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CROSS-SECTIONS, TRANSPORT COEFFICIENTS AND DISSOCIATION RATE CONSTANTS OF RARE GAS DIMER IONS IN COLLISION WITH THEIR PARENT GAS FOR COLD PLASMA MODELLING

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Transport coefficients and dissociation rate constants of positive rare gas ions are needed input data in chemical electro-hydrodynamic plasma models for a better understanding and optimization of plasma reactors used in applications such as biomedicine or spacecraft. A dynamical hybrid method has been used to calculate momentum transfer for the non-dissociative ion scattering and collision induced dissociation. The hybrid method uses a classical formalism for nuclei and quantum treatment for electrons where the electronic Hamiltonian is calculated *via* a diatomics-in-molecules (DIM) semi-empirical model. Effects of dimer rare gas ion rovibronic excitations are also included in the hybrid dynamical method to improve the agreement between calculated and experimental dimer ion mobility. Moreover, for comparison, momentum-transfer cross-sections have also been derived from an inverse method (based on JWKB approximation and an empirical potential) which fits experimental data available on a limited reduced field range and extends it to a wider range. These collision cross-sections are then used in an optimized Monte Carlo code that simulates the ion trajectory to calculate transport coefficients (mobility and diffusion) and dissociation rate constant of He^{2+}, Ne^{2+}, Ar^{2+}, Kr^{2+} and Xe^{2+} dimer ions in collision with their parent gas over a wide range of reduced field.

Biography

Benhenni Malika has obtained her PhD in 1990 from University of North Carolina at Chapel Hill, USA, in Atomic Physics and concerns the electron capture and excitation processes by Auger electron spectroscopy for hot plasma applications. She was a Research Assistant in 1991 in Laboratoire Grenoblois des Ions, Plasmas et Physique Atomique. She is an Associate Professor at University of Toulouse III-Paul Sabatier in France. Her current research is carried out in Laboratoire Plasmas et Conversion d'Énergie and focuses on modelling of basic data for cold plasma applications such as biomedicine, flue gas pollution control, etc. She is Referee in several international journals.

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