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Extreme ultraviolet Fourier holography of nano-scale objects[1]
MARIO MARCONI, NILS MONSERUD, ERIK MALM, Colorado State Univ, PRZEMYSLAW WACHULAK, Military University of Technology, XU HUIWEN, GANESH BALAKRISHNAN, University of New Mexico, WEILUN CHAO, ERIK ANDERSON, Lawrence Berkeley National Laboratory — Fourier transform holography (FTH) is one of the leading short wavelength coherent diffraction imaging techniques. FTH requires precise mask (object) fabrication procedure, but the object reconstruction process is fast and simple. FTH is a coherent imaging technique which utilizes the interference between a point source reference and the object waves to encode object information into the interference pattern. The image of the object can be numerically reconstructed by applying the inverse Fourier transform of the interference pattern. This simple reconstruction method allows for using charge coupled device (CCD) detectors for the recording medium. To obtain high spatial resolution it is necessary to utilize small pinholes in the reference that limits the area of the object to small sizes to match the amount of light from the object to the intensity of the reference pinhole. Therefore, high-resolution mask-based FTH ultimately limits the object size that can be imaged. In this paper, we present a setup that uses a Fresnel zone plate to split the coherent beam of a compact extreme ultraviolet (EUV) laser that allows large field of view, high spatial resolution, time resolved EUV holograms in a table top.

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