Fluorescence and Photodissociation Spectroscopy of Mass-Selected Ions

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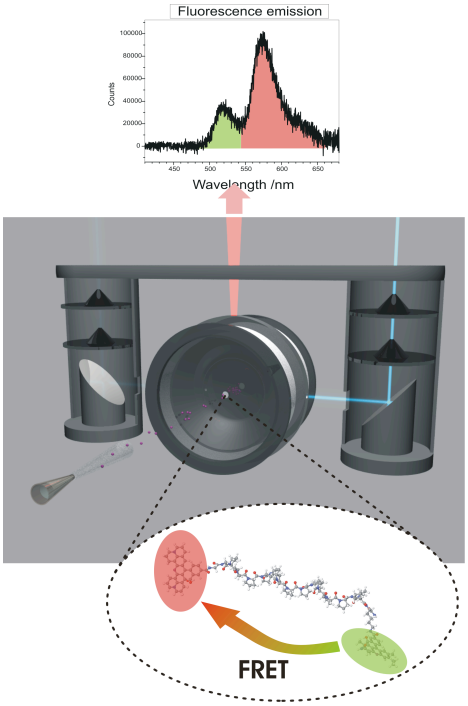
Characterization of biomolecules and biomolecular complexes in a highly-controlled gas-phase environment allows valuable simplification of complex biological systems and provides a route to elucidate the effects of specific non-covalent interactions. We have recently built a flexible interface for doing optical spectroscopic experiments on gaseous molecular ions and clusters, formed by electrospray ionization (ESI), mass selected and stored in a quadrupole ion trap mass spectrometer (QIT-MS). [1] Recent results from fluorescence and photodissociation action spectroscopy of several small molecular ions and fluorophore-labeled peptides will be presented. These include the intrinsic behavior of a model chromophore of the green fluorescent protein.[2] In addition, dispersed fluorescence spectra and fluorescence lifetime measurements showing fluorescence resonance energy transfer (FRET) in gaseous polyproline-based peptides will be presented. The effect of molecular charge on peptide conformation is explored using measured FRET efficiency and computations. The effect of molecular charge on peptide conformation is explored using measured FRET efficiency and computations. The gas-phase FRET studies presented here provide a new route to probe the intrinsic structure of biomolecules, both in isolation and in well-defined micro- environments.



[1] Q. Bian, M. W. Forbes, F. O. Talbot and R. A. Jockusch, (2010) "Fluorescence Excitation and Emission Spectroscopy of Trapped, Mass-Selected Gas-Phase Ions," *Phys. Chem. Chem. Phys.*, *12*, 2590-2598.

[2] M. W. Forbes and R. A. Jockusch (2009) "Deactivation Pathways of a GFP Chromophore Studied by Electronic Action Spectroscopy," *J. Am. Chem. Soc.*, *131*, 17038-17039.