

Abstract Submitted
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Effects of Explosive Shock Prestraining on the Microstructural Evolution and Shear Localization of 304 and 316L Stainless Steels QING XUE, ELLEN CERRETA, GEORGE GRAY III, DYNAMIC MATERIALS PROPERTIES TEAM — Initiation and development of adiabatic shear bands in explosively pre-shocked 304 and 316L stainless steels was investigated to characterize the influence of shock prestraining on the onset of shear bands. Forced shear tests on hat shaped specimens were conducted using a compressive split-Hopkinson pressure bar. The mechanical responses and the shear localized behaviors under the force shear condition in these preshocked materials were examined and compared. Shear band initiation was found to be very sensitive to the preshocked microstructures, especially to the strong interactions among defects such as deformation twin networks. The evolution of microstructure before and during the formation of shear bands has been characterized using transmission electron microscopy(TEM). Dynamic and quasistatic recovery is verified to be a dominant mechanism in the formation of ultra fine substructures within the shear bands generated in these preshocked steels.

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