Abstract Submitted
for the SHOCK13 Meeting of
The American Physical Society

Optical reflectance as a dynamic temperature diagnostic[1] DANIEL DOLAN, CHRISTOPHER SEAGLE, TOM AO, Sandia National Laboratories — Reliable temperature measurements of materials under dynamic compression remain elusive, especially in quasi-isentropic experiments. Optical pyrometry with nanosecond time resolution is essentially impossible for samples below 1000 K—not enough photons are emitted to make satisfactory measurements. Rather than relying on light emission from the sample, one can also infer temperature by the light reflected by the sample. Thermoreflectance measurements are a proven technique in static systems and can readily be applied to dynamic compression experiments. Gold is an ideal candidate for dynamic thermoreflectance measurements. Gold coatings rapidly equilibriate with their surroundings, acting as an embedded gauge that can be probed optically. The optical properties of gold vary in the visible spectrum, and these variations are known to change with temperature, so in principle one can infer temperature from time-resolved reflectivity measurements. Calibration is the largest barrier for using embedded gold gauges because both temperature and pressure contribute to the measurement. This presentation will discuss static and dynamic calibration efforts to establish gold as a dynamic thermoreflectance standard.

[1]Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85

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Date submitted: 13 Feb 2013 Electronic form version 1.4