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The Influence of Shock-Loading Path on the Spallation Response of Ta GEORGE GRAY III, Los Alamos National Laboratory, Los Alamos, NM 87545, NEIL BOURNE, AWE Aldermaston, Reading, Berkshire, RG7 4PR, UK, VERONICA LIVESCU, CARL TRUJILLO, Los Alamos National Laboratory, Los Alamos, NM 87545, SAM MACDONALD, University of Manchester, Sackville Street, Manchester, M60 1QR, UK, DYNAMIC PROPERTIES TEAM COLLABORATION, AWE COLLABORATION, MANCHESTER UNIVERSITY COLLABORATION — Spallation is well known to be a complex process strongly influenced by microstructure, loading path, and the loading profile yet often a singular"spall strength" is utilized in hydrocodes to quantify the dynamic fracture behavior of a material. In the current study the influence of loading path on the "spall strength" and damage evolution in high-purity Ta is presented. The Ta samples where shock loaded to three peak shock stresses using both symmetric impact and two different composite flyer plate configurations such that upon unloading the three samples displayed nearly identical"pull-bac" signals as measured via rear-surface velocimetry. While the "pull-bac" signals observed are similar in magnitude, the highest peak stressed sample resulted in complete spall scab separation while the two lower peak stresses resulted in incipient spall. The damage evolution in the "soft" recovered Ta samples was quantified using optical metallography, electron-back-scatter diffraction, and tomography. The effect of loading path on spallation and its ramifications for the stress and kinetic dependency of dynamic damage evolution is discussed.

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