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Kinetic study of the NO formation in pulsed air-like low-pressure dc plasmas: measurement and numerical modelling MARKO HUEBNER, SERGEJ GORCHAKOV, DETLEF LOFFHAGEN, INP Greifswald, Germany, OLIVIER GUAITELLA, LPP, Ecole Polytechnique, France, DANIIL MARINOV, Open University, UK, ANTOINE ROUSSEAU, LPP, Ecole Polytechnique, France, JUERGEN ROEPCKE, INP Greifswald, Germany, INP GREIFSWALD, GERMANY TEAM, LPP, ECOLE POLYTECHNIQUE, FRANCE COLLABORATION
— The formation of NO has been studied measuring the temporal evolution of the density of NO, NO_2 and N_2O by high time-resolved quantum cascade laser absorption spectroscopy. The densities of these nitrous oxides have been measured in synthetic air as well as in air with an admixture of 1% of NO_2 and N_2O, respectively, at a pressure of 1.33 mbar and mean currents between 50 and 150 mA. The measured time-dependent densities of NO, NO_2 and N_2O have been compared with those calculated by means of a self-consistent numerical model. The modelling approach includes the coupled solution of the time-dependent electron Boltzmann equation and a system of rate equations for various heavy particles. In general, measured and calculated results show good qualitatively agreement. In total four distinct phases of the NO density evolution during the plasma pulse and the early afterglow are found. The densities of NO_2 and N_2O decrease exponentially during the plasma pulse and remain almost constant in the afterglow. The admixture of NO_2 has a remarkable impact on the NO production during the ignition of the plasma. The dominating processes are presented and discussed.

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