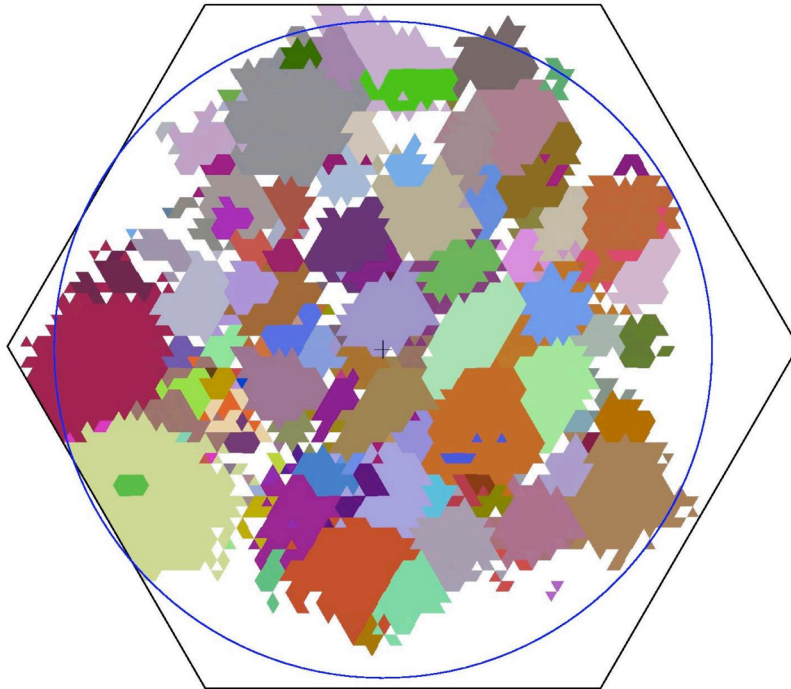


## X-ray Vision for Materials

R.M. Suter/CMU MRSEC, Carnegie Mellon University, NSF DMR-0520425

Researchers in the CMU MRSEC, together with scientists at the advanced photon source, have developed a non-destructive method to visualize the arrangement and orientation of individual crystals within a solid material. High energy X-rays from a synchrotron light source penetrate the material and interact with the crystals in their path. The pattern of transmitted X-rays that emerges from the material is then analyzed by custom software to determine the internal structure of the material. Because the complete X-ray/crystal interaction is modeled, this technique yields far more data than is contained in conventional radiograms. This new tool allows scientists to see within opaque materials with unprecedented detail and, therefore, allows the visualization of a wide range of previously hidden processes, such as crack formation in structural materials.



The figure shows a two-dimensional slice of the microstructure inside of an aluminum wire, 1 mm in diameter (the blue circle). Each color corresponds to a different crystal orientation.

This research was conducted by:

R.M. Suter,<sup>a</sup> C. Xiao,<sup>a</sup> D. Hennessy,<sup>a</sup> and U. Lienert<sup>b</sup>

<sup>a</sup>Carnegie Mellon, Department of Physics and <sup>b</sup>Advanced Photon Source

To learn more, see <http://x2d.phys.cmu.edu/3dxdm/3dxdm.html>