



# Indiana Section of the Society for Applied Spectroscopy

## May/June 2000 Newsletter

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### ISSAS 1999-2000 SEMINARS

Unfortunately the April 20, 2000 ISSAS seminar, at which Dr. Scott A. McLuckey from Purdue University was scheduled to talk, was cancelled due to inclement weather. We were unable to reschedule Dr. McLuckey's seminar for the remainder of the 1999-2000 year, but we are looking to have him speak in the 2000-2001 seminar series.

Our national tour speaker for this year is Dr. Evan R. Williams from the University of California – Berkeley. He will be speaking about two-dimensional mass spectrometry of biomolecules. The seminar will be held in Bloomington at the Indiana University Chemistry Building (C033) at 6:00 p.m. on Tuesday, June 6, 2000. A dinner will be held with Dr. Williams after the seminar at Janko's Little Zagreb. If you are interested in attending dinner with Dr. Williams,

please RSVP Denise McClenathan by Friday, June 2, 2000.

### SPECTROSCOPY NEWS

The Linda and Jack Gill Center for Instrumentation and Measurement Science held the Inaugural Gill Prize Symposium on Saturday, April 25, at the Indiana University Department of Chemistry. The Symposium featured a series of lectures by prominent investigators in the field of Analytical Chemistry, and presentation of the Gill Prize. Jonathan V. Sweedler (University of Illinois), the 2000 recipient of the \$10,000 biennial Gill Prize, gave the keypoint address of the symposium. Dr. Sweedler was awarded the prize based upon his achievements over the past few years in adapting RF microcoils for nanoliter volume NMR.

Others presenters included Dr. Fred E. Lytle (Purdue University), who spoke

of the challenges of integrating optics systems onto microchips. Professor Alan G. Marshall (Florida State University) discussed his ongoing research in the field of FTMS, and the advantages of using such a high-resolution technique. Professor David E. Clemmer (Indiana University) discussed using ion mobility-MS techniques for analysis of protein mixtures, and Dr. Richard A. Keller (Los Alamos National Laboratory) presented his work on DNA sizing using fluorescence methods and single molecule detection. Professor Robert Lodder (University of Kentucky) was also at the symposium, and enlightened all those in attendance with his discussion of remote biosensing.

For more information on the Gill Prize and accompanying symposium, please see <http://www.gillcenter.indiana.edu>.

## **THIS MONTH IN SPECTROSCOPY**

*Who, in 1842, while observing celestial bodies, described a changing in light wave frequency when a light source and observer are in motion relative to one another?*

On May 25<sup>th</sup>, 1842, Christian Doppler delivered a lecture to the Royal Bohemian Scientific Society entitled ‘concerning the coloured light of double stars and some other heavenly

bodies’ in which he stated that light waves change frequency of oscillation, hence color, when a light source or observer is in motion relative to the other. [*Jahrgang 2* (1843) 465]. This motion related change in frequency has since been known as the Doppler effect.

Frequency compression that occurs when the emitter and detector move toward one another results in an increase or blue shift of frequency. When the emitter and detector move away from one another a decrease or red shift of frequency is observed. The direction and magnitude of this frequency shift is used to describe motion in a wide range of applications. In studies similar to Doppler’s original application, the Doppler effect has been used to calculate the size of the universe. In spectroscopy, Doppler broadening of atomic emission lines is a convenient method for determining gas temperatures. In a more common application, meteorologists use Doppler radar to determine the location and velocity of storm systems.

Spectroscopy Trivia:

*What was Sir J.J. Thomson describing when he wrote of “corpuscles” in 1897?*

The answer to this question can be found in next the addition of “This Month in Spectroscopy” or log on to

the ISSAS trivia page at <http://www.indiana.edu/~issas/trivia.html>.

### **2000-2001 ISSAS OFFICER ANNOUNCEMENT**

We are happy to announce the 2000-2001 ISSAS officers:

Andrew W. Szumlas – Chair  
Denise M. McClenathan – Chair-elect  
William C. Wetzel – Secretary  
Jason A. Starkey – Treasurer

Nominations for the 2000-2001 ISSAS officers were accepted until Friday, May 5, 2000, and elections were held Friday, May 12, 2000. The new officers will be taking their positions following the June 6, 2000 ISSAS meeting.

### **ISSAS ONLINE**

You can find your ISSAS homepage at: <http://www.indiana.edu/~issas>. As always, the ISSAS homepage will keep you updated on local section and national events as well as provide information about our corporate sponsors.

If you have a non-commercial spectroscopy related website that you

would like us to link on our web page please contact Denise McClenathan.

### **NEW MEMBERSHIPS**

Your local Indiana Section of the Society for Applied Spectroscopy is looking for new members. We invite you to recommend membership to any of your colleagues or students who you may feel would benefit from membership in such an organization. The fee for joining is very reasonable for both professionals and students alike. Membership also includes a subscription to the journal *Applied Spectroscopy*. For further information, please feel free to contact any of the current officers or visit our website (<http://www.indiana.edu/~issas>).

### **CONTACT INFORMATION**

You may contact any of the ISSAS officers via phone (812) 855-7905, email ([issas@indiana.edu](mailto:issas@indiana.edu)), fax (812) 855-0958, or write to:

Society for Applied Spectroscopy -  
Indiana Section  
Department of Chemistry  
Indiana University  
Bloomington, Indiana 47405



Indiana Section of the Society for Applied Spectroscopy  
1999-2000 Seminar Series

**TWO DIMENSIONAL MASS SPECTROMETRY OF BIOMOLECULES:  
FLIP YOUR IONS THE “BIRD”**

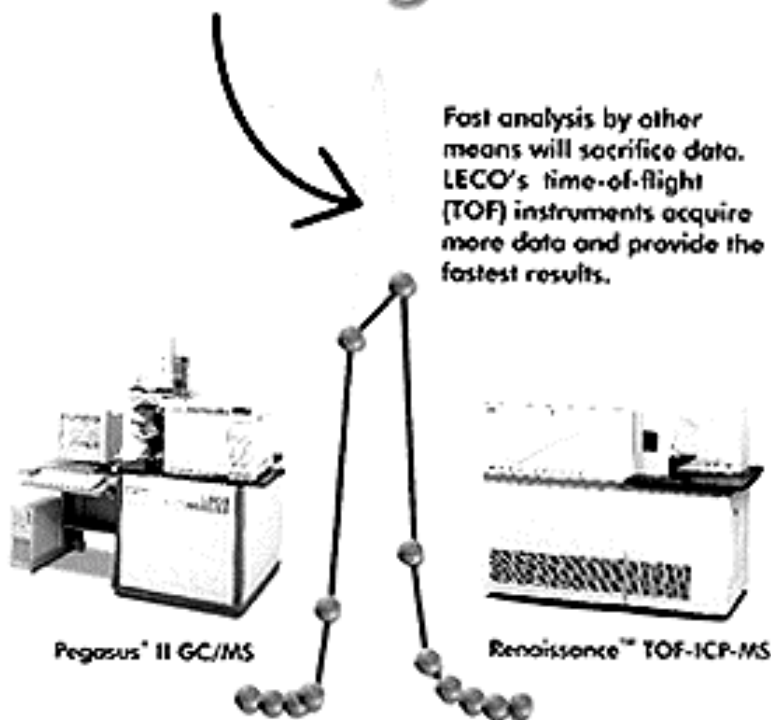
Dr. Evan R. Williams

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The application of mass spectrometry to the structural characterization of large biopolymers has undergone explosive growth in the last several years. Mass spectrometry can provide molecular weights of large proteins and DNA with unprecedented accuracy ( $\pm 1-3$  Da at 100,000 Da) and sensitivity (sub-attomole detection possible). In addition to accurate molecular weights, information about sequence, locations of posttranslational modifications and binding sites can be obtained using two-dimensional mass spectrometry or tandem MS. One method for this, blackbody infrared radiative dissociation or BIRD, can provide accurate information about the dissociation energies and mechanisms for large ions. The structure and energetics of a wide variety of biomolecule ions, including oligonucleotides, peptides, and proteins have been investigated with BIRD. These experiments indicate that conformation plays a significant role in the gas-phase ion chemistry as it does in solution. In addition, many aspects of solution-phase structure are preserved in the complete absence of solvent, including zwitterions, salt bridges, and Watson-Crick base pairing in DNA duplexes. Gas-phase ions of large biomolecules can also be produced with a sufficient number of water molecules attached such that they should have solution-phase structures. These results suggest that mass spectrometry can provide a bridge between the pure gas-phase structure of an isolated biomolecule and the chemistry of the biomolecule in aqueous solution.

6:00 pm  
Tuesday, June 6, 2000  
Chemistry Building Rm C033  
Indiana University, Bloomington, IN

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## *Biographical Sketch*

**Professor Evan Williams** received his degree from Cornell University in 1990 working with Prof. Fred McLafferty on biological mass spectrometry. He was a NSF postdoctoral fellow with Prof. Richard N. Zare at Stanford prior to joining the faculty in the Chemistry Department at the University of California at Berkeley in 1992. At Berkeley, Professor Williams and his group have developed novel instrumental and computational techniques in mass spectrometry, tandem mass spectrometry, chromatography, and laser spectroscopy for probing structure and function of large biomolecules. His group has developed new dissociation methods for rapid protein and DNA sequencing, and ion-molecule chemistry for investigating electrostatic interactions in biomolecules. Current projects include developing novel sample introduction techniques for interfacing liquid separation methods (e.g., capillary electrophoresis) with mass spectrometry and exploring the structure of solvated ions in the gas phase to understand the role of water in biomolecule conformation. Professor Williams' interests also include designing new experiments and curricula for both undergraduate and graduate chemistry courses in Analytical Chemistry at Berkeley.



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**Post-Seminar Dinner with**  
**Dr. Evan R. Williams**

**Tuesday, June 6, 2000**

Seminar

Chemistry Building, Rm C033  
Indiana University  
Bloomington, IN  
6:00 p.m.

Dinner

Janko's Little Zagreb  
223 West Sixth Street  
Bloomington, IN  
7:30 p.m.

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For dinner, please RSVP Denise McClenathan  
([issas@indiana.edu](mailto:issas@indiana.edu) or (812) 855-7905) by Friday, June 2, 2000.

# Discover The Potential

## Raman Microscope

### FEATURES

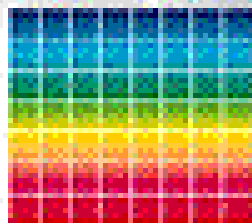
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- Method development
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