Temperature-programmed Native ESI Mass Spectrometry

Résumé

Under appropriate, so-called "native" spray conditions, electrospray ionization (ESI) allow the observation of noncovalently bound complexes in the gas phase, and to determine noncovalent biomolecular binding affinities using mass spectrometric read-out. This has great advantages over other biophysical methods such as SPR or CD, because details of different ligation states and the stoichiometry and influence of cofactors can be clearly resolved using MS. I will present the development of a temperature controlled ESI source for performing T-dependent binding assays. This gives access to the full thermodynamic information, i.e., enthalpic (H) and entropic (S)contributions to the Gibbs free energy (G) for noncovalent binding interactions measured by ESI-MS, in a stoichiometry-specific manner. We also have developed a T jump source, where we can follow folding / unfolding kinetics. Finally, application of this technology to a range or problems will be discussed, including biomolecule•ligand complexes, other noncovalent assemblies such as collagen model peptides that form triple helices, and noncanonical DNA structures like G quadruplexes, G quadruplexes linked by proximal DNA duplex structures, Y junctions, and other oligonucleotide complexes.