

Abstract Submitted
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Deformation Twinning and Dynamic Strength of Copper During High-Rate Strain VICTOR RAEVSKY, RFNC-VNIIEF — We will present the results of a study of the conditions under which microstructural changes involving the formation of complex bi-periodic twin structures occurs in copper during shock wave and high strain rate ($\dot{\epsilon} > 10^7 \text{ s}^{-1}$) shock-less loading. The overall morphology of the observed twin structures is rather complex, consisting of what we shall refer to as “packages,” with each “package” being composed of two sets of parallel twins aligned in a quasi-herringbone pattern. It is widely accepted that deformation twinning results in increased shear strength in samples recovered after shock wave loading. We have observed in this work a significant temporal component to the effect that these complex twin structures have upon shear strength. We have observed, for example, that the formation of these bi-periodic (herringbone-type) twin structures results in an initial loss of shear strength that is significant over a time period of about 0.2 to 0.4 μs . Following the initial loss of shear strength, deformation hardening produces an increase in shear strength that can be as great as several multiples of the initial value.

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