DATA NEEDED FOR MODELING LOW-TEMPERATURE PLASMAS

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The modeling of low temperature, non-equilibrium plasmas (LTPs) is centered on a description of the electron and ion components of the plasma. The transport of electrons and ions and the coupling of the charged particle transport to electromagnetic fields can be described using different levels of models ranging from macroscopic fluid models to detailed kinetic models such as particle in cell/Monte Carlo collision (PIC–MCC) simulations. Data needs depend on the level of description, but in all cases are extensive. For PIC–MCC simulations, electron/ion-neutral scattering cross sections are required input whereas the information required for fluid models includes electron/ion transport and rate coefficients. Hybrid models have been developed and these use a combination of both kinds of data. An important consideration is that the electron energy distribution function is generally non-Maxwellian and can be determined by solving the Boltzmann equation using cross section data as input.

The LXCat project was initiated in 2009 for the purpose of providing a warehouse for data related to the charged particle components of low temperature plasmas along with on-line tools to facilitate intercomparisons and evaluation. LXCat is a dynamic, open-access, website (www.lxcat.net) for collecting, displaying, and downloading **the** cross sections and transport coefficients required for modeling low temperature plasmas. This is a community-wide activity and anyone willing to contribute data or to contribute in other ways to the development of the project is welcome – at present there are over 40 members of the LXCat team. The contents and maintenance of the individual databases are the responsibility of the contributors. Also available on the LXCat site is an option for calculating electron transport and rate coefficients in pure gases or in gas mixtures when cross section data for the component species are available in the LXCat databases.

This talk will provide an overview and status report on the LXCat project. Also included in this talk will be mention of some recent efforts on the part of the Low Temperature Plasma community to extend the LXCat concept to plasma chemical kinetics models with associated reaction rates, validation by comparison of model predictions with target experiments, and distribution in open-access electronic format. Data related to plasma surface interactions are another issue which will be mentioned only briefly.