

# Efficiency Improvement of EUV Diffractive Optical Elements for High-Throughput Imaging

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Diffractive optical elements (DOE) are powerful and versatile optics. Not only are they generally lightweight and compact, but they can also be designed to generate complex wavefronts like multi-foci beams or orbital angular momentum beams. However, they suffer from multiple diffraction order focusing and generally low efficiency (around a few percent). The first shortcoming can be addressed using proper upstream illumination or downstream order sorting apertures. The second shortcoming can be improved by switching the DOE material to a less absorptive, phase shifting material, which allows positive contribution of light intensity to the focus from the otherwise negative interfering light. In the presentation, we will discuss our long-term project of developing nanofabrication processes for EUV phase zoneplates with up to five-fold efficiency improvement.