

Development of Laser desorption / laser spectroscopic system for nonvolatile molecules

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Introduction Our group has been developing laser spectroscopy and mass spectrometry of nonvolatile molecules such as bio-related molecules and functional molecules in the gas phase. Here, most important part is the vaporization of the neutral samples without decomposition. One of the best methods for the vaporization is the laser desorption. In this study, we report the development of laser desorption-laser spectroscopic and mass spectrometry for nonvolatile molecules.

Experiments Fig.1 shows experimental setup. The sample is vaporized in the channel-type nozzle by laser desorption. The sample vapor is mixed with Ar carrier gas at 6 atm and is expanded into vacuum, generating a supersonic jet. The jet is skimmed by a skimmer to obtain the supersonic beam. The molecule in the beam is irradiated by a tunable UV pulse and the S_1 - S_0 electronic spectrum is obtained by laser induced fluorescence (LIF) or resonance-enhanced two-photon ionization (R2PI) spectroscopy.

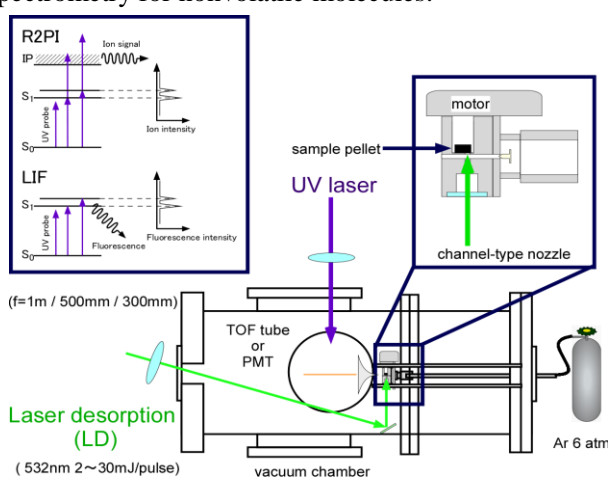


Fig.1 Laser desorption / spectroscopy experimental setup.

Results and discussion Fig.2 shows the TOF mass spectrum of calix[4]arene (C4A) ionized by R2PI after laser desorption. The spectrum shows a single peak at $m/z=424$, indicating a success of LD/R2PI of C4A. Fig.3 shows the LIF spectrum of L-Tyr and L-Tyr-(H₂O) generated by LD. The spectrum shows the presence of several conformers for bare L-Tyr. On the other hand, the number of the conformers is reduced by the complex formation with water. We will discuss the possible structure of the complexes.

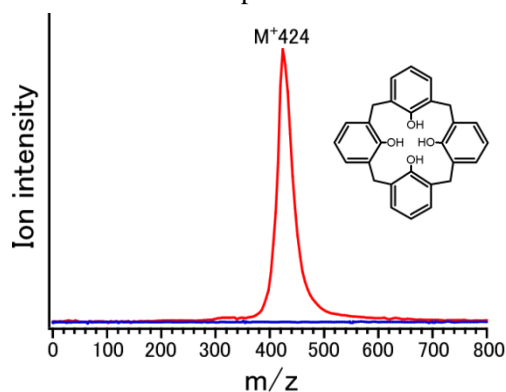


Fig.2 LD/ R2PI TOF mass spectrum of C4A.

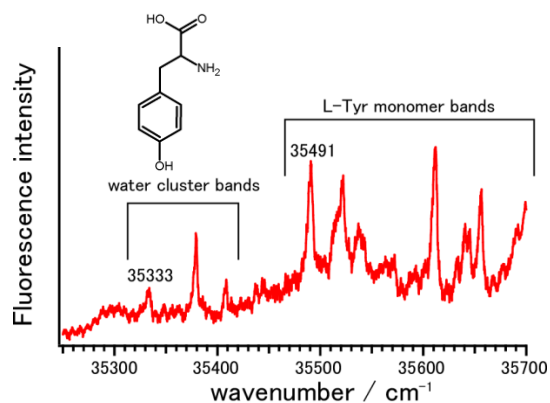


Fig.3 LD/LIF spectrum of L-Tyr and L-Tyr-(H₂O).