Hybrid Nanoscale X-ray Imaging

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Hybrid x-ray imaging methods combine direct methods, which include the development and optimization of the optical components, and computational methods include reconstruction capabilities, encoding algorithms, propagation techniques, and others to create a high performance imaging technique. X-ray diffractive optics provide one of the most versatile ways to shape and manipulate an x-ray beam, which is especially important for hybrid nanoscale x-ray imaging. One of the barriers to practical use of x-ray diffractive optics, especially for the hard x-ray region, is the low efficiency of these optics, stemming from the difficulty in fabricating very high aspect ratio, high resolution dense features. We will describe the use of metal assisted chemical etching schemes to address and solve problems in the area of x-ray optics. We will also describe utilization of specialized diffractive optics in hybrid imaging schemes.