Abstract Submitted
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Nucleation and Growth of Voids in Shock Loaded Copper Bicrystals[1] ELIZABETH FORTIN, BENJAMIN SHAFFER, Arizona State University, SAUL OPIE, General Atomics, MATTHEW CATLETT, Los Alamos National Laboratory, PEDRO PERALTA, Arizona State University — Understanding the evolution of damage and deformation due to spall at grain boundaries can provide a basis for connecting micro- to macroscale failure behavior in metals under extreme conditions. Bicrystal samples were shock loaded using flyer-plated via light gas gun with pressures ranging from 35 GPa. Pulse duration as well as crystal orientation along the shock direction were varied for a fixed boundary misorientation to determine thresholds for void nucleation and coalescence as functions of these parameters. Samples were soft recovered and cross-sectioned to perform damage characterization using electron backscattering diffraction and Scanning Electron Microscopy to gather information on damage characteristics at and around the GB, with emphasis on void growth and lattice rotation around boundary and bulk voids. Chemistry and composition analysis were also performed on samples to determine if trace elements present in a sample affected the threshold for void nucleation. Initial results show that the kinetics of damage growth at the boundary are strongly affected by stress level and impurities, and that damage grows faster at the boundary compared to the bulk of the grains as pressure increases.

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