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Shock Loading and Unloading Experiments on Thermally-Sprayed Porous Tantalum* J. L. WISE, N. W. MOORE, A. VACKEL, W. M. SCHERZINGER, C. A. MCCOY, G. R. CHANTLER, Sandia National Laboratories
— Gas-gun tests expanded the database for impact loading and unloading response of porous tantalum samples generated by a controlled thermal-spray deposition process. Velocity interferometer (VISAR) diagnostics provided time-resolved, single-point observations of sample motion under one-dimensional (*i.e.*, uniaxial strain) shock compression to peak stresses between 1 and 4 GPa. The resultant transmitted-wave measurements from forward-ballistic testing were analyzed to assess sample-to-sample variability in the presence and magnitude of detectable evidence for a Hugoniot Elastic Limit (HEL) and high-pressure yield strength. Reverse-ballistic experiments featuring porous tantalum impactors and witness windows (PMMA, LiF, and sapphire) with different characteristic shock impedances yielded Hugoniot data for multiple peak stresses. Sample-related fluctuations in material velocity during the peak compression state were quantified to further assess the magnitude of stochastic effects for this spray-formed material. *Supported by the Laboratory Directed Research and Development program at Sandia National Laboratories, a multi-mission laboratory managed and operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc., for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-NA-0003525.

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