

# Indiana Section of the Society for Applied Spectroscopy

## November/December 2001 Newsletter

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### ISSAS 2001-2002 SEMINAR SERIES

The Indiana Section of the Society for Applied Spectroscopy is pleased to announce its 2001-2002 Seminar Series. We have scheduled a group of excellent speakers from various institutions covering a wide range of topics. Our series will begin in the next few weeks with two distinguished speakers, Professor Marcos Dantus and Professor David Lubman.

The first seminar will be presented by Professor Dantus from Michigan State University. The topic of the lecture will be his research in ultrafast dynamics and control of chemical reactions. The seminar will be held in Bloomington at the Indiana University Chemistry Department (Room C001) at 6:00pm on Monday, November 26, 2001. Dinner at Janko's Little Zagreb

with Professor Dantus will follow the seminar. All ISSAS members are welcome to attend this event. If you are interested in attending dinner, please RSVP to William Wetzel ([wwetzel@indiana.edu](mailto:wwetzel@indiana.edu)) by Wednesday, November 21. More information about Professor Dantus' research and group can be found on his website at <http://www.cem.msu.edu/~dantus>.

Professor David M. Lubman will be presenting the second seminar in this year's series. A member of the University of Michigan faculty, Professor Lubman will be discussing 2-D liquid separations and mass mapping methods for interlysate comparisons of cancer progression. The talk will be held in Bloomington at the Indiana University Chemistry Department (Room C001) at 6:00pm on Monday, December 3, 2001. Following the seminar, dinner with

the speaker will be held at the Uptown Café. Current ISSAS members are welcome to attend. If you are interested in attending dinner, please contact William Wetzel ([wwetzel@indiana.edu](mailto:wwetzel@indiana.edu)) by Wednesday, November 30. Please visit Professor Lubman's webpage for additional information about his research and group members (<http://www.geocities.com/ResearchTriangle/Facility/2190/>).

In the spring semester, three additional speakers will round out our seminar series, and these lecturers will be followed by the SAS National Tour Speaker. A tentative schedule for the remaining seminars this year is shown below with information about each speaker.

February 18, 2002

Professor Mary K. Carroll  
Union College  
Molecular Spectroscopy; Chemical Sensors

April 22, 2002

Dr. Michelle V. Buchanan  
Oak Ridge National Laboratory  
Biological Mass Spectrometry

April/May 2002

Professor Gary W. Small  
Ohio University  
Near-infrared and passive infrared spectroscopy

Summer 2002

SAS National Tour Speaker  
To be announced

Please keep watching the ISSAS newsletters and website (<http://www.indiana.edu/~issas>) for additional information about upcoming seminars and events.

## **SPECTROSCOPY NEWS**

**Walter Slavin Special Issue:** A special issue of *Spectrochimica Acta Part B* (2001, 56) has been dedicated to Walter Slavin on the occasion of his retirement as editor of this popular journal. A graduate from the University of Maryland in Chemistry and Physics, Dr. Slavin spent almost 35 years during his career with Perkin-Elmer. He developed the first successful commercial atomic absorption spectrophotometer (AAS). In addition, Dr. Slavin established an analytical chemistry laboratory to extend the employment of AAS to applications in environmental sciences, biology, geology, and industry. He also launched a technical journal, the *Atomic Absorption Newsletter*, for communicating new information in the field. The journal, now called *Atomic Spectroscopy*, is still in press today, 30 years after its birth. The special issue of

Spectrochimica Acta Part B highlights the many fields that Walter Slavin has influenced and also includes personal tributes from individuals who are grateful for his contributions.

### **THIS MONTH IN SPECTROSCOPY**

*In September of 1954, who first described the application of NMR as a chemical analysis technique?*

In 1954, James N. Shoolery described the first application of nuclear magnetic resonance spectroscopy (NMR) [Anal. Chem. 26, 1400-1403 (1954)]. Although the detection of nuclear magnetic effects in solid matter was reported eight years earlier by Purcell and coworkers [Phys. Rev. 69, 37 (1946)], the use of NMR as a chemical analysis technique had not yet been demonstrated. Using "high resolution" spectra, Shoolery demonstrated the utility of NMR for molecular electron distribution studies, structure determinations, organic group identifications, and for studies concerning organic compound structural features. Later, incorporation of Fourier Transform (FT) analysis revolutionized the field of NMR spectroscopy by allowing the simultaneous excitation and

detection of multiple frequencies, which greatly enhanced the sensitivity and utility of this technique. Today, FT-NMR is widely employed in numerous chemical and biological applications, including those first described Shoolery.

Spectroscopy Trivia:

*In December of 1973, which two scientists first reported the use of a Fourier Transform ion cyclotron resonance mass spectrometer for the broadband detection of a wide mass range?*

The answer to this question can be found in the next addition of "This Month in Spectroscopy" or log onto the ISSAS trivia page at <http://www.indiana.edu/~issas/trivia.html>.

### **ISSAS ONLINE**

Please remember to check us out at our website! The ISSAS homepage will keep you updated on local section and national events as well as provide information about our corporate sponsors. Please visit our website at the following address: <http://www.indiana.edu/~issas>.

## 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 a very reasonable price for both professional and students alike. Membership also includes a subscription to the monthly journal *Applied Spectroscopy*. For further information on ISSAS membership, please feel free to contact any of the officers or visit our website the following address: <http://www.indiana.edu/~issas>.

## CONTACT INFORMATION

You may contact any of the ISSAS officers via phone (812) 855-7905,

fax (812) 855-0958, email at ([issas@indiana.edu](mailto:issas@indiana.edu)), or write to:

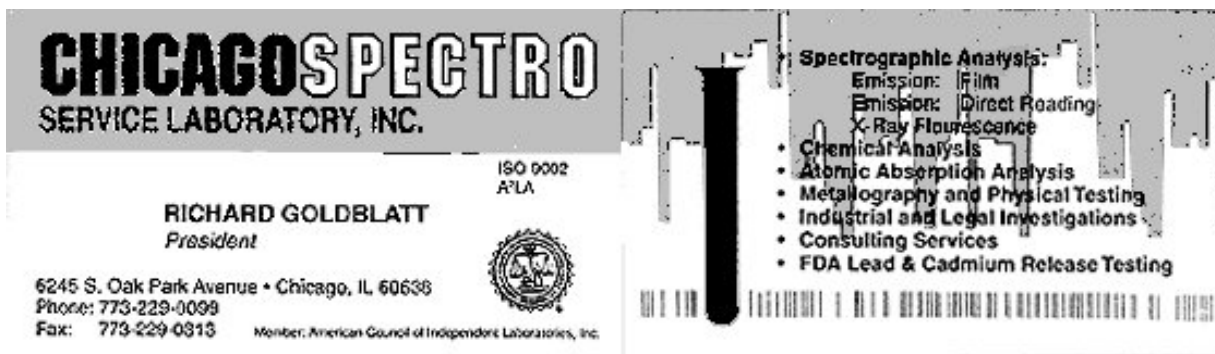
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Indiana University  
Bloomington, Indiana 47405

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The Indiana Section of the Society for Applied Spectroscopy would like to give a special thank you to our corporate sponsors who make this year's seminar series possible.

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If your company or organization is interested in supporting the ISSAS, please contact our Treasurer, James Barnes IV (812 855-7905 or [jambarne@indiana.edu](mailto:jambarne@indiana.edu)).



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Indiana Section of the Society for Applied Spectroscopy  
2000-2001 Seminar Series

## **USING LASERS TO OBSERVE AND CONTROL MOLECULAR DYNAMICS**

Professor Marcos Dantus  
Department of Chemistry and Department of Physics and Astronomy  
Michigan State University  
East Lansing, Michigan 48824-1322  
<http://www.cem.msu.edu/~dantus/>

In the Dantus Research Group for Ultrafast Dynamics and Control of Chemical Reactions, work is proceeding along two lines. The more fundamental work focuses on laser-molecule interactions. We are exploring coherent nonlinear multiple pulse methods to observe ground and excited state vibrational and rotational dynamics.<sup>1</sup> The methods being developed, in addition to having a high intrinsic spectroscopic value, can be used to encode and manipulate information that is stored on quantum superpositions of states. This capability can be considered useful for constructing a molecule based quantum computer. The more applied work is aimed at controlling chemical reactivity.<sup>2</sup> The goal for laser control is to have the energy localize on a desired bond instead of dissipating throughout the entire molecule. This requires very specific amplitude and phase information to be introduced in the laser pulse. One can envision selective bond fission in a molecule (a unimolecular process) or the reaction between two reagents (a bimolecular process) to produce the desired product. In principle, laser-synthesis or laser-catalysis could be used to produce unique products that defy conventional synthetic methods. We believe that 'Smart' photons, from ultrafast shaped-pulses, will revolutionize techniques such as laser machining, laser deposition, and laser desorption in the near future.

- 1) M. Dantus, "Ultrafast four-wave mixing in the gas phase," *Annu. Rev. Phys. Chem.* 52, 639 (2001).
- 2) M. Dantus, "Laser Control of Chemical Reactions," *Chemical and Engineering News*, March 26, p. 191 (2001).

6:00 PM  
Monday, November 26, 2001  
Chemistry Building Room C001  
Indiana University  
Bloomington, Indiana 47405

## Biographical Sketch

**Marcos Dantus** is an Associate Professor in the Department of Chemistry and an Adjunct Associate Professor in the Department of Physics and Astronomy at Michigan State University. He received his B.A. and M.A. in Chemistry from Brandeis University in Waltham, Massachusetts and a Ph.D. in Physical Chemistry from the California Institute of Technology under the advisorship of Ahmed Zewail. After spending two years in a postdoctoral position at the California Institute of Technology, Professor Dantus joined the faculty at Michigan State University in 1993. Currently, he serves as a consultant for Total Power, Inc. and is the Founder and a Member of the Board of Directors of KTM Industries, Inc.

Professor Dantus' research interests involve ultrafast dynamics, coherent laser control of chemical reactions, and quantum computation. He has received numerous awards and honors, which include a Beckman Young Investigator Award, the Packard Fellowship for Science and Engineering, an Eli Lilly Teaching Fellowship, the Camille Dreyfus Teacher-Scholar Award, and an Alfred P. Sloan Research Fellowship. Additionally, he was featured in the 125<sup>th</sup> Anniversary Issue of Chemical and Engineering News and was a plenary speaker at the 8<sup>th</sup> International Workshop on Femtosecond Technology in Tsukuba, Japan. Professor Dantus has over 60 publications and over 180 invited and contributed presentations.

Indiana Section of the Society for Applied Spectroscopy  
2000-2001 Seminar Series

**A 2-D LIQUID SEPARATIONS/MASS MAPPING METHOD FOR  
INTERLYSATE COMPARISONS OF CANCER PROGRESSION**

Dr. David M. Lubman  
Department of Chemistry, The University of Michigan  
Ann Arbor, Michigan 48109-1055  
<http://www.geocities.com/ResearchTriangle/Facility/2190/>

A novel 2-D liquid separations/mass mapping method is being developed to profile the protein content of tumor cells. The method involves using 2-D liquid separations as a replacement for 2-D gel electrophoresis, where the first dimension involves a liquid phase batch IEF separation of proteins according to their pI and the second dimension is based on separation by nonporous reversed-phase HPLC. The result is a 2-D comprehensive separation of proteins where the proteins can be collected as isolated proteins in the liquid phase as the eluent of HPLC. Alternatively, the liquid eluent can be detected on-line using electrospray TOF mass spectrometry to provide the molecular weight of the intact proteins. The result is a 2-D mass map based upon pI versus MW, which is analogous to a 2-D gel but which provides MW accurate to a 100 ppm accuracy. The advantages of this method in terms of speed, throughput, sensitivity, and quantitation will be discussed. Further, it will be shown that by using these highly accurate mass maps that interlysate comparisons can be performed to search for changes in protein expression and structure as a function of the progression of cancer. Applications to protein profiling for biomarkers related to the detection and prognosis of ovarian and breast cancers will be discussed.

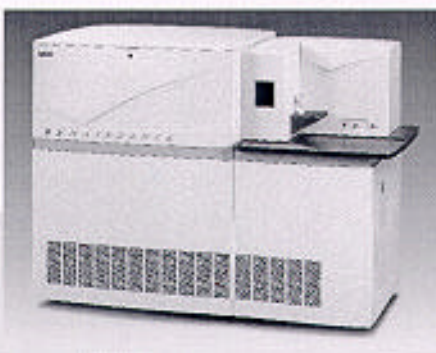
6:00 PM  
Monday, December 3, 2001  
Chemistry Building Room C001  
Indiana University  
Bloomington, Indiana 47405

## Biographical Sketch

**David M. Lubman** received his A.B. from Cornell in 1975 and his Ph.D. from Stanford in 1979 in Physical Chemistry under the direction of Professor Richard N. Zare. He worked as a staff scientist for Quanta-Ray in Palo Alto from 1979-1983 developing a program in the use of lasers in Chemical analysis. He was a Senior Fellow at the Weizmann Institute in Rehovot, Israel during 1982-1983 in the Department of Chemical Physics with Professor Ron Naaman. Dr. Lubman is currently Professor of Chemistry at the University of Michigan.

Professor Lubman's current interests are in biotechnology, bioanalytical chemistry, separations/mass spectrometry, proteomics and cancer biology. This involves developing capabilities for probing biological systems with sensitivities on the attomole level over a size range from small peptides to large biopolymers. In order to study these systems his group is using electrospray ionization mass spectrometry as a means of generating large ions from solution with identification and detection via mass analysis. He has received numerous awards including Eli Lilly Postdoctoral Teaching Fellow, William F. Meggers Award of the Society for Applied Spectroscopy, and is a Research Fellow of the Alfred P. Sloan Foundation.

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**Post-Seminar Dinner with  
Professor Marcos Dantus**

**Monday, November 26, 2001**

Seminar

Chemistry Building, Rm. C001  
Indiana University  
Bloomington, IN  
6:00pm

Dinner

Janko's Little Zagreb  
223 West Sixth Street  
Bloomington, IN  
7:30pm

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For dinner, please RSVP to William Wetzel (812 855-7905 or [issas@indiana.edu](mailto:issas@indiana.edu)) by Wednesday, November 21, 2001.

**Post-Seminar Dinner with  
Professor David M. Lubman**

**Monday, December 3, 2001**

Seminar

Chemistry Building, Rm. C001  
Indiana University  
Bloomington, IN  
6:00pm

Dinner

Michael's Uptown Cafe  
102 East Kirkwood Ave.  
Bloomington, IN  
7:30pm

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For dinner, please RSVP to William Wetzel (812 855-7905 or [issas@indiana.edu](mailto:issas@indiana.edu)) by Wednesday, November 28, 2001.

# Discover The Potential

## Raman Microscope

### FEATURES

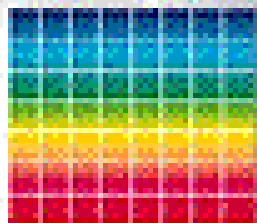
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