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Orientation dependent mechanical behavior of shocked AMX602 Mg alloy SCOTT TURNAGE, CHAD HORNBUCKLE, CYRIL WILLIAMS, KRISTOPHER DARLING, US Army Rsch Lab - Aberdeen — Shock loading provides a means of strengthening beyond the limits of traditional hardening mechanisms in certain alloys. However, while the potential benefits of applying such strengthening mechanisms to lightweight materials are appealing, the effects of shock loading on the residual microstructure and mechanical behavior of complex materials such as ultrafine grained AMX602 Mg alloy have not been thoroughly investigated. To resolve this, samples of ultrafine grained AMX602 Mg alloy are shocked, released, and recovered for microstructural and mechanical analyses. The influence of the high anisotropy of the extruded Mg alloy on the shock deformed structure is probed using electron backscatter diffraction (EBSD), micro-tension testing, and micro hardness testing. Results indicate that significant twinning is observed resulting from shock compression along the extrusion direction. When placed under quasi-static tensile stress, detwinning occurs in both the extrusion and normal directions resulting in a high degree of ductility.

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