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Method for characterization of gas-puff targets for high energy laser matter interactions

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In order to use gas-puff targets in high power laser matter interaction experiments the characterization measurement of the targets are require. One possible method is an extreme ultraviolet (EUV) pulsed radiography (shadowgraphy) [1,3]. The shadowgrams are formed by EUV light, illuminating the gas-puff target. From the shadowgrams it is possible to obtain the density of the target using numerical method. The result of experiments is 2-D density map of the targets. Using pulsed radiography method, possible is to get fully 3-D reconstruction of measured object (ex. gas-puff targets). 3-D representation of pulsed gaseous target has been obtained using special software [2] by combining 2-D shadowgram images, recorded at various rotation angles.

In this paper we present some results of characterization of gas-puff target, developed at the Institute of Optoelectronics, MUT. This method of characterization should be useful for developing a new EUV or X-ray sources based on interaction of gas-puff targets with high power lasers. For that purpose we demonstrated a desktop backlighting system based on a laser-plasma gas puff target EUV source. The tomographic method allows for more complete characterization of objects, e.g. some additional information regarding the complicated density structure of the target [3].

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[2] available from *http://www.volumegraphics.com*

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Structural studies of Au layers irradiated by intense EUV nanosecond pulses

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Present results refer to the samples irradiated in single-shot mode with the laser plasma source with a spectrum containing an intensity maximum at 10–11nm wavelength [1]. The experiments were carried out for the thin Au layers with different thickness. The fluence of EUV beam has been regulated by moving the sample in and out of focus. The radiation modified area depending on fluency and irradiation geometry was around 0,8 mm^2.

After irradiation, the samples were examined by the atomic force microscopy, interference-polarizing microscopy and the X-ray diffraction. The structural characterization was done with synchrotron radiation at the DORIS W1.1 beamline in Hasylab with the monochromatic beam of wavelength λ = 1.54056 Å. The measurements were recorded in a 2θ scan mode in the grazing incidence geometry. The ω-2θ scans were also recorded in order to find the structural changes in the near-surface layers affected by the irradiation.

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