

# Indiana Section of the Society for Applied Spectroscopy

## October/November 1999 Newsletter

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### ISSAS 1999-2000 SEMINARS

The Indiana Section of the Society for Applied Spectroscopy 1999-2000 Seminar Series opened with a seminar given by Dr. John C. Wright, University of Wisconsin – Madison, who gave an exciting and informative presentation about the use of two dimensional coherent vibrational spectroscopy as an optical analogue to 2D NMR. Thank you Dr. Wright and all who attended.

Our next speaker in the seminar series is Dr. Marc D. Porter from Iowa State University. Dr. Porter will be discussing the use of infrared spectroscopy and force microscopy to study organosulfur monolayers on gold. The seminar will be held in Bloomington at the Indiana University Chemistry Building (A400) at 6:00 p.m. on Thursday, November 11, 1999. A dinner will be held with Dr. Porter after the meeting at Uptown Cafe. If you are interested in attending the dinner with Dr. Porter, please RSVP Andrew Leach by November 9.

We still have some excellent speakers remaining in this year's seminar series. The tentative schedule is:

February 17, 2000  
*Dr. David M. Hercules*  
*Vanderbilt University*

April 6, 2000  
*Dr. Raoul Kopelman*  
*University of Michigan*

This year's ISSAS national tour speaker has yet to be confirmed. When we receive the announcement, we will post the information in the newsletter and on the ISSAS website.

### SPECTROSCOPY NEWS

**The 1999 Nobel Prize in Chemistry Awarded:** This year's Nobel Prize in Chemistry was awarded to Professor Ahmed H. Zewail, of the California Institute of Technology. Professor Zewail was recognized for his work in applying femtosecond spectroscopy to

the study of transition states of chemical reactions. For more information, see <http://www.nobel.se/announcement-99/chemistry99.html>.

**Novel Surface Chemistry Using a Femtosecond Laser:** Researchers at Berlin's Fritz Haber Institute recently demonstrated the use of a pulsed near infrared laser to induce chemical reactions. By sparsely depositing atomic oxygen and carbon monoxide on a Ruthenium substrate, the CO and oxygen were simply desorbed when the substrate was heated. However, carbon dioxide can be produced when the substrate is heated by focusing 110 fs pulses of 800 nm light onto the substrate. Their experiment demonstrates electron-mediated reactions through the use of high intensity laser pulses, not achievable through simple substrate heating. (*Science*, 1999, 285, 1042-5)

**Non-Crystal Imaging by X-Ray Crystallography:** X-ray crystallography is a well-known tool for studying crystalline objects. Jianwei Miao and colleagues have recently demonstrated use of the technique to image a noncrystalline array of 100 nm gold nanoparticles. The image can then be reconstructed from the resulting continuous diffraction pattern by using oversampling and an iterative algorithm. It is hoped that this same technique can be used to image

cellular level objects in biological systems. (*Nature*, 1999, 400, 342-4)

## THIS MONTH IN SPECTROSCOPY

*Who developed the first mass spectrometer to analyze "Rays of Positive Electricity"?*

**1912:** Sir Joseph John (J.J) Thomson utilized an instrument consisting of parallel magnetic and electric fields to deflect a beam positive ions [Phil. Mag. 6 (1920) 752-767]. By using a photographic plate to record the trajectory of the ions Thomson was able measure the extent to which the ions were deflected. Knowledge of the strengths of the magnetic and electric fields allowed Thomson to calculate the mass-to-charge ratios of the positive rays. Because of this achievement, J.J. Thomson is widely considered the "Father of Mass Spectrometry". Thomson received more wide spread acclaim for his previous work discovering and characterizing the electron, for which he received the Nobel Prize in Physics in 1906 and was knighted in 1908. Additionally, Thomson was known for his outstanding teaching abilities, mentoring eight future Nobel Laureates in Physics including his son George.

Spectroscopy Trivia:

*What technique, developed in 1985, combines scanning tunneling microscopy (STM) with stylus profilometry (SP) to achieve atomic resolution for insulators?*

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>.

### **ISSAS ONLINE**

We hope you have enjoyed surfing the new ISSAS web page. To better provide you with a more advanced web page we have moved the homepage to a new site. You can find your favorite ISSAS homepage at: <http://www.indiana.edu/~issas>.

Some new pages that we hope to soon have available on the website are a history page, a links page, a spectroscopy events page, and an online membership application. Look for these and other exciting improvements to the ISSAS web page. 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.

### **NEWS OF ISSAS MEMBERS**

Dr. Gary M. Hieftje, Chairman and Distinguished Professor of Chemistry at Indiana University, will be receiving the Society for Applied Spectroscopy Honorary Membership Award at the upcoming FACSS Conference in Vancouver, Canada. The award is given to recognize individuals who have made an exceptional contribution to spectroscopy. Congratulations Dr. Hieftje.

If you have information that you would like to have published in the ISSAS Newsletter please contact Denise McClenathan.

### **GOVERNING BOARD MEETING**

The governing board meeting will be held at FACSS this month. If you have any issues you would like presented, please contact Andrew Leach, and we will make sure that your ideas are presented. Look for the minutes in the next ISSAS newsletter.

## 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

## SPONSORS

The Indiana Section of the Society for Applied Spectroscopy would like give a special thank you our corporate sponsors who make this newsletter and seminar series possible:

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

**FORMATION, STRUCTURAL CHARACTERIZATION, AND  
REACTIVITY OF ORGANOSULFUR MONOLAYERS ON GOLD: AN  
INFRARED SPECTROSCOPY AND FORCE MICROSCOPY  
INVESTIGATION**

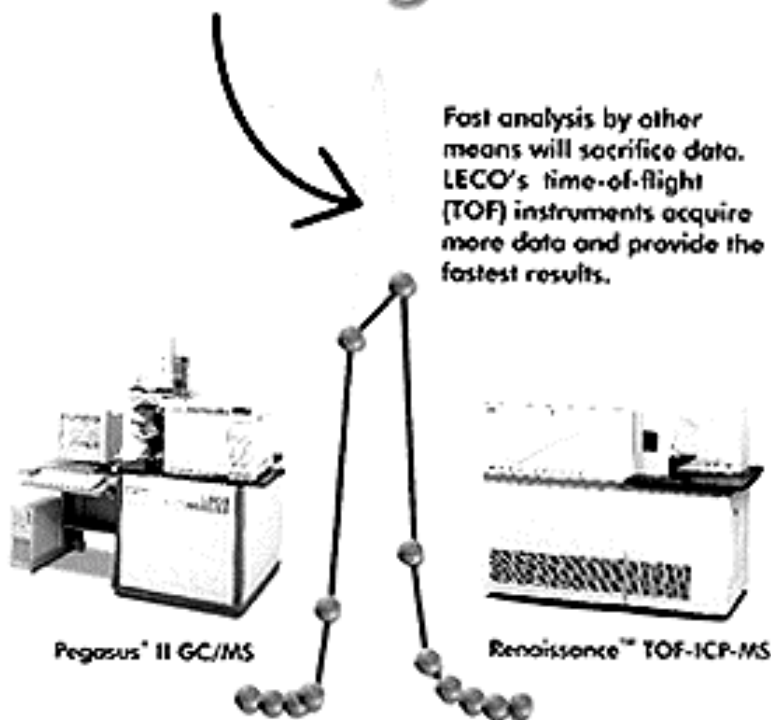
Jeremy Jenseth, Sze-Shun Wong, Hajime Takano, Marc D. Porter

Department of Chemistry, Ames Laboratory – USDOE, and Microanalytical  
Instrumentation Center, Iowa State University, Ames IA 50011

Organosulfur monolayers have been employed extensively as models for a wide range of interfacial processes. This presentation describes two such applications: the use of thiol-derived monolayers chemisorbed on gold as coupling agents for a novel detection format for immunoassays, and the use of the same general architecture as substrates for the extension of surface compositional mapping techniques. Both applications couple the compositional and architectural insights provided by infrared reflection spectroscopy (IRS) and the topographical and friction force imaging capabilities of atomic force microscopy (AFM). IRS is used in both cases as a probe of the formation, structural arrangements, and chemical modification of the different adlayers. The AFM is used in the former application to detect the changes in topography that arise from the specific binding of an antibody to a patterned array of immobilized antigens, and in the latter application to detect frictional differences that arise from differences, for example, in the orientation of the terminal groups of the adlayer. Details of the surface patterning processes are also described.

6:00 pm  
Thursday, November 11, 1999  
Chemistry Building Rm A400  
Indiana University  
Bloomington, IN

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## *Biographical Sketch*

**Marc D. Porter** received B.S. and M.S. degrees from Wright State University and a Ph. D. from The Ohio State University in 1984. After a post-doctoral appointment with D. Allara at Bell Laboratories, he joined the faculty at the chemistry department of Iowa State University, and presently holds the rank of Professor and is the Director of the University's Microanalytical Instrumentation Center. He has received a Special Creativity Grant Extension Award from NSF in 1993 and was the recipient of the Wright Brothers Award from the Society of Aeronautical Engineers in 1993. He is currently serving on the Analytical Chemistry Advisory Board. He is affiliated with the American Chemical Society, The Electrochemistry Society, and The Society for Applied Spectroscopy. He has over 100 publications, and has given over 175 presentations at national and international meetings. He has also given over 90-invited talks at various universities and industries. He holds five patents, with several more pending. His research interests focus largely on the role of interfaces in analytical chemistry, including electrochemically modulated liquid chromatography, electrocatalysis, organic monolayer films and the chemical modification of surfaces, scanning probe microscopies, infrared and Raman spectroscopies, and fiber optic and acoustic wave sensors.

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**Post-Seminar Dinner with**  
**Dr. Marc D. Porter**

**Thursday, November 11, 1999**

Seminar

Chemistry Building, Rm A400  
Indiana University  
Bloomington, IN  
6:00 pm

Dinner

Uptown Cafe  
102 E Kirkwood  
Bloomington, IN  
7:30 pm

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For dinner, please RSVP Andrew Leach  
([issas@indiana.edu](mailto:issas@indiana.edu) or (812) 855-7905) by November 9, 1999.

# Discover The Potential

## Raman Microscope

### FEATURES

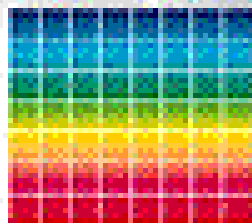
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