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## Cross-sections and dissociation rate constants for rare gas ions colliding with their parent gas in cold plasma jet for biomedical applications

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Momentum transfer cross-sections for the non-dissociative ion scattering and collision-induced dissociation is calculated for different rare gas dimer cations ($He_2$+, $Ar_2$+, and $Ne_2$+) in a collision with their respective parent gas. Different methods (quantum, hybrid, and inverse) have been used for momentum transfer cross-section in the ion collision energy range (0.01 - 100) eV. While a full quantum treatment is used in the quantum case, the hybrid dynamical method uses a classical treatment for nuclei and quantum treatment for electrons where the electronic Hamiltonian is calculated via a DIM semi-empirical model. On the other hand, the inverse method, based on a simple isotropic potential and JWKB semiclassical approximation, uses measured ion mobility to extract ion momentum transfer collision cross-sections. These calculated cross sections are used in an optimized Monte Carlo code that simulates the ion trajectory to obtain $He_2$ +, $Ar_2$ + and $Ne_2$ + reaction rates and transport coefficients over a wide reduced electric field range. The obtained dissociation reaction rate data are compared to measurements when available (for $Ne_2$ + dissociation only) in the literature. These calculated dimer cation dissociation rate constants are necessary as input data in electrohydrodynamic and chemical plasma models of the low-temperature plasma jets to quantify and optimize the production of active species for biomedical applications.

### Biography

Benhenni Malika obtained her PhD in atomic physics from University of North Carolina at Chapel Hill, USA, in 1990 and concerns the electron capture and excitation processes by auger electron spectroscopy for hot plasma applications. She was a research assistant in Laboratoire Grenoblois des Ions, plasmas et physique atomique in 1991. 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'Energie 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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