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Single-shot Raman spectroscopy and time-resolved reflectivity of a shocked TATB-based explosive PHILIPPE HEBERT, CHARLES SAINT-AMANS, MICHEL DOUCET, CEA, DAM, Le Ripault, THIBAUT DE RESSEGUIER, Institut PPRIME, UPR CNRS 3346, ENSMA, Universite de Poitiers
— Single-shot Raman spectroscopy experiments under shockwave loading were performed in order to get information on the initiation mechanisms that can lead to sustained detonation of a TATB-based explosive. Shocks up to 30 GPa were generated using a two-stage laser-driven flyer plate generator. The samples were confined by an optical window and shock pressure was maintained for at least 30 ns. Photon Doppler Velocimetry measurements were performed at the explosive/window interface to determine the shock pressure profile. Raman spectra were recorded as a function of shock pressure and the shifts of the principal modes were compared to static high-pressure measurements performed in a diamond anvil cell. Our shock data indicate the role of temperature effects on the H-bonding network present in TATB. Our Raman spectra also show a progressive extinction of the signal which disappears around 9 GPa. High-speed photography images reveal a simultaneous progressive darkening of the sample surface up to total opacity at 9 GPa. Time-resolved reflectivity measurements under shock compression seem to indicate that this opacity is due to a broadening of the absorption spectrum over the entire visible region.

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