Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Verification and Application of a New Analysis Method for X-ray Diffraction Microscopy[1] ROBERT SUTER, CHANGSHI XIAO, DANIEL HENNESSY, Department of Physics, Carnegie Mellon Univeristy, ULRICH LIENERT, Advanced Photon Source, Argonne National Laboratory — X-ray diffraction microscopy has been used to determine microstructure maps of bulk polycrystalline material. Data are collected at the Advanced Photon Source beamline 1-ID using line focused 50keV x-rays. Diffracted beams are imaged with a CCD camera and are tracked through space so that orientation, point-of-origin, and shape of individual grains are encoded. Analysis uses a computer simulation of the measurement and sample to generate calculated diffraction patterns; orientations of sample space area elements are adjusted to obtain a match to the data. We illustrate data and analysis using a thin silicon wafer sample. We then show images of several layers of an aluminum polycrystal. The ability to obtain such images in a non-destructive way opens the possibility of measurements of the response to external stimuli of ensembles of individual grains. Our analysis is amenable to inclusion of complex scattering rules such as will be needed to study defected materials.

[1]This work was supported primarily by the MRSEC program of the National Science Foundation under Award Number DMR-0520425. Use of the Advanced Photon Source is supported by the U. S. Department of Energy under Contract No. W-31-109-ENG-38.

Robert Suter
Department of Physics, Carnegie Mellon Univeristy

Date submitted: 30 Nov 2005 Electronic form version 1.4