the INFLUENCE OF IRRADIATION PARAMETERS OF TUNGSTEN WITH HELIUM IONS FROM ICP DISCHARGE ON NANOSTRUCTURES GEOMETRY [[1]](#footnote-1)\*)

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Surface modification under plasma irradiation has crucial importance for both the first wall of the tokamak devices and for a wide range of technological applications [1]. The phenomenon of nanostructuring of surface layers [2] is not just a new fundamental property of plasma-surface interaction, but it also leads to easier initiation of independent electrical discharges on the first wall of thermonuclear installations [3].

For a deeper understanding of the formation process of arc discharges between the plasma and the wall, it is necessary to consider the mechanisms of the occurrence of explosive emission cells of the cathode spot on nanostructured tungsten surfaces (W-fuzz) formed in the conditions of the first wall of thermonuclear installations [4, 5, 6].

The experiments on tungsten irradiation with helium ions were carried out in the “Bella” installation. A planar RF coil was used to generate inductively coupled plasma (ICP). The operating frequency of the RF power source was 13.56 MHz. To maintain the samples at the same temperature during the experiment, a holder with controlled heating was used. The samples were irradiated in the temperature range from 1000 to 1500 K, and their bias potential was varied from –150 V to –500 V.

The discharge parameters and the values of the current and bias voltage characteristic of breakdowns on a structured surface have been determined. Dynamical changes in the surface structure have been studied by optical registration of the sample radiation. The influence of the sample temperature during processing, and the energy of the incident ions on the surface structure has been analyzed. The effect of the current density on the surface structure has been examined by changing the discharge power with simultaneous tuning of the sample temperature to meet the fixed value while maintaining the same bias voltage.

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References

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