Abstract Submitted
for the SHOCK07 Meeting of
The American Physical Society

Influence of Microstructure on the Bauschinger Effect and the Shock Hardening in 1080 High-Carbon Steel. GEORGE GRAY III, ELLEN CERRETA, LISA DOUGHERTY, CARL TRUJILLO, MIKE LOPEZ, Los Alamos National Laboratory — The importance of a microstructurally-controlled Bauschinger component to defect storage during the shock loading process has been shown to be correlated to both quasi-elastic release effects and reduced shock hardening in materials. In the current study shock recovery experiments have been conducted on a high-carbon 1080 steel as a function of two microstructural states; fully pearlitic and where the cementite has been spheriodized. The 1080 steel in the fully-pearlitic condition is shown to exhibit a significant Bauschinger effect while the spheriodized microstructure is observed to display significantly higher shock hardening when shock prestrained to an equivalent shock peak stress. The shock hardening response of 1080 steel is discussed in terms of the micromechanisms controlling defect generation and storage during shock loading in materials.

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Date submitted: 16 Feb 2007 Electronic form version 1.4