

UV spectroscopy of gas phase proteins and metal cluster-peptide hybrids

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UV-Vis spectroscopy was used to obtain signatures of geometric and electronic structures of protein and metal peptide complexes. The objective of these gas phase experiments is to provide the bases to construct atomic models of functional molecule in actions.

The experimental set up integrates an electrospray ion source, an ion trap mass spectrometer and one or two tunable UV-Vis lasers. A first series of results was obtained on multiply negatively charged peptides and proteins [1]. Electron emission was observed after irradiation. The electron detachment mechanism and the influence of the repulsive Coulomb barrier will be discussed. Electron detachment yield as a function of the laser wavelength and optical signatures of proton and radical transfers will be presented.

Metal cations are ubiquitous in biology. We will show that gas phase experiments can be used to determine the exact nature of the binding between the cation and the peptide and the influence of the cation on the conformation of the biomolecule. Finally, we will present results on peptide- silver cluster complexes. The surface plasmon of the metal moiety induces a spreading and a strong enhancement of the optical absorption of the complex (see Fig. 1) [2]. These systems can be used as prototypes of biomolecules on surfaces in a well-defined environment.

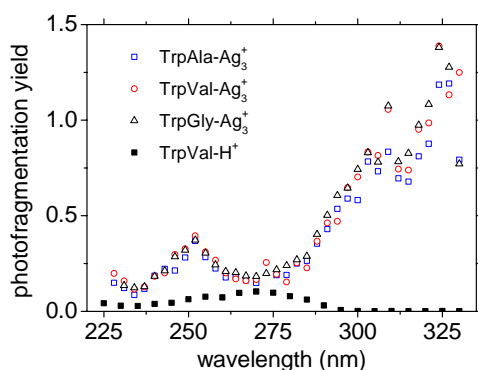


Figure 1: Photofragmentation yields measured for protonated Tryptophane-Valine (TrpVal-H⁺) dipeptide and silver cluster-dipeptide complexes.

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[2] R. Mitric, J. Petersen, A. Kulesza, V. Bonacic-Koutecký, T. Tabarin, I. Compagnon, R. Antoine, M. Broyer and P. Dugourd, J. Chem. Phys. **127**, 134301,134301-134309 (2007).