Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Thin metal thermistors for shock temperature measurements of polymers N.E. TAYLOR, D.M. WILLIAMSON, A. PICARD, L.K. CUNNINGHAM, A.P. JARDINE, University of Cambridge — Equations of state can be used to predict the relationship between pressure, volume and temperature. However, in shock physics, they are usually only constrained by experimental observations of pressure and volume. Direct observation of temperature in a shock is therefore valuable in constraining equations of state. Bloomquist and Sheffield (1980, 1981) and Rosenberg and Partom (1984) have attempted such observations in poly(methyl methacrylate) (PMMA). However, their results disagree strongly above 2 GPa shock pressure. The present authors previously presented an improved fabrication technique, to examine this outstanding issue. This technique made use of the fact that the electrical resistivity of most metals is a known function of both pressure and temperature. By fabricating a thin metal thermistor gauge and measuring its change in resistance during a shock experiment of known pressure, its temperature can be recovered. Heat transfer into the gauge depends strongly on the gauge dimensions and the thermal conductivity of the shocked PMMA. Here we present several improvements to the technique. By varying the gauge thickness over the range 100 nm to 10 μm we assess the heat transfer into the gauge.

Nicholas Taylor
University of Cambridge

Date submitted: 30 Jan 2015 Electronic form version 1.4