Numerical analysis of the role of a hard ionizer in increasing the efficiency of pumping the active medium of compact EUV lasers [[1]](#footnote-1)\*)

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The application of compact radiation sources of high spectral brightness in the extreme ultraviolet (EUV) range includes a wide range of tasks related to atomic and molecular spectroscopy, biophysics, medicine, lithography, dense plasma diagnostics and materials science. In this regard, it is of a great practical interest to study the possibility to increase the efficiency of such sources. In this paper, sources based on a plasma of multiply charged ions created in a capillary discharge are considered. One of the ways to increase it is to use a hard ionizer: beams of fast electrons and high-energy photons. This approach has certain prospects for creating capillary discharge lasers, especially in the light of the fact that high currents lead to the destruction of the capillary itself.

The report analyzes the formation of the active medium of the lasers in EUV spectral range at high-voltage nanosecond discharge developed in a capillary, taking into account the action of a hard ionizer. The internal ionizing source is determined by runaway electrons and electromagnetic X-ray radiation due to the interaction of electrons with heavy plasma particles. Requirements for the characteristics of the radiation flux (wavelength, intensity, pulse duration) are formulated, which are necessary to obtain the gain k≥1см-1 at the transitions of H- and He-like ions with a generation wavelength λ <15 nm of elements with atomic number Zn=6-7.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/XLVIII/It/ru/DP-Timshina.docx) [↑](#footnote-ref-1)