Mass Spectrometry in the Future
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The future of mass spectrometry is seen as lying in synthesis as well as analysis. The argument is made that ions are agents of chemical synthesis as much as they are of analysis. The surface preparation method of ion soft landing represents such an application\(^1\) as does the use of electrolytic sprays to create nanomaterials\(^2\) and the small scale chemical synthesis discussed in the previous lecture. Analysis is seen as increasingly being done in the ambient environment, at the point-of-care and as such, it involves portable miniature mass spectrometers.\(^3,4\) Metabolite analysis is found to be fast using MRM-Profiling\(^5,6\), a two-step exploratory approach based on functional group screening by neutral loss and precursor ion scans followed by fast interrogation of individual samples using MRM scans. The analytical applications of 3D printed ion mobility instruments\(^7\) and miniature ion trap mass spectrometers, in combination with ambient ionization methods are reported as are new methods of scanning\(^8,9\) these simple mass spectrometers.

References:
\(^1\) Cyriac, et al. Chem. Rev. 112 (2012) 5356-5411

Graham Cooks was educated at the University of Natal and at Cambridge University and is the Henry Bohn Hass Distinguished Professor of Chemistry at Purdue University. His interests in mass spectrometry include ion soft landing at surfaces, the kinetic method of thermochemical measurement, and high throughput and on-line reaction monitoring. Several new types of mass spectrometers have been constructed in his laboratory, including miniature and hybrid instruments. He contributed to the development of desorption ionization and tandem mass spectrometry, and to ambient mass spectrometry especially desorption electrospray ionization and its applications to medical diagnostics. Professor Cooks has authored more than 1,200 publications, served as PhD thesis adviser to 138 students, has an h-index of 104 [ISI Web of Science], and is a member of the National Academy of Sciences and the American Academy of Arts and Sciences.

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Izaak M. Kolthoff was born on February 11, 1894, in Almelo, Holland. He died on March 4, 1993, in St. Paul, MN. In 1891, he entered the University of Utrecht, Holland. He published his first paper on acid titrations in 1915. On the basis of his world-renowned reputation, he was invited to join the faculty of the University of Minnesota’s Department of Chemistry in 1927. By the time of his retirement from the University in 1962, he had published approximately 800 papers. He continued to publish approximately 150 more papers until his health failed. His research, covering approximately a dozen areas of chemistry, was recognized by many medals and memberships in learned societies throughout the world, including the National Academy of Sciences and the Nichols Medal of the American Chemical Society. Best known to the general public is his work on synthetic rubber. During World War II, the government established a comprehensive research program at major industrial companies and several universities, including Minnesota. Kolthoff quickly assembled a large research group and made major contributions to the program. Many of Kolthoff’s graduate students went on to successful careers in industry and academic life and, in turn, trained many more. In 1982, it was estimated that approximately 1,100 Ph.D. holders could trace their scientific roots to Kolthoff. When the American Chemical Society inaugurated an award for excellence in 1983, he was the first recipient.