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Dynamic response of Cu46Zr54 metallic glass to high-strain-rate shock loading: Plasticity, spall, and atomic-level structures BEDRI ARMAN, Texas A&M, SHENG-NIAN LUO, TIMOTHY GERMANN, Los Alamos National Laboratory, TAHIR CAGIN, Texas A&M — Dynamic response of Cu46Zr54 metallic glass under adiabatic planar shock wave loading with molecular dynamics simulations was investigated. We analyzed the Hugoniot (shock) states up to 60 GPa, shock-induced plasticity and dynamic spall strengths. Especially, the spall strengths likely represent the limiting values achievable in experiments such as laser ablation. To characterize local deformation and structure at various stages of shock, release, tension and spallation, the local von Mises shear strain and Voronoi tessellation analyses were used. Modeled glass showed plasticity as localized shear transformation zones rather than thermal origin. Nucleation of voids occurred preferentially at the highly shear-deformed regions. Our simulations through the Voronoi and shear strain analyses suggest that the atoms having different local structures are of different shear resistances that lead to shear localization.

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