

Abstract Submitted  
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**Application of a large wall probe in a short dc discharge as a gas analytical detector for high-energy atomic and molecular processes.** V. I. DEMIDOV, West Virginia University, S. F. ADAMS, AFRL, M. E. KOEPKE, West Virginia University, A. A. KUDRYAVTSEV, St. Petersburg State University, I. P. KURLYANDSKAYA, INTEPH Technologies LLC, J. A. MILES, AFRL — An approach, which is based on the measurements of the electron energy distribution function (EEDF) with a large electric wall probe in a short (without positive column) dc discharge, can lead to the development of gas analytical detectors [1]. In this work, a short dc discharge with cold cathode and conducting walls was used in experiments at gas pressures of a few Torr to measure fine structures associated with atomic and molecular plasma processes at the high-energy portion of the EEDF in the plasma. It is experimentally demonstrated that for the investigated conditions the maxima associated with plasma-chemical reactions at the EEDF are proportional to the second derivative of electron current with respect to the probe potentials. Measurements have been conducted in helium gas and helium-argon gas mixtures with content of argon from 0.002% to 5%. Calibration of the device for the absolute measurements of densities of plasma constituents has been demonstrated. It is shown that the presence of a specific target gas component can be monitored from the measured EEDF. [1] V. I. Demidov et al., Phys. Plasmas, 23, 2016, 103508.

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