

From Elementary Processes to Modelling of Low-Temperature molecular Plasmas

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Ionized gas in low-temperature conditions, are in general characterized by the presence of molecular species, which can strongly affect the system properties and its evolution. In particular, when non-equilibrium conditions exists, the interactions occurring among the particles at a microscopic level, give rise to a complex collisional physics, largely dominated by molecules in different internal quantum states which act as different chemical species. So the modeling of these systems requires the characterization of a plethora of collisional processes, involving molecules, where exchanges of ro-vibronic energies, dissociation, ionization, reactive processes etc., may occur. In this frame, the availability of large sets of cross section data becomes a crucial prerequisite for a realistic simulation of plasma system.

In the oral contribution to the present CRP meeting, examples will be given of plasmas of technological interest (ns discharges⁽¹⁾, dense plasmas⁽²⁾, divertor simulations⁽³⁾, aerospace entry problems⁽⁴⁾), focusing the discussion on the macroscopic outcomes of the modelling as seen from a point view of the elementary processes. A brief overview on heavy-particle and electron-molecule collisions, will be also presented.

1. G. Colonna *et al.*, *Eur. Phys. J. D*, **71**, 279 (2017)
2. A. Laricchiuta *et al.*, *Eur. Phys. J. D*, **71**, 265 (2017)
3. F. Taccogna *et al.*, *Chem. Phys*, **398**, 27 (2012)
4. P. Reynier *et al.*, *Progress in Aerospace Sciences* **96**, 1 (2018)