

X-ray microscopy with 1 nm resolution

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The short wavelengths of X-rays allow imaging at high resolution, which is usually only fully exploited in coherent diffractive imaging techniques such as X-ray crystallography. Ptychography provides a robust method to phase coherent diffraction by adding diversity to the measurement with a structured beam, and perhaps the highest diversity is achieved when that beam is the smallest possible probe, created by a lens of high numerical aperture (NA). A high-NA lens is indeed a handy optical element for imaging. A probe focused to a 1 nm spot can not only be used for coherent imaging but can also be used for imaging fluorescence and inelastic scattering. Creating such a lens appears to be feasible, but challenging. Coupled with a source of sufficient brightness, it could be used for rapid tomographic imaging of complex objects over extended fields of view.

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