

Abstract Submitted
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Use of a fast near-infrared spectrometer for absorption and emission measurements within the expanding blast wave of a high explosive¹
JON KOCH, Marquette University, SCOTT PIECUCH, JAMES LIGHTSTONE, JOEL CARNEY, Indian Head Division, Naval Surface Warfare Center — We demonstrate the use of a fast InGaAs array and spectrometer to measure properties related to near-infrared absorption and emission (750 nm -1500 nm) following a high explosive detonation. Using a broadband light source and a rigid absorption gauge, gas temperatures are measured at a rate of 20 kHz for a period of several milliseconds behind the blast wave from a 20 g PETN detonation. The temperature and concentration of water vapor is determined by fitting experimental transmission spectra to a simulated database. Strong emission signatures obtained during the breakout event (integrated over approximately the first 20 microseconds) indicate the presence of high energy nitrogen atoms with temperatures as high as 9700 K. Measurements from water absorption at a distance of 23 cm from the charge indicate temperatures decaying from 1600 K to 600 K during the first few milliseconds. These measurements are intended to aid the development of detonation and explosive simulations.

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