

Opto-Electronics Review, 2015, volume 23, issue 2, pp. 172-186

Laser-plasma extreme ultraviolet and soft X-ray sources based on a double stream gas puff target: interaction of the radiation pulses with matter

Bartnik, A.

DOI: <https://doi.org/10.1515/oere-2015-0023>

Abstract:

In this work a review of investigations concerning interaction of intense extreme ultraviolet (EUV) and soft X-ray (SXR) pulses with matter is presented. The investigations were performed using laser-produced plasma (LPP) EUV/SXR sources based on a double stream gas puff target. The sources are equipped with dedicated collectors allowing for efficient focusing of the EUV/SXR radiation pulses. Intense radiation in a wide spectral range, as well as a quasi-monochromatic radiation can be produced. In the paper different kinds of LPP EUV/SXR sources developed in the Institute of Optoelectronics, Military University of Technology are described. Radiation intensities delivered by the sources are sufficient for different kinds of interaction experiments including EUV/SXR induced ablation, surface treatment, EUV fluorescence or photoionized plasma creation. A brief review of the main results concerning this kind of experiments performed by author of the paper are presented. However, since the LPP sources cannot compete with large scale X-ray sources like synchrotrons, free electron lasers or high energy density plasma sources, it was indicated that some investigations not requiring extreme irradiation parameters can be performed using the small scale installations. Some results, especially concerning low temperature photoionized plasmas are very unique and could be hardly obtained using the large facilities.