

Refractive Contrast in X-ray Diffraction Enhanced Imaging

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X-ray Diffraction Enhanced Imaging (DEI) is a promising technique for the future medical application. However, the contrast mechanism of the DEI is still not clearly expressed and understood, although there have been many considerations related on the refractive contrast for DEI. In this paper, the deflecting angles of X-ray beams caused by refractive objects are deduced according to the refractive process at interface of different refractive indexes. The spacial resolution and the electron density resolution of the DEI method are discussed relating to the experimental parameters. Appearances of refractive contrast in the DEI method are discussed and experimentally confirmed. Vivid images of blood vessels in human liver sample are obtained by DEI technique using X-rays with different energies. The contributions of the refractive contrast in improving the image contrast are easily understood.