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Brittle-to-Ductile Spall Transition in Laser Shocked Aluminum Alloys D.A. DALTON, A.C. BERNSTEIN, University of Texas-Austin, J.L. BREWER, Stress Engineering Services, Inc., E.D. JACKSON, S. STEUCK, W. GRIGSBY, D. MILATHIANAKI, E.M. TALEFF, T. DITMIRE, University of Texas-Austin — We have explored the role material microstructure plays on the spall strength of alloyed aluminum in the high strain rate range of 10^6 to 10^7 s^{-1}. We performed pump-probe style experiments using the Z-Beamlet Laser at Sandia National Laboratories to drive shocks in thin slabs of recrystallized Al+3 wt. pct. Mg. Velocity interferometry was used to measure the spall strength of the materials, and post-shot target analysis explored the microscopic fracture morphology. Observation of the Al+3 wt. pct. Mg showed evidence of a combination of brittle intergranular and ductile transgranular fracture features. Post-shot target analysis and hydrocode simulations indicate that this mixed mode failure results from spall dynamics occuring on spatial scales on the order of the grain size.

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