# Characterization of Spontaneous Arcs on Fuzzy Tungsten Surfaces under Exposure to Helium Plasma

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In nuclear fusion devices, plasma-facing tungsten elements are prone to the formation of nanostructured layers due to surface irradiation with intense helium ion fluxes. These so-called W fuzz layers are known to facilitate the initiation of electrical discharges on the first wall. In this contribution, we experimentally investigate the growth of nanostructures on tungsten surfaces in an RF He plasma and the spontaneous initiation of arcs when a pulsed bias voltage is applied to the sample. A custom-built power supply was used to generate the bias in a single-pulse mode. The arc current and voltage waveforms were obtained, and the scanning electron images of the arc traces were analyzed. The behavior of the arc at the smooth/fuzzy surface boundary directly demonstrated the beneficial arcing conditions of the nanostructured layer. Using single-pulse bias mode enabled registration of individual arc traces. From the experimental results, the total arc trace length and arc velocity were calculated and compared with literature data, yielding good agreement between experiments and theory, as well as across different arc initiation conditions. The work was supported by the Russian Science Foundation (grant No. 22-12-00274).