Abstract Submitted
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N2(A) vibrational kinetics in streamer discharges: effect of oxygen on formation of low vibrational levels[1] MILAN SIMEK, Institute of Plasma Physics of the CAS, Prague, Czech Republic, PAOLO FRANCESCO AMBRICO, PLASMI lab @ CNR Nanotec, VACLAV PRUKNER, Institute of Plasma Physics of the CAS, Prague, Czech Republic — In the present study we report on the N2(A) vibrational kinetics in nitrogen-oxygen mixtures revealed by LIF technique under DBD streamer discharge conditions at low pressures. In pure nitrogen, the observed evolution of the N2(A) LIF signal during the decaying streamer channel period evidences fast initial relaxation of high vibrational levels towards the v = 2 and 3 levels, followed by a delayed increase of terminal v = 0 and 1 levels. In nitrogen-oxygen mixtures however, the efficient quenching of higher N2(A) levels by oxygen significantly inhibits vibrational relaxation towards the lower and terminal levels, causing much lower populations of the v = 0–3 levels. This is already clearly visible in the N2 + 0.8% O2 mixture with all the kinetics limited to the first 10 microseconds. In synthetic air, the kinetics is limited to few microseconds in the post discharge. Furthermore, much more effective quenching of fluorescence makes the measurements extremely challenging. Obtained results show that with the addition of oxygen the evolution of the N2(A) vibrational distribution is effectively terminated during the collisional-radiative cascade inhibiting energy pooling mechanism which is effective in pure nitrogen

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