

# Study on Dissociation Processes of Core-Excited Acetone Using Auger Electron-Photoion-Photoion Coincidence Measurements

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To elucidate the detail of the dissociation processes of core-excited organic molecules, especially those from the dicationic states produced after Auger decay, Auger electron-photoion-photoion coincidence (AEPIPICO) method has been applied to acetone. Measurements are carried out at the soft x-ray beamline BL8B1 of the UVSOR using a cylindrical mirror analyzer and a high-resolution time-of-flight mass spectrometer. Electrons and ions are extracted from the interaction region by a weak electrostatic field (40V/cm). Correlations between different ions produced by an Auger process are recorded in a fast multiscaler, by using the signal of an energy-selected resonant Auger electron as a start signal and the ion signals as multi-stop signals.

AEPIPICO signals at the O 1s to  $\pi^*$  resonance, from where only singly charged ionic states are formed by Auger decays, are observed at the lower Auger electron energy side. When the energy of resonant Auger final state is higher than the threshold of dication formation, autoionization channels to form dication states and therefore dissociation to form ion-pairs become possible. By selecting the energy of Auger electron, it is found that only a unique ion-pair  $\text{CH}_3^+ + \text{CH}_3\text{CO}^+$  is produced from the ground state of acetone dication whereas various ion-pairs such as  $\text{C}_3\text{H}_3^+ + \text{O}^+$  and  $\text{CH}_3^+ + \text{CH}_3\text{C}^+$  are produced from the excited states.