

Abstract Submitted
for the 4CS21 Meeting of
The American Physical Society

Sample Preparation for Lensless Strain Imaging at Twin Grain Boundaries LANDON SCHNEBLY, RICHARD SANDBERG, MCKAYLA TOWNSEND, HYRUM TAYLOR, NAOMI JENSEN, NICK PORTER, Brigham Young University, MATT WILKIN, ANASTASIOS PATERAS, ANTHONY ROLLETT, YUEHENG ZHANG, Carnegie Mellon University, ROSS HARDER, WON-SUK CHA, BARBARA FROSIK, Argonne National Laboratory — We seek to use Bragg coherent diffraction imaging (BCDI) to study how metals begin to damage at the nanometer scale. BCDI has previously been shown to have near wavelength-limited resolution. We use BCDI data from coherent x-rays scattered from crystalline metal samples at Argonne National Laboratory's Advanced Photon Source. We then use a program, Cohere, to create 3D strain maps of single metal grains during past beam times. We wish to eventually develop a method allowing joint reconstruction of multiple Bragg peaks. This would allow us to better study how defects in a polycrystalline metal are transmitted through a grain boundary under strain. The constraints necessary for 3D complex image retrieval via an iterative phase-retrieval technique will be explained with the aid of computer simulations utilizing fast Fourier transforms. Because a priori information results in more quickly converging iterative solution, twin grain boundaries were identified as prime sites for testing our technique. To identify samples with the necessary properties, we used scanning electron microscopy. The analysis and preparation of samples for our beamline experiments will be discussed.

Landon Schnebly
Brigham Young University

Date submitted: 20 Sep 2021

Electronic form version 1.4