DISSOCIATIVE MULTIPLE IONIZATION FOLLOWING VALENCE AND Si:2p CORE LEVEL PHOTOEXCITATION OF MOLECULES

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Dissociation processes of $SiCl_4$ and $HSi(CH_3)_3$ have been investigated in the valence and Si:2p core-level excitation/photoionization by photoelectron-photoion coincidence and photoion-photoion coincidence (PIPICO) techniques together with synchrotron radiation. The present mass spectrometric studies led to the observation of various fragmentation patterns of singly and doubly charged parent molecules as a function of the photon energy. Partial ion yield and PIPICO spectra were measured as a function of the incident photon energy in the range 65 - 133 eV. At discrete resonance energies below the ionization edge, the photoionization efficiency is greatly enhanced by the core-hole decay process. The discrete resonance energies of $HSiMe_3$ below the Si:2p ionization edge were esimated by using the equivalent core approximation method by performing the HF calculation on $HPMe_3^+$. The PIPICO efficiency measurements show that the Si:2p core excitation is the key process in the multiple ionization processes.

Our *ab initio* calculation based on the MP2 and MP4 perturbation theories and the G2 thoery predicts the structures and energies and also provide the plausible dissociation patways of the charged precursor. The variation of the dissociation pattern with the photon energy is discussed in conjunction with the relevant electronic states.