

Abstract Submitted
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Electrical and emission spectroscopic investigation of a self-pulsing micro hollow cathode discharge BEILEI DU, SEBASTIAN MOHR, DIRK LUGGENHOELSCHER, UWE CZARNETZKI, Institute for Plasma and Atomic Physics, Ruhr-Universitaet Bochum — Micro hollow cathode discharges (MHCD) consist of two electrodes separated by a thin dielectric (here: 100 μm). The discharge develops in a hole penetrating all three foils (200 μm diameter). When powered by a DC voltage of several 100 V, the discharge shows self-pulsing operation. Voltage and current measurements, optical emission measurements by an ICCD camera equipped with a microscope lens as well as the determination of electron density from the Stark broadening of the H_β -line are performed in argon at pressure from several 1000 Pa to atmospheric pressure. The voltage-current characteristic during self-pulsing indicates a transition from abnormal mode to spark mode as in a DC glow discharge. The pulse frequency can range from kHz up to about 1 MHz and depends on the capacitance of the discharge setup. The pulse width can be as short as several 10 ns and the current peaks can be as high as 1 A. With the appearance of the self-pulsing the electron density increases from the order of 10^{15} cm^{-3} during the non self-pulsing operation to the order of 10^{16} cm^{-3} . A comparison of the plasma conductivity obtained from the performed measurements with the electrical measurements shows excellent quantitative agreement.

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