Award for a Distinguished Contribution in Mass Spectrometry

2013 Recipient: Richard D. Smith

Award Lecture: 4:45 pm, Monday, *Exhibit Hall A (lower level)*

The increasing role of mass spectrometry (MS) in the physical and biological sciences can be attributed in a large part to the versatility afforded by the growing number of ionization methods and to mass spectrometry's increasing sensitivity. The development of the electrodynamic ion funnel in the laboratory of Dr. Richard Smith has been an important factor in the latter increase.

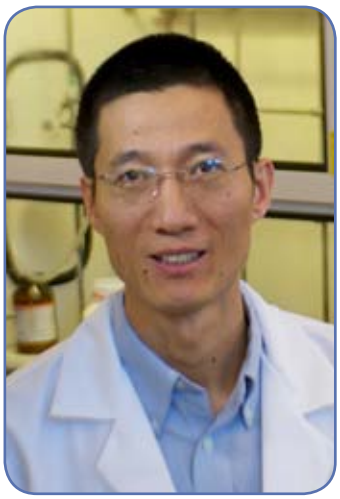
The ion funnel was originally created in the Smith lab in 1997 to replace ion transmission-limited skimmers and to efficiently capture ions in the expanding gas jet while radially focusing them. It has been adapted for a variety of uses and has proven to be a broadly applicable tool for ion focusing and manipulation at elevated pressures that challenged conventional approaches. Although it has undergone several iterations in the last 15 years, the defining features of the ion funnel have not changed: closely spaced ring electrodes of gradually decreasing inner diameter, out-of-phase RF potentials applied to adjacent electrodes, and a longitudinally-applied DC gradient. The ion funnel concept continues to be adapted in a growing number of applications such as ion trapping, ion cooling, low pressure electrospray, and ion mobility spectrometry; however, its original use, decreasing ion losses in the interface of high pressure sources, has remained its most prevalent. Currently, the funnel is employed by Bruker Daltonics' and Agilent Technologies and similarities can be seen in Thermo-Fisher's recent S-lens design found on the newer generations of Orbitrap instruments. In the ion funnel, Dr. Smith's obsession with sensitivity has provided a basis to greatly improve mass spectrometers, today allowing routine detection of low concentration species that would have been undetectable 15 years ago.

Dr. Richard Smith is Battelle Fellow and Chief Scientist in the Biological Sciences Division and Director of Proteomics Research at Pacific Northwest National Laboratory (PNNL).

Biemann Medal

2013 Recipient: Yinsheng Wang

Award Lecture: 4:45 pm, Tuesday, *Exhibit Hall A (lower level)*



Dr. Yinsheng Wang has focused his research on discovering the biological consequences of DNA damage and on unraveling mechanisms of action for anti-tumor drugs and environmental toxicants. His laboratory's use and development of mass spectrometry, synthetic organic chemistry, biochemistry and molecular biology enables us to understand and quantify, at the molecular level, how various DNA damage products are repaired, and how they perturb the efficient flow and fidelity of genetic information during DNA replication and transcription.

Professor Wang has identified and characterized new DNA lesions, including bulky lesions induced by reactive oxygen species. His laboratory developed LC-MS/MS combined with a plasmid-based shuttle vector to quantitatively assess how structurally defined DNA lesions alter the frequency and efficiency of DNA replication and transcription in cells, and to measure the types and frequencies of mutations induced by lesions. They also discovered that N-2-(1-carboxyethyl)-2'-deoxyguanosine (N-2-CEdG) is the major stable DNA adduct derived from methylglyoxal, and demonstrated that it is the previously unknown endogenous substrate for DinB (polymerase IV). Dr. Wang's new methods have provided some long-sought biomarkers for oxidative stress: cyclopurine lesions including 8,5'-cyclo-2'-deoxyadenosine and 8,5'-cyclo-2'-deoxyguanosine.

Dr. Yinsheng Wang is Professor of Chemistry at the University of California-Riverside.