

# Irradiation systems for accelerated testing of EUVL components

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Fraunhofer ILT has been developing EUV sources for more than 2 decades. In collaboration with Philips and Ushio, ILT has contributed to the development of discharge-based sources, which have been operated in the first EUV lithography scanners for chip production.

Having the know-how on EUV sources and their implementation into optical system at hand, ILT has been developing multitude of applications in collaboration with RWTH Aachen University, e.g., EUV laboratory-scale lithography for patterning and resist testing with demonstrated resolution of 28 nm HP or EUV reflectometry for surface sensitive analysis.

The talk will focus on the incorporation of a new source-collector-module developed for irradiation tests of optical components. The system is based on our proven FS5440 high power EUV source, whose emission is focused on a sample in controllable atmosphere to study EUV induced effects on surfaces or plasmas. Using strong vacuum separation and particle mitigation, an operating base pressure  $<10^{-7}$  mbar at the irradiation position can be achieved. Without pumping orifices in the vicinity of the focal spot, clean, unbiased experimental conditions can be achieved. The expected performance includes: EUV irradiance  $>40$  W/cm<sup>2</sup>, angle of incidence on sample  $<5^\circ$ , spot diameter  $>1.8$  mm and pulse repetition rate up to 2.5 kHz.

Design and results from optical and gas-flow simulations have been presented in previous talks [1,2]. This talk shall show first results from incorporation.

[1] Irradiation Systems for accelerated Testing of EUVL Components; 2021 EUV Source Workshop, EUV Litho, inc.; Jochen Vieker

[2] Irradiation Systems for accelerated Testing of EUVL Components; 2021 PTB Seminar VUV and EUV Metrology; Jochen Vieker