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Microstructural Analysis of Spall Damage Nucleation and Growth in Multicrystalline Titanium[1] ELIZABETH FORTIN, Arizona State University, ANDREW BROWN, UNSW Canberra, LEDA WAYNE, PEDRO PERALTA, Arizona State University, SHENG-NIAN LUO, The Peac Institute of Multiscale Modeling, AARON KOSKELO, Los Alamos National Laboratory — Shock loading is a dynamic condition that can lead to material failure and deformation modes at the microstructural level such as cracking, void nucleation and growth, and spallation. By studying these deformation patterns at and around grain boundaries, we can determine initiation sites in the material's microstructure where voids will nucleate and grow and create computational models that can simulate and predict the effects of these weak links, particularly grain boundaries. Existing work does not look into the effect of grain boundaries of hexagonal close packed materials, such as titanium. Samples were heat treated to produce large grains (multicrystals) to isolate grain boundary effects and shocked using laser-launched flyer plates at the Trident laser at Los Alamos National Laboratory at pressures close to the spall strength of Ti and monitored using a VISAR system. Samples were soft recovered and cross-sectioned to perform quantitative characterization of damage using electron backscattering diffraction (EBSD) to gather information on the crystallographic characteristics of damage nucleation sites, with emphasis on grain boundaries that lead to nucleation.

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