Single-element elliptical hard x-ray micro-optics

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Using micro-fabrication techniques, we have manufactured two optics; a single element kinoform lens in single-crystal silicon with an elliptical profile for 12.4 keV (1Å) x-rays, and a Fresnel prism. By choosing to fabricate an optic optimized at a fixed wavelength, absorption in the optic can be significantly reduced by removing $2\pi$ phase-shifting regions, while maintaining phase coherence across the optic. This permits short focal length devices to be fabricated with small radii of curvatures, allowing one to obtain a high demagnification of a finite synchrotron electron source size. We present our first results from experiments at the National Synchrotron Light Source X13B beamline.

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