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THE OCTAGON

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LVACS Meeting

The next meeting of the LVACS will be held at Muhlenberg College on Wednesday January 23, 2002. The topic will be ***Laboratory Automations: A Simple Approach to Solving Various Analytical Problems.*** The reception and dinner will take place at Hoffman House, N23rd Street, while the meeting and talk will take place in the Trumbower Lecture Hall Room 130.

Reception and wine tasting: 5:30 pm
Dinner: 6:00 pm
Meeting, Talk: 7:15 pm
Cost: $20, $10 for students
Menu:

Chicken Breast stuffed with Feta Cheese, Spinach and Pine Nuts

Or

Balsamic Grilled Flank Steak

Reservations: Contact LuAnn Feist at 484-664-3260 or feist@muhlenberg.edu by noon. on Thursday, January 17. Please include your name, affiliation, choice of entrée, and phone number.

Abstract

Laboratory Automations: A Simple Approach to Solving Various Analytical Problems

Increasing the overall throughput of analytical testing is of great importance to many laboratories. Our laboratory explores custom automated systems to aid in analytical data collection, including robotic workstations and parallel processing separations instrumentation.

Robotic workstations are convenient and versatile systems that can remove some of the mundane tasks of analytical testing. We have been investigating two basic workstations: one designed to conduct accelerated stability studies of new potential drug substances, and the other to automate powder dispensing and weighing for the preparation of routine samples. In order to support the vast number of samples being generated and subsequent methods that need to be developed, we are designing parallel separation instruments. The first system is a multi-channel capillary electrophoresis instrument capable of running eight individual methods simultaneously. The second is a parallel processing liquid chromatographic system that employs mass flow control valves to regulate the chromatographic flow rates, and preliminary data from a single column will be presented based on this valve technology.

This presentation will focus on the design and application of the aforementioned laboratory automation techniques as well as the philosophical approach to the success of automation in your laboratory.

Author

Adam M. Fermier received his bachelor's degree in chemistry from Delaware Valley College in 1993. He earned his Ph.D. in analytical chemistry from the State University of New York at Buffalo in 1997, where he specialized in column technology and detection in capillary electroseparation techniques. After a postdoctoral appointment in 1998 at Johnson & Johnson's R.W. Johnson Pharmaceutical Research Institute, he accepted a position later that year as Senior Scientist in the Spectroscopy/Drug Chemistry/Automation Group in Drug Evaluation. Dr. Fermier quickly established himself as an innovative scientist seeking automated solutions to the routine tasks in the development laboratories, and was recently promoted to Principal Scientist. His work focuses on laboratory automation, including the design and implementation of a degradation robot (JABA), a capillary array electrophoresis instrument, and a weighing/sample preparation robot. He has shared his work with the scientific community in eight written publications, one book chapter, 45 presentations, one issued patent, and three patents pending.

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All applications for membership in the American Chemical Society should be sent to the Secretary at the address above. This publication, founded in 1894, is devoted to the interests of the Lehigh Valley Section of the American Chemical Society. It is published eight times each year (January through May and September through November) and mailed free to members of the Local Section; subscription fee to non-members is $1 yearly.

November Minutes

The 732nd meeting of the LVACS was called to order by Chair Dr. Paul Bouis at 7:35 PM on Tuesday, November 13, 2001. The meeting was hosted by Lehigh University on their campus. Dr Bouis began the meeting by reminding the section about last year's speaker at Lehigh University, Dr. Dick Zare. Dr. Bouis pointed to a picture of him in a recent issue of Chemical & Engineering News and noted that Dr. Zare was wearing the watch that was presented to him by the section at last year's meeting in appreciation for his talk. Dr. Bouis announced that the web page for the section would be up in January of 2002. Please pay attention for information on the web address. Dr. Bouis told the group that there are plans to give section members the option of receiving the Octagon either through snail mail or electronically. The web page will announce the section meetings. Dr. Roger Egolf gave a brief description of the visit to the Joseph Priestly house in October to commemorate the journey made in 1926 to celebrate the 50th anniversary of the ACS. Dr. Dan Zeroka presented the treasurer's report. The checking account contains $7,110.24, the LVACS Foundation in Chemistry Scholarship Fund is valued at $1,539.50 and the Merrill-Lynch Ready Assets Account is valued at $31,205.96. Dr. Zeroka also presented the proposed budget for the year 2002 to the section for approval. Dr. Zeroka announced that the proposed expenditures would exceed the proposed income by approximately $1,000. This difference is due to the section contributing $1,000 to the Foundation in Chemistry Scholarship Fund. The proposed budget was unanimously approved. Dr. Al Martin announced that TEACHEM would be meeting on Feb. 12, 2002 at Moravian College. For more information, contact Dr. Martin.

Dr. John Larson, chair of the Department of Chemistry at Lehigh University, introduced the speaker for the evening, Dr. Thomas Mallouk. The title of the talk was "Nanowires: Synthesizing the Computer of the Future." Dr. Mallouk began the lecture by explaining the diversity of individuals who have collaborated with him on this fascinating problem. He has been supported by electrical engineers and computer scientists. Dr. Mallouk presented some background about the current state of affairs with respect to computer chips. He noted that Gordon Moore had articulated an empirical law (affectionately known as Moore's Law) which states that the number of devices that can fit on a chip doubles every eight-teen months. Moore's second law states there is an exponential in the fabrication cost of the chips.

Dr. Mallouk pointed out the need to develop methods to efficiently develop computer chips. The chips continue to become smaller but the current technology will soon be unable to keep up with the miniaturization process and the associated costs to produce them. Dr. Mallouk's goal is to use chemistry to solve this problem. He noted that current computer chips contain mostly wires and many different electrical devices (e. g. diodes, resistors, and transistors) in a highly organized fashion. The question becomes how does one develop wires, electrical devices and wire on this chip at the nanoscale level. Dr. Mallouk then presented the work that has been accomplished by his group in constructing wires and electrical devices on the nanoscale level, and how he is developing methods for these devices to self-assemble. He discussed how the nanowires (20 - 300 nm in diameter) are constructed using aluminum membranes and how these wires have been characterized. The resistance of these wires displays the same properties as do the bulk material. He then discussed how his group has been able to develop diodes at this same scale. He presented data (plots of current vs. voltage) that illustrated their typical characteristics. Dr. Mallouk then presented the approach they were taking to develop a logic gate and finished by presenting how they were causing these nanoscale devices to self-assemble.

Dr. Mallouk completed the talk by summarizing the material that had been presented at the meeting and work for the future. At the end of the talk, Dr. Mallouk answered several questions. Dr. Bouis expressed the section's appreciation and presented the speaker with a gift. The meeting was adjourned at 8:55 PM.

Respectfully submitted,
Rolf Mayrhofer
Secretary, LVACS

October Minutes

The 751st meeting of LVACS was called to order by Chair-Elect Dr. Joe Sherma at 7:30 PM on Thursday, October 18, 2001. Kutztown University hosted the meeting on their campus. Dr. Sherma announced that the Web page being developed by Teresa Michelle Jones-Wilson for the section should be up shortly. Dr. Roger Egolf gave a short report on the train ride to the Priestly House located in Northumberland, PA. This trip commemorated a similar trip taken in 1926 that honored the 50th Anniversary of the ACS. The candidates for the sectional offices were presented to the section and were unanimously approved. The Chair-Elect for next year will be Dr. Paul Bouis, the treasurer will be John Freeman and the secretary will be Tara Baney. Dr. Sherma announced the names of those individuals who are 50-year members of the ACS and live within the Lehigh Valley Section. They will receive a certificate from the ACS recognizing their achievement. Dr. Thrygeve Meeker was present to receive his certificate and shared with the section his excitement of being a chemist. Dr. Sherma concluded the business meeting by announcing that the Student Affiliates of ACS (SAACS) will be 65 years old next year and that the first SAACS chapter was created at Lafayette College.

The speaker for the evening, Dr. Mark Mowery, was introduced by Dr. Tom Betts. The title of Dr. Mowery's talk was "The Application of Laser Induced Breakdown Spectroscopy (LIBS) and Raman Imaging for the Analysis of Pharmaceutical Products and Intermediates." This presentation resulted from work he has accomplished with his current employer, Merck Research Laboratories.

Dr. Mowery began the talk by giving an overview of how tablet coatings are traditionally analyzed. He then discussed how he is developing spectroscopic methods to improve the analysis. The first method presented was using laser induced breakdown spectroscopy. A laser is used to "drill" a hole through the coating of the tablet. From this analysis, coating depth, coating variability and other coating parameters are determined. Dr. Mowery spent some time discussing the role of coatings for tablets. Several examples were cosmetic, improve chemical stability, improve physical stability and improve shelf life.

The next technique that Dr. Mowery discussed was Raman Imaging. He introduced the apparatus used to take this data and then described how this technique is being used to examine coating degradation. He pointed out that this analysis gives a wealth of information but is very time intensive technique.

At the end of the talk, Dr. Mowery answered several questions about his work. Dr. Mowery was given a gift to express the section's appreciation. The meeting was adjourned at 8:30 PM.

Respectfully submitted,
Rolf Mayrhofer
Secretary, LVACS

Editor's Notes

In mid-December I had the pleasure of lunch with Dr.s Sherma and Bouis, our section Chair and Chair-Elect. We were discussing plans for growing the Octagon into something truly noteworthy.

When I took over editorial control of the Octagon my head was full of ideas of things that could be done with it…things that quite frankly, I can not achieve alone, and quickly tired of trying. I was pleased to learn that Dr.s Sherma and Bouis have similar ideas of where we can take the Octagon.

First of all, as has been announced at previous meetings, a web site is being developed for our local section, and the Octagon will appear on that site. Currently you can access it at :

www.esu.edu/~mjwilson/acslocal/index.html

By accessing this web site you should be able to read the Octagon about 2 weeks sooner than you currently receive it in your mail box. This will give you more time to plan to attend meetings. Starting in the fall we plan to have e-mail notification of when the Octagon is posted on the web page. If you would like this notification in place of receiving a hard copy of the Octagon or in addition to a hard copy, please send an e-mail to LVACS_Octagon@yahoo.com

Another change underway is the "Chemistry in the Valley" segment, currently authored by Dr. Bouis. Read his article on the next page to get more of an idea of what this is—we will accept submissions from any members of articles of this kind. Also discussed was discussing local "chemistry related" news. For example, we discussed the unfortunate explosion at Concept Sciences as a missed opportunity for an article in the Octagon.

Next month I will discuss more of our ideas for improvements…but if you have any ideas, please, share them with me! E-mail waxwoman98@yahoo.com.

I haven't seen the latest Planet of the Apes film, but I remember the

original movie had a "Forbidden Zone" representing a devastated planet earth. They could have filmed this sequence on one of the many scorched patches of terrain in Palmerton, Pa, courtesy of the New Jersey Zinc Corporation. If you have not seen Planet of the Apes, you have surely seen the ravages, which have been inflicted on the mountains of Tora Bora. The top of Blue Mountain, right above Palmerton, looks strikingly similar. Yet, not one conventional bomb has ever touched this mountain. The almost complete defoliation of this once pristine mountain comes as no surprise to anyone who might postulate the potential effects of exposing vegetation to the off-gases from the roasting of sulfide containing ores. Is this what happened here?

On a sweltering August day this past summer I decided to visit Palmerton and see for myself, what I had read and heard about since moving to the Lehigh Valley in 1986. On a road that mirrors the surrounding landscape, Pa 248, I slowly drove into a "Zinc Twilight Zone". From 248, you can see "Palmerton the Zinc City", as the old town sign announced back in the heyday of zinc smelting. However, before you can see any of the downtown you are forced to view the legacy of zinc processing. Off to the right you see a patchy, bald mountain on top of which sits an ultra modern form of communication, a relay tower. On a red rocky outcrop, an ultra primitive form of communication has been whitewashed onto the landscape, "Jamilyn I Love You". Across the road from the mountain, you can see a myriad of dilapidated mostly abandoned red brick buildings, surrounded by rust encrusted fences. Welcome to the former West plant of the New Jersey Zinc Corporation.

Pulling over, I decide to walk onto a plot of land where dead trees are scattered across the landscape like so many scarecrows. One is immediately struck by the dramatic erosion that has occurred in certain areas, and the blackness of whatever soil remains. The rocks, which dominate most of the surface of this hill I have wandered onto, look like they have been acid-washed. They probably have been! Looking around this surreal landscape, twenty years after the shutdown of the last "vertical retort smelter", and being a practicing industrial chemist, my initial reaction is to be mad as hell. Is this hill a remnant of the total disregard of the environmental consequences of running a zinc processing plant? I ask myself, "did this devastation take place in a different era where industrial progress was king and many industrialists looked the other way when it came to the environment"? It was certainly an era in which the population density was nowhere near what it is today. What was the real difference back then between timber companies ravaging the landscape by clear cutting beautiful hardwood forests, or coal companies surface mining with little or no reclamation of the land, and a chemical company processing zinc in a far away valley deep inside Pennsylvania? Or was this done in the modern era by industrialists who should have know better but looked the other way on behalf of the shareholders? In the coming months we will examine these questions. If you would like to contribute to an upcoming column drop me a line.

A few days later I would visit the "East Mountain" by hiking along the Appalachian Trail, but that story is for next month's column.

Spring Meeting Schedule

February, Moravian February 12

March, Desales Friday, March 15, HS Teachers Night

April, Lafayette April 9-11, Student Awards Night

May, Cedar Crest May 6-10, Spouses Night

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The February LVACS meeting will be at the Moravian College, North Campus on February 12. The topic is *Identifying Diabolic Pathogens With Separation Techniques*. Details will be in the next issue of the *Octagon.*

Visit the NEW Lehigh Valley Section of the American Chemical Society Webpage and tell us what you think!

www.esu.edu/~mjwilson/acslocal/index.html