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Pyrometric temperature measurements of shocked metals with uncertainties of less than 2% BRANDON LALONE, GERALD STEVENS, WILLIAM TURLEY, National Security Technologies, Special Technologies Laboratory, DAVID HOLTKAMP, Los Alamos National Laboratory, ADAM IVERSON, ROBERT HIXSON, LYNN VEESER, National Security Technologies, Los Alamos Operations — Advances in reflectance measurements have enabled accurate measurements of the emissivity of metals subjected to shock wave compression. Using three spectral bands, we performed reflectance and radiance measurements of shock compressed tin glued to LiF windows and combined them to determine time resolved temperatures with uncertainties of less than 2%. Details of the uncertainty analysis are discussed. The tin samples were shock loaded using high explosives so there is a Taylor wave stress release that follows the shock front. Stress histories of the release were determined from PDV measurements and were combined with the temperatures to obtain temperature-stress release paths for the tin-glue-LiF interface. We discuss the link between the experimental release paths and release isentropes that begin on the principal shock Hugoniot. There is a complex relationship between the measured interface temperatures and the temperatures within the interior of the samples which complicates the analysis. Several of the complications are briefly discussed and interior temperatures are estimated. This work was done by National Security Technologies, LLC, under Contract No. DE-AC52-06NA25946 with the U.S. Department of Energy, and supported by the Site-Directed Research and Development Program.

Brandon LaLone
National Security Technologies, Special Technologies Laboratory

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