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Experiment and modeling of laser photodetachment of negative ions in helium oxygen barrier discharges ROBERT TSCHIERSCHE, SEBASTIAN NEMSCHOKMICHAL, JÜRGEN MEICHSNER, Institute of Physics, University of Greifswald — Helium oxygen discharges operating at atmospheric pressure are of great interest for applications, such as surface treatment of biological samples. Helium as the buffer gas keeps the driving power low, and oxygen serves as the source of radicals. The large electronegativity of oxygen results in the formation of negative ions which in turn have a remarkable influence on the discharge development. To point out this role of negative ions, the change of the discharge behavior after the laser photodetachment of negative ions is measured in a helium oxygen barrier discharge. These measurements reveal a lower breakdown voltage when firing the laser during the pre-phase of the discharge. The reason is the additional pre-ionization by the detached electrons which was proved by a 1D numeric fluid modeling. The next step is the determination of absolute number densities of negative ions by a comparison of the experimental parameter variations with those from the modeling. Furthermore, the actual role of negative ions on the discharge behavior will be emphasized by the modeling.

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