AMERICAN CHEMICAL SOCIETY
KENTUCKY LAKE SECTION

January 2010 Kentucky Lake Section Meeting
@
August Moon Restaurant
Murray, KY
Thursday, January 28, 2010

Social @ 5:30, Dinner @ 6:00, Presentation @ 7:00

The August Moon Restaurant is located at
1550 Lowes Drive, Murray, KY 42071

The price is $10 (Students $5)
Menu: Chinese Buffet

Presentation:

"Maldi Mass Spectrometry: Quantitative Analysis and Coupling with Thin-Layer Chromatography"

By

David Hercules
Vanderbilt University

See Reverse Side for Biographical Sketch and Abstract

Comments from the Chair

Dear Members:

I hope that everyone had a Happy New Year! This meeting is the initial kick off for the Section's programming for 2010. I hope that each of you will take advantage of the activities provided to you by your local section. If you have any suggestions or comments on the Section's programming activities, please feel free to contact a Section officer. Additionally, if you get a chance please make sure and congratulate our new Chair-Elect, Dr. Robbie Montgomery.

Harry Fannin

Biographical Sketch

David M. Hercules graduated from Juniata College with a B.S. in chemistry in 1954 and received his Ph.D. from M.I.T. in analytical chemistry in 1957. His thesis research was performed under L. B. Rogers. From 1957 to 1960 he was a member of the faculty of Lehigh University, and from 1960 to 1963 he was on the faculty of Juniata College. In 1963 he became assistant professor of chemistry at M.I.T., associate professor in 1968. In 1969 he became associate professor in chemistry at the University of Georgia, professor in 1974. He joined the faculty at the University of Pittsburgh as professor in 1976 and served as department chairman (1980-1989) and as Miles Professor of Chemistry (1989-1994). Currently he is chairman and Centennial Professor of Chemistry at Vanderbilt University. Dr. Hercules' research interests concern the analytical chemistry of surfaces and solid-state mass spectrometry. This involves such areas as catalysis, polymers, quantitative methodology, surface oxidation and modification, and trace analysis. The major instrumental techniques that he uses are X-ray photoelectron spectroscopy (XPS), secondary ion mass spectrometry (SIMS), ion scattering spectroscopy (ISS), infrared spectroscopy, Raman spectroscopy, and laser mass spectroscopy. He is heavily involved in laser mass spectrometry of nonvolatile, organic solids and development of the scanning laser microprobe. He served as a member of the Governing Board of the Council for Chemical Research, the joint Board-Council Committee on Science of the ACS, and as a member of the Chemistry Advisory Committee for the National Science Foundation. He is a member of the organizing committee for the International Conference on the Analytical Chemistry of Pollutants and was for many years a member of the Pittsburgh Conference Committee. He was awarded the Lester Strock Medal in 1981 by the SAS and the ACS Award in Analytical Chemistry (Fisher Award) in 1986. He was also awarded the Bendetti-Pichler Award by the American Microchemical Society in 1987, the Eastern Analytical Symposium Award in 1989, and the first ACS award in Surface Chemistry (Adamson Award) at the Denver ACS meeting in April 1993. He received the Pittsburgh Spectroscopy Award at the Pittsburgh Conference in 1996. He received the 1997 award of the Pittsburgh Section of the ACS. He is a Guggenheim Fellow and received an Alexander von Humboldt prize.

Abstract

MALDI mass spectrometry has become commonplace as a method for high molecular weight compounds, particularly for proteins and peptides. There has also been significant interest in coupling MALDI with planar methods of chromatography, such as thin-layer chromatography (TLC). Early work involved ex-situ measurements, usually scraping and extracting the analyte from the TLC plate. We have successfully coupled MALDI and TLC for in-situ measurements, i.e., adding the MALDI matrix directly onto the TLC plate and inserting it into the mass spectrometer. In fact, we have demonstrated that it is possible to do quantitative measurements directly from TLC plates. The major technological problem was to maximize extraction of the analyte from the TLC plate while minimizing spreading of the TLC spot. A discussion will be given of the development of the TLC-MALDI method and its optimization. Examples will be given of application to bioanalytical and environmental analyses. Although MALDI has been used primarily for high molecular weight compounds, one can obtain high quality spectra for smaller molecules. One particularly attractive aspect of this is that using either an internal standard, or the method of standard addition. There are many experimental factors which influence MALDI ion intensities and these will be surveyed. Some examples of quantitative analysis for biologically or environmentally important compounds will be presented.