Comparison of Refraction Contrast to Absorption Contrast Using Diffraction Enhanced Imaging

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Refraction contrast of an object has been obtained using the new imaging modality, diffraction enhanced imaging (DEI). Lucite cylinders and trilene wires were imaged using 18 keV synchrotron radiation at the National Synchrotron Light Source (NSLS). The DEI images were obtained by placing a Si analyzer crystal tuned to the [333] plane in the beam path between the sample and detector. The DEI images showed improved contrast of the objects when compared to normal radiographs. The ratio of the signal-to-noise ratio (SNR) in the refraction image to the SNR of the normal radiograph is defined as the refraction gain. For objects on the order of 1 - 2 cm diameter, the refraction gain ranges from 2 - 5. For objects on the order of 1 mm, the gain ranges from 2 - 12. Computer models of the imaging process have been concurrently developed to study the contrast mechanisms. Results will be presented and discussed.

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