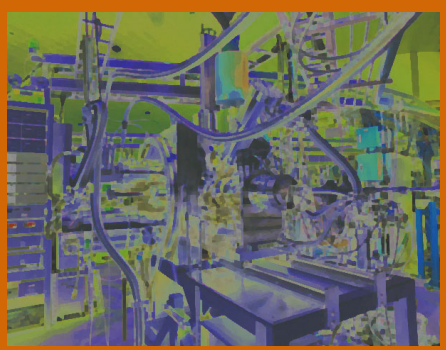
Molecular Science



Introduction

The capabilities of U5, U9, High-Flux, and HSGM beamlines make it promising to study the dynamic process following selective photoexcitation in molecules. A variety of experiments on molecular science have been performed to investigate the dissociation dynamics of molecules and further contribute to the understanding of elementary processes involved on photodissociation or dissociative photoionization.

One study selected in the highlights is "Enhanced Production of Neutral and Ionic Fragments of Core-Excited Molecules." State-specific fragmentation dynamics for excited and ionic fragments of gaseous and condensed $Si(CH_3)_2Cl_2$ following Cl 2p and Si 2p core-level excitations have been characterized. The core-to-Rydberg excitations at both Si 2p and Cl 2p edges lead to enhanced production of the excited fragments. These complementary results provide deeper insight into the origin of state-selective fragmentation of molecules via core-level excitation. Another highlight article is "Universal Detection of Reaction Products." The combination of a time-of-flight mass spectrometer with a photon ionizer in a crossed-molecular-beam apparatus using tunable undulator VUV light has achieved universal detection of reaction products. Products from photodissociation of several polyatomic molecules have all been successfully detected and thus their branching ratios, kinetic-energy distributions, and angular anisotropies can be measured unambiguously. This detection scheme is also applicable to crossed-beam reactions.