

Topography as a method to evaluate of x-ray mirrors*

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ABSTRACT

For many years the X-ray topography unit at the Advanced Photon Source has been successfully used to characterize diffracting crystals and for testing monochromators to determine the magnitude of residual stresses on the crystal surface. Recently the method has been adapted to standard x-ray mirrors consisting of single-crystal silicon. Typically, the quality of a mirror is determined by metrology with visible light for characterizing the fine and coarse surface features. This information is useful for evaluating the quality of the visible surface, but it does not supply information regarding the subsurface stresses in the mirror. The technique discussed in this paper applies to the evaluation of mirror quality and the characterization of the state of strain in the subsurface. This new method of mirror testing may supplement previous metrology measurements for a more complete mapping of optical surfaces where the crystal surface is penetrated by x-rays and the underlying subsurface may affect the quality of a reflected beam.

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