GAS-PHASE PHOTOIONIZATION OF A PROTEIN

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Abstract. We present preliminary results on gas phase photoionization of electrospray-produced multiply protonated cytochrome *c* protein (104 amino acids; ≈12.4 kDa), which has been achieved with a newly developed experimental system for spectroscopy of electrosprayed ions in a linear quadrupole ion trap using a monochromatized vacuum ultraviolet (VUV) synchrotron radiation and tandem mass spectrometry method. The investigation of proteins in the gas phase, where they are free of the influence of counterions and solvent molecules, offer a possibility to understand their intrinsic molecular properties. However, due to limited both ion densities and available number of photons, the use of synchrotron radiation for the trapped ions spectroscopy is a rather challenging task. The feasibility of coupling a Fourier transform ion cyclotron resonance ion trap with soft x-ray synchrotron beamline and the first successful use of synchrotron radiation for spectroscopy of electrosprayed negative ions stored in a three-dimensional quadrupole ion trap have been demonstrated only recently (R. Thissen et al., 2008, *Phys. Rev. Lett.*, **100**, 223001; A. Giulliani et al., Proc. 57th ASMS Conf., Philadelphia, 2009). The present results are the first reported on photoionization of kDa species in the gas phase and are valuable regarding both a fundamental interest of accessing physical properties of large biological ions isolated *in vacuo* and potential development of a new technique for proteomics.