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The influence of impurities on the electrical behaviour of high pressure noble gas plasmas TOM MARTENS, ANNEMIE BOGAERTS, Research Group PLASMANT, Department of Chemistry, University of Antwerp, WOUTER BROK, JAN VAN DIJK, Department of Applied Physics, Eindhoven University of Technology — Since reactor designs are rarely completely the same, gases of different quality grades are being used and since in simulations the impurity levels are sometimes used to fit the simulated breakdown voltages to the experimental values, we focus our current research on the influence of different levels of gas impurity on the electrical characteristics of dielectric barrier discharges in atmospheric helium. For matters of simplicity and to be able to make comparison with results published in literature, we focus on nitrogen impurities and use a fluid model to describe the discharge. Our results show that when the nitrogen content rises, the amount of current pulses in each half period increases, a phenomenon that has been investigated experimentally by Radu et al. [IEEE Trans. Plasma Sci., Vol. 31(6), 1363-1378]. Interestingly, our results show that the power consumption shows a steep drop and becomes minimal at about 3800 ppm and quickly rises again for higher impurity levels. This drop coincides with the transition from 2 to 3 current pulses and appears to originate from the decrease of the peakwidth with rising nitrogen content. This drop is followed by a quick increase in power consumption due to an extra current pulse at 4000 ppm.

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