Talbot nano-patterning with a table-top soft X-ray laser¹ LUkasz Urbanski, Przemyslaw Wachulak, Colorado State University, Artak Isoyan, Fan Jian, Yang-Chun Cheng, University of Wisconsin, Jorge Rocha, Carmen Menoni, Colorado State University, Franco Cerrina, University of Wisconsin, Mario Marconi, Colorado State University, Colorado State University Collaboration, University of Wisconsin Collaboration — We demonstrate a novel high resolution soft X-ray (SXR) patterning approach based on the generalization of the Talbot effect. This effect was used to print periodic structures of arbitrary patterns with nanometer resolution over a large area. The coherent illumination of a tiled mask produced self images of arbitrary motifs allowing for a non-contact replication technique that opens a new avenue for nanofabrication. Compact soft X-ray laser sources recently developed enable this new nanopatterning technique demonstrated with a table-top SXR laser at $\lambda = 46.9$ nm. Shorter wavelength SXR lasers emitting in the 13 nm region would allow printing of millimeter square areas with sub-10 nm resolution.

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