

AWARD FOR A DISTINGUISHED CONTRIBUTION IN MASS SPECTROMETRY

2015 RECIPIENT: BRIAN T. CHAIT

AWARD LECTURE: 4:45 PM, MONDAY, HALL 5, LEVEL 1



Dr. Brian T. Chait is awarded the 2015 ASMS Award for a Distinguished Contribution in Mass Spectrometry for the recognition and demonstration of the link between protein structure and conformation and electrospray ionization mass spectra. His discovery that a protein's solution phase conformation impacts its electrospray ionization mass spectrometry (ESI-MS) charge state distribution (CSD) blasted away the barriers isolating mass spectrometry from its ability to probe higher order macromolecular structures and fostered a continuing deluge of applications of MS to noncovalent assemblies, hydrogen/deuterium exchange, probes of gas-phase protein structure, and ultimately "native mass spectrometry."

Today, interpreting ESI-MS and MS/MS data for proteins examined from native solutions often begins from NMR or crystal structures, based on assumptions that the gas-phase structure will not be too distant. But 24 years ago there was no expectation that relationships from higher order solution structure could be retained in the gas phase and any such assumption would have been foolhardy. The Chait laboratory opened the world to this possibility, first by demonstrating that electrosprayed cytochrome *c* molecules assumed about twice as much charge when

sprayed from pH 2.6 than from pH 5.2 H₂O (*J. Am. Chem. Soc.* 112, 9012 (1990)), by probing conformational changes in proteins via hydrogen/deuterium exchange (*Rapid Commun. Mass Spectrom.* 5, 214 (1991)), and by monitoring solution-phase thermal denaturation processes by ESI-MS (*Anal. Chem.* 65, 1, (1993)).

Dr. Chait's achievement must be viewed from the perspective of mass spectrometry in 1990 when few of us were capable of spraying 100% aqueous solutions, or did we see a need for it. For some of us an organic sheath solvent (or make-up flow) reduced surface tension enough to complete our analyses; others simply added methanol directly. However, Chowdhury and Chait (*Anal. Chem.* 63, 1660 (1991)) demonstrated that electropolished needles could electrospray water at voltages sufficiently below those inducing dielectric breakdown. That ability to electrospray 100% H₂O was key to observing the charge state distribution differences associated with natively folded proteins. Equally important was Dr. Chait's ability to rationalize and prove that the source of the observed CSD difference had to be solution-phase structure.

We know so little about electrospray ionization today; we knew even less 25 years ago, yet the ideas that Dr. Chait precisely articulated about the electrospray CSD/conformation relationship were a turning point for biological mass spectrometry.

Dr. Brian T. Chait is the Head of the Laboratory of Mass Spectrometry and Gaseous Ion Chemistry and a Camille and Henry Dreyfus Professor at The Rockefeller University, New York, NY.

RON A. HITES AWARD OUTSTANDING RESEARCH PUBLICATION IN JASMS

AWARD PRESENTATION: ASMS MEETING, 4:45 PM, WEDNESDAY, BALLROOM 222/224



The Ron Hites Award recognizes an outstanding publication of original research, based on a paper's innovative aspects, technical and presentation quality, likely stimulation of future research and impact on future applications. The award is named to honor Professor Ron Hites of Indiana University, who led the creation of JASMS in 1988 while president of ASMS. The award includes \$2,000 and a certificate for each author.

The 2015 award recognizes **John Klassen**, University of Alberta, and co-authors Lan Liu, Alyson Baergen, Klaus Michelsen, Elena N. Kitova, and Paul D. Schnier; for their paper Energetics of Intermolecular Hydrogen Bonds in a Hydrophobic Cavity: *JASMS*, 2014, 25, 742-750.

Left to right: Lan Liu, Elena Kitova, and John Klassen

