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Plasma decay in O_2-containing mixtures after high-voltage nanosecond discharge NICKOLAY ALEKSANDROV, EVGENY ANOKHIN, SVETLANA KINDYSHEVA, Moscow Institute of Physics and Technology, Dolgoprudny, 141700, Russia, ANDREY STARIKOVSKIY, Princeton University, Princeton, USA — Plasma decay after a high-voltage nanosecond discharge has been studied experimentally and numerically in O_2:Ar, O_2:CO_2 and some other mixtures for room gas temperature and pressures between 1 and 10 Torr. Time-resolved electron density history was measured by a microwave interferometer for initial electron densities in the range (1-3) $\times$ 10^{12} cm^{-3} and the effective electron-ion recombination coefficient was determined. A numerical simulation was carried out to describe the temporal evolution of the densities of charged particles under the conditions considered. The balance equations for these particles were solved simultaneously with the equation for electron effective temperature. It was shown that the loss of electrons in this case is determined by dissociative and three-body electron recombination with O_2^+ ions. The rate coefficient of three-body electron recombination was determined for these molecular ions. When changing gaseous mixture composition, the frequency of electron energy relaxation was varied by many orders of magnitude. This allowed extracting the values of three-body electron-ion recombination for both thermalized and heated electrons.

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