

Comparative Study of Electron and Positron Scattering from *c*-C₄F₈

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Perfluorocyclobutane (*c*-C₄F₈) molecules are a plasma processing gas employed in the plasma etching of semiconductors. Its CF₂ radicals have especially been used in the selective etching of SiO₂ [1]. These CF₂ radicals are also formed indirectly in a *c*-C₄F₈ plasma by dissociative electron impact with its C₂F₄ by-product [2]. On the other hand, as recently reviewed [3], predictions of positron bound states with neutral atoms, use of the positron emission tomography (PET) in the study of metabolic processes, and applications of positron scattering to the characterization of materials, have increased interest in positron scattering studies. In this study we carry out a comparative of electron and positron scattering total cross sections (TCSs) from *c*-C₄F₈ molecules.

The TCS measurements were carried out for 0.8-600 eV electron and 0.7-600 eV positron impact using a linear time-of-flight apparatus [4]. The results are shown in Fig. 1. Below 2.2 eV, electron and positron TCSs show the striking opposite trends. The rising trend in electron TCSs agrees well with the electron affinity (+0.63 eV) and increasing electron attachment cross sections below 1 eV, while the drop in positron TCSs could be attributable to the near cancellation of the attractive and repulsive scattering in this region [5].

Detailed comparative studies of these and other features will be presented at the conference.

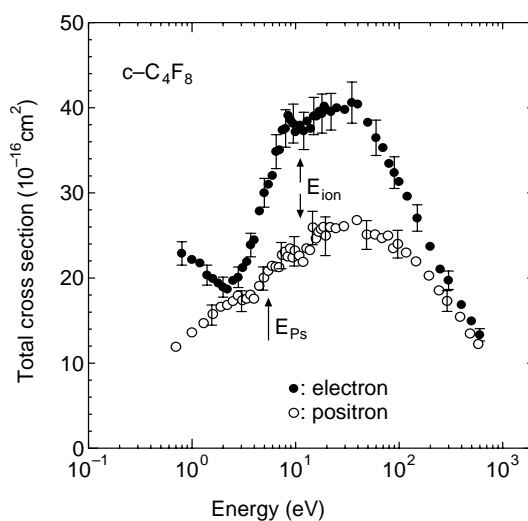


Fig. 1 *c*-C₄F₈ electron and positron TCSs. Arrows show the thresholds for ionization, E_{ion} , and positronium formation, E_{Ps} .

References

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