Abstract

X-ray waveguide optics for x-ray in-line holo-microscopy

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We present recent advances of x-ray point source production by two-dimensional lithographic x-ray waveguide nanostructures. A pre-focussed synchrotron beam is coupled in from the front side of a polymer channel embedded in silicon, which acts as a waveguide and blocks the unwanted (super-illuminated) part of the beam, leaving a well defined hard x-ray beam of around 30 x50 nm2 the end of the 1-5 mm long device. The field propagation and efficiency of the combined KB mirror and waveguide optics are discussed. A waveguided beam with a flux on the order of 106 photons per second has been achieved in a first ESRF undulator experiment using this coupling scheme. The divergent and coherent beam exiting from the quasi-point source can then be used to magnify the wave front distorted by the object. The scheme of in-line holographic imaging, the image formation and object reconstruction will be discussed.