

Abstract Submitted
for the SHOCK11 Meeting of
The American Physical Society

Shear stress relaxation in silver over 300 - 1233 K temperature range EUGENE ZARETSKY, Ben-Gurion University of the Negev, GUENNADY KANEL, United IVTAN — Evolution of the elastic-plastic shock waves in 99.9-% purity silver samples of 0.127 to 2.0-mm thickness, having initial temperature varied from 300 to 1233 K have been recorded with VISAR. The free surface velocity histories at room temperature and at 773 K do not show any distinct step at the front of the elastic precursor wave which looks like gradual velocity increase from zero value. Starting from 933 K the waveforms clearly exhibit finite HEL whose value grows with temperature and decreases with sample thickness. The decay of the elastic precursor wave at 933, 1173, and 1233 K is nearly inversely proportional to the square root from the propagation distance. This corresponds to the cubic dependence of the initial plastic strain rate on the shear stress at HEL. The flow stresses at the fixed strain rates display non linear temperature dependences while the plastic strain rates estimated from the plastic wave rise times are of an order of magnitude higher than those at HEL. Such behavior cannot be explained only by dislocation drag controlled by the phonon friction. The results are discussed in terms of motion and multiplications of dislocations.

Eugene Zaretsky
Ben-Gurion University of the Negev

Date submitted: 10 Feb 2011

Electronic form version 1.4