STUDY OF THE EMISSION PROPERTIES OF THE SURFACE OF TUNGSTEN WITH A NANOSTRUCTURE OF THE "FUZZ " TYPE [[1]](#footnote-1)\*)

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One of the negative processes that affect erosion and serve as a source of plasma contamination is the formation of unipolar arcs (UA) when the surface is a cathode and an anode at the same time. Unipolar arcs can be predominantly generated on rough and inhomogeneous surfaces, including tungsten surfaces with a nanostructure of the "fuzz" type. Such surfaces from layers of nanofibers with a diameter of 20–50 nanometers are formed by irradiating tungsten with helium plasma during hourly discharges under special conditions for the flow of particles to the surface. In the PLM setup [1], when testing tungsten with stationary plasma flows, nanostructured layers of the “fuzz” type up to 1.5 micrometers thick are formed on the surface.

In this work, the emission properties of a modified tungsten surface with such a “fuzz” type nanostructure are studied [1]. The experiment was carried out using a sample with a surface area of ​​1.5 cm2, uniformly covered with a "fuzz" type structure. The width of the interelectrode gap between the hemispherical surface of the anode and the sample is 0.3 mm. Negative potential in the range of 0 - 10 kV was applied to the sample (Figure 1 a). The vacuum chamber was evacuated to a residual gas pressure of 6·10-6 Torr. The results of the experiment in comparison with the data of work [2] are presented in Figure 1 b. The resulting electron emission current can cause explosive electron emission and erosion, which must be taken into account when operating thermonuclear installations.

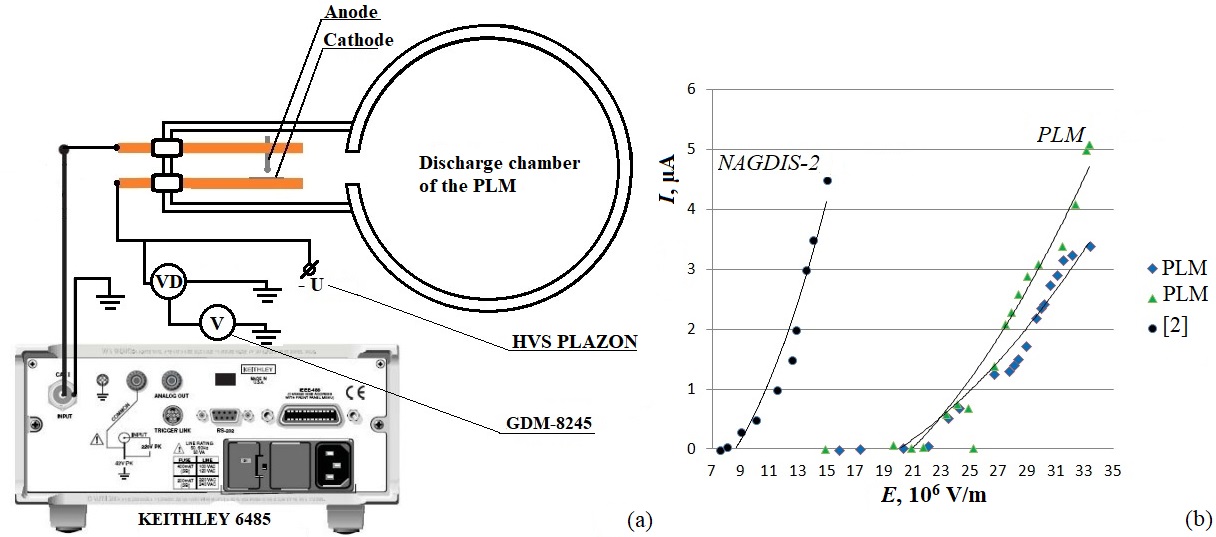


Figure 1 - Electrical circuit of measurements (a) and the dependence of the emission current on the field strength (b)

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References

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2. Hwangbo D. at al. IEEE Trans. Plasma Sci. – 2017. Vol. 45, No. 8. – P. 2080.

1. \*) [abstracts of this report in Russian](http://www.fpl.gpi.ru/Zvenigorod/L/Pt/ru/GP-Feodorovich.docx) [↑](#footnote-ref-1)