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**Songhee Han**

Department of Chemistry, KAIST, Daejeon, Korea

## Quantum state and conformer specific photoionization and photodissociation

Mass-analyzed threshold ionization (MATI) spectroscopy, combined with the supersonic jet method, has been widely used in many laboratories, providing excellent energy resolution with a relatively simple pulsed-field ionization scheme. One-photon MATI spectroscopy using a vacuum ultraviolet (VUV) laser source has been employed to provide information about the cationic ground states ( $D_0$ ) for various biological building blocks. Two-photon ( $1+1'$ ) MATI spectroscopy has been applied to investigate neutral molecules in the excited state ( $S_1$ ) with the aid of assignment for  $D_0$ . On the other hand, the MATI-photofragment excitation (PHOFEX) technique has been verified as a useful method to unravel complex cationic excited states ( $D_1$ ), because great advantages have been obtained from spectral simplification induced by the rotational cooling in  $D_0$ . From these, the initial conditions in  $S_1$  or  $D_0$  could be determined prior to the photoionization and/or photodissociation rather than the ones in  $S_0$ .

Although there are well known experimental techniques in regard to the state-to-state measurements specifying the quantum states in  $S_0$ , these are based on the optical method and suffer from the averaging problem over the quantum states or conformers. The Stark deflection technique has been suggested as a new approach to select quantum states in  $S_0$  and then combined with the velocity map ion imaging technique to study state specific photoionization and photodissociation. Preliminary experiments have been accomplished to demonstrate and assure the feasibility of above method.