Award for a Distinguished Contribution in Mass Spectrometry

2012 Recipient: Catherine Fenselau

Award Lecture: 4:45 pm, Monday, *Exhibit Hall A*

Efforts to detect, characterize, and differentiate microorganisms are driven by the needs of homeland security, counterterrorism and counter-proliferation programs, medical providers, food safety labs and microbiologists.

Professor Catherine Fenselau is honored for her pioneering work in this arena. The current paradigm for rapid MS characterization of intact microorganisms relies on the detection and identification of unique biomarker molecules from experimental mass spectra, a paradigm that can be traced back to Anhalt and Fenselau. In 1975, they were the first to report that biomolecules from different pathogenic bacteria, introduced intact in a mass spectrometer

a) could be vaporized and directly ionized,
b) could be structurally identified;
c) and, most importantly, that the compositions and abundances of these chemical biomarkers, revealed in the mass spectra, permitted taxonomic distinctions.

Fenselau's pioneering philosophy to employ intact molecular biomarkers for rapid microorganism characterization by mass spectrometry was in stark contrast to concurrent research elsewhere advocating vigorous pyrolysis prior to MS analysis.

In the following decade Fenselau's team was the first to evaluate newer ionization methods (laser desorption, plasma desorption and fast atom bombardment) for the rapid MS analysis of non-volatile biomarkers from intact bacterial cells. They introduced computer algorithms for characterizing mixtures of cells based on biomarker profiles related to taxonomic groupings. Her work in fingerprinting and applying proteomic techniques for microorganisms has laid the foundation for what is soon to become a major revolution in epidemiology to track and prevent disease from established and newly emerging infectious diseases. Commercial products based on these approaches have been placed around Europe and Asia to further the clinical application of MS to microbiology.

Dr. Catherine Fenselau is Professor of Chemistry at the University of Maryland, College Park.

Biemann Medal

2012 Recipient: Joshua J. Coon

Award Lecture: 4:45 pm, Tuesday, *Exhibit Hall A*

ETD, the ion-ion analog of ECD, has become an essential method for protein sequencing because it allows for the dissociation, and consequently the sequence and analysis of large peptide cations, peptide cations bearing post-translational modifications, and even intact proteins. By allowing chemists and biologists to probe previously inaccessible regions of the proteome, ETD offers a unique lens through which to study proteins.

Besides being a critical participant in the development of electron transfer dissociation (ETD), **Joshua Coon** is honored for coupling this fragmentation technique with the high-resolution Orbitrap analyzer. Coon was instrumental in demonstrating the greatly enhanced analytical capabilities of the ETD/Orbitrap configuration in large-scale proteomics applications, and in developing related mass spectrometric techniques, such as Supplemental activation for ETD and real-time decision making to blend dissociation methods. In a seminal study, Coon's team discovered that the fundamental difference between radicals and even-electron species stretches into the molecular mass domain, and that these species can always be separated given sufficient mass accuracy.

His achievements have been recognized by many awards, including the ACS Arthur F. Findeis Award, the Ken Standing Award, and the Pittsburgh Conference Achievement Award. He continues to develop both ETD applications and the method itself.

Dr. Joshua Coon is Associate Professor of Chemistry at the University of Wisconsin-Madison.