

Abstract Submitted  
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**Hypervelocity Impact Flash at 6, 11, and 25 KM/S** R.J. LAWRENCE, W.D. REINHART, L.C. CHHABILDAS, T.F. THORNHILL, Sandia Nat'l Labs(\*) — Impact-flash phenomenology has been known for many years, and is now being considered for missile-defense applications, in particular, remote diagnostics for kill assessment and target typing. To technically establish this capability, we have conducted a series of experiments at impact velocities of  $\sim 6$ ,  $\sim 11$ , and  $\sim 25$  km/s. Two- and three-stage light-gas guns were used for the lower two velocities, and magnetically-driven flyers on the Sandia Z machine achieved the higher velocity. Spectrally- and time-resolved flash output addressed data reproducibility, material identification, and target configuration analysis. Usable data were obtained in the visible and infrared regions of the spectrum. Data from the Z shots extended for nearly  $0.5 \mu\text{s}$ , and from the gas-guns usable reading times lasted for  $\sim 100 \mu\text{s}$ . Standard atomic spectral databases were used to identify strong lines from all the principle materials used in the study. The data were unique to the individual materials over the wide range of velocities and conditions examined. The time-varying nature of the signals enabled correlation of differing spectra with multi-layer targets containing different materials in the separate layers. Integrating the records over wavelength helped to clarify those time variations. (\*)Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the US Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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