IMPROVING BEAMLINE X-RAY OPTICS BY ANALYZING THE DAMAGE TO CRYSTALLOGRAPHIC STRUCTURE*

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ABSTRACT

The mission of the X-ray Characterization Laboratory in the X-ray Science Division (XSD) at the Advanced Photon Source (APS) is to support both the beamline users and the Optics Fabrication Shop production. The lab collaborates with staff and users to produce high performance optics for synchrotron X-ray beamlines.

Built within the X-ray Lab, the Topography Test Unit (TTU) has been successfully used to characterize diffracting crystals and test monochromators, by quantifying residual surface stresses. This topographic method has also been adapted to testing standard x-ray mirrors and characterizing concave crystal optics. In addition, the TTU has been instrumental in eliminating the crystal mounting stresses, mechanically induced by positioning, holding and cooling fixtures.

Topographic analysis has been shown to be an effective method to visualize and quantify the distribution of stresses, to help identify methods that mitigate stresses and to improve crystal rocking curves.

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