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Using EBSD for Strain Analysis in Laser Shocked Ta Samples[1]
KAMERON HANSEN, Brigham Young University – Provo, Utah, GREG RANDALL, DON WALL, General Atomics – San Diego, California, BRIAN JACKSON, Brigham Young University – Provo, Utah, GENERAL ATOMICS INERTIAL FUSION TECHNOLOGY TEAM — A recent comparison of high-pressure, high-strain rate compression experiments with simulations (H.S. Park et al., Phys. Rev. Lett., 2015) indicates that a metal's initial dislocation density is a key factor in determining its strength at extreme strain rate and pressure. However, mapping the dislocation density in these materials, specifically after they have been formed into experimental targets, has not been performed. We use electron backscatter diffraction (EBSD) to develop a method to characterize strain and dislocation density in annealed, coined, and shocked polycrystalline tantalum samples. In this initial work, we use linescans across grain boundaries to evaluate the resolution of our tungsten filament electron microscope and Oxford EBSD camera/EBSD acquisition software. Furthermore, we measure dislocation density using both Hough transform and cross-correlation strain analysis algorithms, and form misorientation maps (corresponding to dislocation density).

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