# Cross section Data for Modeling Non-equilibrium Plasmas in $N_2O$

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In this paper we present a swarm analysis of electron scattering cross sections in nitrous oxide ($N_2O$). Experimental results for drift velocities and effective ionization coefficients, obtained by using a Pulsed-Townsend technique [1] over a broad range of the density-normalized electric field strength (E/N), were compared with numerical solution of Boltzmann equation in two term approximation [2] and with the results of Monte Carlo simulations [3]. Measurements and calculations were performed for pure gas and for a number of $N_2O/N_2$ mixtures up to 80% of $N_2O$. The cross section set for nitrogen that we have used is well established and well tested and it was taken from the *Sigmalib* database of cross sections [2].

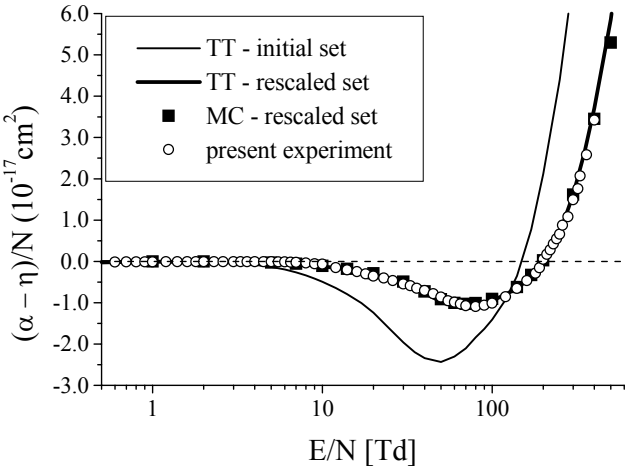


Fig1. A fit of the effective ionization coefficient

Our analysis shows that commonly used sets of cross sections [4, 5] for $N_2O$ have to be modified in order to fit experimental data, in particular the dissociative attachment and electronic excitation cross sections (with the threshold energy of 4.0 eV). In Figure 1 we show the fit of effective ionization coefficient obtained with the initial and rescaled set of cross sections for pure $N_2O$.

In order to complete the data base for modeling non equilibrium plasmas and plasma devices containing $N_2O$, a number of transport and rate coefficients for the case of both DC and RF electric and magnetic fields were calculated. A behavior of transport coefficients under the influence of the magnitude and the frequency of the fields was studied separately revealing some complex features in the time dependence, such as anomalous anisotropic diffusion and time-resolved negative differential conductivity.


[1] E. Basurto, J. L. Hernández–Avila, A. M. Juárey, J. de Urquijo, S. Dupljanin, O. Šašić, Z. Lj. Petrović, 28th ICPIG, July 15-20 2007, Prague, Czech Republic, p.227 .

[2] W.L.Morgan and B.M. Penetrante, Comput. Phys. Commun. **58**, 127 (1990) .

[3] Z. M. Raspopović, S. Sakadžić, S. Bzenić and Z. Lj. Petrović, IEEE, Trans. Plasma Sci. **27**, 1241 (1999)

[4] J. Mechlińska-Drewko, T. Wróblewski, Z. Lj. Petrović, V. Novaković and G. P. Karwasz (2003) Rad. Phys. and Chem. **68**, 205-209

[5] Zecca A, Karwasz G P, Brusa R S and Wróblewski T (2003) Int. J. Mass. Spectrom. 223, 205-215