

Abstract Submitted
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EUV laser produced and induced plasmas for nanolithography.¹

TATYANA SIZYUK, AHMED HASSANEIN, Purdue Univ — EUV produced plasma sources are being extensively studied for the development of new technology for computer chips production. Challenging tasks include optimization of EUV source efficiency, producing powerful source in 2 percentage bandwidth around 13.5 nm for high volume manufacture (HVM), and increasing the lifetime of collecting optics. Mass-limited targets, such as small droplet, allow to reduce contamination of chamber environment and mirror surface damage. However, reducing droplet size limits EUV power output. Our analysis showed the requirement for the target parameters and chamber conditions to achieve 500 W EUV output for HVM. The HEIGHTS package was used for the simulations of laser produced plasma evolution starting from laser interaction with solid target, development and expansion of vapor/plasma plume with accurate optical data calculation, especially in narrow EUV region. Detailed 3D modeling of mix environment including evolution and interplay of plasma produced by lasers from Sn target and plasma produced by in-band and out-of-band EUV radiation in ambient gas, used for the collecting optics protection and cleaning, allowed predicting conditions in entire LPP system. Effect of these conditions on EUV photon absorption and collection was analyzed.

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