

Abstract Submitted
for the DPP05 Meeting of
The American Physical Society

Energy deposition and expansion rates of single 25 μm copper wires with and without copper plated ends D.A. CHALENSKI, H.S. BARNARD, B.R. KUSSE, Laboratory of Plasma Studies, Cornell University, Ithaca NY 14853 — Previous experiments looking at the explosion of single, small diameter wires driven by 1-5 kA current pulses have shown that the energy deposited, and consequently the expansion rates, are strongly dependent on the electrical contacts at the ends of the wires. Continuing with this investigation we report here the results of a series of experiments using 25 μm diameter, 2cm long copper wires driven by the Cornell LCP3 pulse generator which produced nominally 5 kA, 200 ns current pulses with 15 to 100 ns rise times. For these measurements some of the wires had additional copper electroplated on the ends to increase the diameter by approximately 35%. The ends of the plated and un-plated wires made mechanical contact with the pulser by passing through small 0.35mm holes drilled in the electrodes. Comparisons were made of the explosions of plated and un-plated wires. Measurements were obtained for the energy deposited from current and voltage waveforms. Laser back-lighting allowed observation of the radial expansion rates and axial uniformity of the explosions. This research was supported in part by Sandia National Laboratories, Albuquerque, contract AO258 and by the NNSA Stockpile Stewardship Academic Alliances program under DOE Cooperative Agreement DE-FC03-02NA00057.

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Date submitted: 19 Jul 2005

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