Abstract Submitted
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Probe measurements of electron energy spectrum in Helium/air micro-plasma at atmospheric pressure.[1] V. I. DEMIDOV, AFRL, WVU, S. F. ADAMS, J. A. MILES, AFRL, M. E. KOEPKE, WVU, I. P. KURLYANDSKAYA, INTEPH Technologies LLC, A. L. HENSLEY, B. A. TOLSON, UES Inc. —
It is experimentally demonstrated that a wall probe may be a useful instrument for interpretation of electron energy spectrum in a micro-plasma with a nonlocal electron distribution function at atmospheric pressure. Two micro-plasma devices were fabricated with three layers of molybdenum metal foils with thickness of 0.1 mm separated by two sheets of mica insulation with thickness of 0.11 mm. In one device a hole with the diameter of 0.2 mm formed a cylindrical discharge cavity that passed through the entire five layers. In the second device the hole has the diameter of 0.065 mm. In both devices the inner molybdenum layer formed a wall probe, while the outer layers of molybdenum served as the hollow cathode and anode. The discharge was open into air with flow of helium gas. It is found that the wall probe I-V trace is sensitive to the presence of helium metastable atoms. The first derivative of the probe current with respect to the probe potential shows peaks revealing fast electrons at specific energies arising due to plasma chemical reactions. The devices may be applicable for developing analytical sensors for extreme environments, including high radiation and vibration levels and high temperatures.

[1]This work was performed while VID held a NRC Research Associateship Award at AFRL.

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