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Impact of N_2O and O_2 admixtures on pulsed DBDs in N_2 at atmospheric pressure M. M. BECKER, H. HOFT, M. KETTLITZ, R. BRANDENBURG, D. LOFFHAGEN, Leibniz Institute for Plasma Science and Technology (INP) — The gas composition is a key parameter that determines basic properties of dielectric barrier discharges (DBDs). N_2 is a common working gas for DBD-based plasma processing and N_2O is frequently admixed as a precursor in plasma-enhanced chemical vapour deposition of thin oxide layers or for the control of layer stoichiometry in other layer deposition processes. Furthermore, O_2 impurities are known to have a strong impact on discharge characteristics and are difficult to avoid. The present contribution investigates systematically the impact of N_2O and O_2 admixtures on pulsed-driven, single-filament DBDs in N_2 at atmospheric pressure. Reaction kinetic modeling was used to analyze the change of plasma-chemical processes for different gas mixtures, and electrical measurements were performed. Similar non-monotonous changes of DBD properties caused by pre-ionization effects were observed both for increasing N_2O and O_2 content, although the underlying processes were found to be essentially different for N_2O and O_2 admixtures, respectively. A transition from electropositive to electronegative plasma conditions was found with increasing N_2O content, while the admixture of O_2 strongly affects the recombination of electrons with positive ions.

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