

Workshop "Collision Data for Plasma Modelling"

The role of swarm studies in normalizing (deriving?) cross section data for plasma processing

J de Urquijo

Instituto de Ciencias Físicas, Universidad Nacional Autónoma de México

Gas discharge modeling for plasma processing is one of the most dynamic fields in the low-temperature plasma physics. A successful modeling process depends, at least, on three fundamental tools, namely, an accurate physical model, a complete and accurate set of electron/ion collision cross sections or swarm coefficients, and a powerful Boltzmann Equation or Monte Carlo code to solve the problem.

Regarding the many collision cross section sets needed for a particular simulation, there exist several sets of high quality and reliability, covering wide ranges of collision energies, although there are many other sets awaiting validation and further measurements, an increase in the energy range, or even completion. This is particularly true for many fluorocarbon gases used in the semiconductor industry, for instance.

This talk deals with a review of the relevance of swarm studies in the validation, normalization and derivation of cross section data for plasma processing. Selected examples of simultaneous work involving the measurement of swarm coefficients and their calculation leading to (i) successful testing of present sets of cross sections, (b) careful adjustment of existing cross sections to fit the experimental swarm data, or (c) derivation of new cross sections.