Highlights of the 11th Asilomar Conference on Mass Spectrometry

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The 11th Asilomar Conference on Mass Spectrometry was held at the Asilomar Conference Center in Pacific Grove, CA, September 24–28, 1995. This year's topic was The Challenges of High Mass Ions: New Approaches to Structure, Energetics and Reactivity. The meeting was jointly chaired by Scott A. McLuckey and Peter J. Derrick. A listing of presentations, along with their authors, concludes this review.

This conference was very stimulating in that more open discussions of topics were possible due to the limited number of attendees (a total of 88 registered). The evening informal discussion groups were especially lively this year because of the size of the groups and the nature of the topic. In some cases, these groups were spontaneously structured to have more general discussion on topics that grew out of presentations. One of these had to do with varying results due to possible ion temperature differences between fast-atom bombardment ionization and electrospray ionization in Catherine Fenselau and Igor Kaltashov's presentation of Confirmation Analysis Using Mass Spectrometry in the Gas Phase.

Some of the inferences that could be gleaned from both the formal presentations and the informal discussion groups were in the areas of instrumentation and behavioral difference of large mass ions in the gas phase as compared to that in solution. The latter is of significant importance as to how the biochemist can use mass spectral information of biopolymers. In the area of instrumentation, there was definitely a propensity for the use of Fourier transform ion cyclotron resonance (FTICR) instruments for many of the studies being done. Sector-based instruments for multiple mass spectrometry experiments, although still in extensive use, are much less popular than both magnetic and quadrupole ion traps. However, due to the cost of superconducting magnets, the FTICR mass spectrometer is still an extremely healthy investment for many investigators.

Brian Chait presented some very interesting arguments for the use of quadrupole ion trap mass spectrometers with matrix-assisted laser desorption ionization (MALDI). Peter Derrick's comparison of field desorption to electrospray ionization was very thought provoking. This work used a unique instrument composed of two time-of-flight (TOF) tubes separated with an electrostatic sector. A collision cell was placed between the first TOF and the electrostatic sector.

Richard Smith was first to contrast the difference in

the shape of ions in the gas phase with those in solution. When Julie Leary talked about this with respect to double-charge metal-coordinated oligosaccharides, she drew an analogy that she had tested on her two preschool children as to the differences in the shapes of oranges and bananas. Jack Beauchamp, as did several others, picked up on what is now known as the "the Julie Leary orange/banana theory of ionic behavior in the gas phase." I am sure we will hear more about this at the Sanibel Island conference in January.

Michael Bower's presentation on Conformation of Exotic Species in the Gas Phase: An Intersection of Experiment and Theory contained a rather interesting MALDI technique. Fresh sample is presented to the laser with each ionization by placing the sample in matrix on a rotating spindle in the ion source. Bowers pointed out that the behavior of ions of macromolecules in the gas phase must be described by using "molecular mechanics" as opposed to "quantum mechanics."

The foregoing text contains just some of the highlights of this year's Asilomar Conference. The location is ideal for this type of conference. The limited attendance made for an excellent environment for open discussion and generation of new ideas. The two chairs as well as the ACMS board of directors (R. Graham Cooks, Chairman, Michael L. Gross, Arnold M. Falick, Mark M. Ross, Christie G. Enke, and, let us not forget the Monkey) are to be complemented on this year's conference.

List of Presentations

Session 1. Scott McLuckey, Presiding, Chapel

- Talk 1. Peter J. Derrick, Desorption, Ionization and Collisional Activation of Macromolecules
- Talk 2. Richard D. Smith, The Activation of Large Biopolymers and their Noncovalent Complexes
- Talk 3. Catherine Fenselau and Igor Kaltashov, Conformation Analysis Using Mass Spectrometry in the Gas Phase
- Talk 4. Don Douglas, Collision Cross Section and Dissociation Studies of the Structure of Gas Phase Protein Ions

Session 2. Jon Amster, Presiding, Chapel

- Talk 5. Evan R. Williams, Gas-Phase Ion Titration: Probing Electrostatic Interactions and Protein Ion Conformation
- Talk 6. Charles Wilkins, Surface-Induced Dissociation of High-Mass MALDI Ions by FTMS

Session 3. Carlito Lebrilla, Presiding, Chapel

- Talk 7. Helmut Schwarz, Hydrocarbon Activation by "Heavy" Elements
Talk 8. R. Graham Cooks, Reactive Collisions of Ions with Functional Groups at Surfaces
Talk 9. Janine de Maaijer, Surface-Induced Dissociation in a Time-of-Flight Instrument
Talk 10. Julie Leary, Electron Transfer Processes during CID of Doubly Charged Metal-Coordinated Oligosaccharides

Session 4. Keith Jennings, Presiding, Chapel

- Talk 11. Michael T. Bowers, Conformations of Exotic Species in the Gas Phase: An Intersection of Experiment and Theory
Talk 12. Curt Reimann, Conformation of High-Mass Studies by Surface Probe Microscopy
Talk 13. Martin Jarrold, Ion Mobility Studies of Naked Protein in the Gas Phase, David E. Clemmer and Robert R. Hudgins, co-authors

Session 5. Bob Hettich, Presiding

- Talk 14. Brian Chait, Matrix-Assisted Laser Desorption/Ionization Ion Trap Mass Spectrometry as a Practical Tool for the Study of Proteins
Talk 15. Bernhard Spengler, Fundamental Investigations of Post-Source Decay for Structure Analysis of Biomolecules
Talk 16. Franz Hillenkamp, MALDI-MS: Is There a Common Mechanistic Denominator?

*Talk 17. Ron Beavis, Extending the Dynamic Range of MALDI-TOF Measurements**Session 6. Rachel Ogorzalek Loo, Presiding*

- Talk 18. Jurgen Gotemeyer, Photodissociation of Large Molecules in Fast and Trapped Ion Beams
Talk 19. Michael L. Gross, A Fourier-Transform Mass Spectrometry Approach to High Mass-to-Charge Ions: Theory, Modeling, and Experiment
Talk 20. Robert Hettich, Evaluation of CAD and SORI for MALDI- and ES-FTICR Structural Studies of Biomolecules
Talk 21. Keith Jennings, An ESI/CID Study of Some Aberrant Haemoglobins

Session 7. Peter Derrick, Presiding, Chapel

- Talk 22. Jack Beauchamp, How Selective are the Bimolecular and Unimolecular Reactions of Large Biological Molecules in the Gas Phase?
Talk 23. Joe Loo, Protein Structure Analysis by ESI-MS: From Making Molecules Stick Together to Breaking Them to Bits
Talk 24. Jeanette Adams, Experiments in High-Energy Tandem Mass Spectrometry of Multiply Charged Ions: B/E, MIKES, and MS
Talk 25. Scott McLuckey, The Chemistry of High-Mass Multiply Charged Ions in the Paul Trap

In addition, several posters were presented. A five-minute presentation on each poster was presented just prior to the poster session.