

Abstract Submitted  
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**The Effects of Stress and Release Rate on the Spall Behavior of Single Crystal [100] Copper**<sup>1</sup> GERALD STEVENS, WILLIAM TURLEY, BRANDON LA LONE, LYNN VEESER, ROBERT HIXSON, Natl Security Technologies — A systematic study was performed of the spall behavior of single crystal [100] copper as a function of impact stress and release-rate at the spall plane. The release rate is governed by material thicknesses, peak stress, and the intrinsic wave-speeds of copper. Release rates were varied from 4.3 to 24.5 GPa/ $\mu$ s, and peak stress was varied from 5.3 to 14.0 GPa. PDV measurements of the target free surface velocity were used to measure spall-strengths which varied from 1.7 to 2.7 GPa. Our data are well described by a simple, semiempirical two-parameter model. By focusing on single crystal behavior, we have removed the influence of grain-size and also limited the slip systems available to the shocked metal. Measured velocity profiles show pronounced acceleration at spall, which suggests that [100] copper exhibits brittle tensile fracture. This is in contrast to the other crystal orientations [111] and [110] which have spall-velocity profiles similar to polycrystalline copper.

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