molecular monolayer. In previous work we used nonlinear coherent vibrational spectroscopy to study long chain alkane molecules with a 4 GPa shock. The long-chain molecules have little strength along the long axis, and we found they quickly created *gauche* defects by rotation around carbon-carbon bonds. We have greatly improved the sensitivity of our laser apparatus. We have also developed the ability to study "heat shocks" where large amounts of heat flow ballistically rather than diffusively from a metal surface into the monolayer. We look at energetic molecule simulants, which are monolayers having either nitro or nitramine functionalities. This material is based on work supported by the US Army Research Office under award number UNLV 08-655K-A-00 and the Air Force Office of Scientific Research under award number FA9550-06-1-0235. Aaron Lozano acknowledges the Stewardship Sciences Academic Alliance Program from the Carnegie-DOE Alliance Center under grant number DOE CIW 4-3253-13.

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