

Electron Induced Processing; Applications and data needs

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Domain : Low Energy Electron Molecule Interactions

Electron induced reactions in both gaseous and condensed phases initiate and drive many of the basic physical and chemical processes in science and technology. For example, it has recently been demonstrated that low energy electrons may play a key role in radiation damage of the DNA of living systems¹ while electron processing plays a key role in aeronomy and atmospheric chemistry². In the technological field electron induced reactions underpin most of the multibillion dollar modern semiconductor industry since it is those reactive fragments produced by electron impact of etchant gases that react directly with the silicon substrate³.

Electron induced processes are also of extraordinary importance for determination of structure and chemical reactivity of species adsorbed on surfaces⁴, indeed recently it has been demonstrated that, using STM based technology, discrete electron reactions may be performed at the individual molecular level thus introducing the prospect of designer synthesis on the nanoscale⁵. Electron induced chemistry in ice films plays a key role in molecular formation in both the interstellar chemistry and on planetary surfaces, underpinning much of modern astrochemistry.⁶

However the data base for electron-molecule interactions remains woefully inadequate^{7,8} providing a major impediment to development of many of these fields. In this talk I will review the many applications of electron induced processes, review the current state of our knowledge and suggest a strategy by which we might improve the data base.

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