

VELOCITY MAP IMAGING OF DISSOCIATIVE CHARGE TRANSFER IN TRANSITION METAL ION - MOLECULE COMPLEXES

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Transition metal ion-molecule complexes (e.g., M^+ (benzene), M^+ (furan), M^+ (methanol), etc. where $M = \text{Zn, Ag, Au}$) are generated in the gas phase by laser vaporization and are detected using a time-of-flight mass spectrometer. The ionization potentials of the metals are typically lower than those of many molecules, leading to the charge being localized on the metal in a cation-molecule complex. Laser excitation of the ion-molecule complexes leads to a charge transfer dissociation channel producing the molecular ion fragment. If the excitation wavelength is sufficiently high, excess kinetic energy release above the dissociation threshold can be detected using velocity map imaging. This energy release can then be used to calculate an upper bound on the metal ion-molecule bond energy.