

KNOXVILLE-OAK RIDGE SECTION AMERICAN INSTITUTE OF CHEMICAL ENGINEERS

Newsletter

March 1999

Chair:	David DePaoli	574-6817	ddi@ornl.gov	Directors:	Hank Cochran	574-6821	hdc@ornl.gov
Vice-Chair:	Jan Berry	241-1939	vnb@ornl.gov		Steve McCoy	220-4730	mccoys@ttnus.com
Secretary:	Saleem Zwayyed	690-3211	szwayyed@ITCRP.COM		Ken Plummer	574-7069	pek@ornl.gov
Treasurer:	Thomas Klasson	574-6813	kt9@ornl.gov		Paul Taylor	574-1965	tap@ornl.gov
					Tse-Wei Wang	974-6769	twang@utk.edu

MARCH MEETING: A BIOPROCESSING LAB SESSION

Date & Time
Monday, March 22, 1999
7:00 p.m.

Place
Leaf & Ale
Cedar Springs Shopping Center
9220-B Kingston Pike

"The Basics of Homebrewing" Mike Nelson, Leaf & Ale

The earliest known and still most widespread application of chemical engineering is fermentation. The invention of fermented beverages from grain has been attributed to both the Sumerians and the Egyptians, who are known to have produced an alcoholic drink more than 5,000 years ago. Today, chemical engineers can be involved in bioprocessing applications ranging in capacity and complexity from highly sophisticated plants that collectively produce 2.4×10^{10} L (6.3 billion gallons) of highly consistent beer per year in the U.S. alone, to simple home brewing at 5 gallons or less per batch.

Our meeting this month will feature a beginner-level session on home brewing. Mike Nelson, an expert in home brewing, will present how to make several types of beer, including Pilsner, Ales, and Stout, in a 2-hour session. He will discuss home-brewing supplies and will direct us step-by-step through the brewing of a batch. Although the class is focused on, and will use the terminology of, home brewing, it will exhibit important aspects of bioprocessing, including sterile operations, processing of feed materials, care of biocatalysts, and process monitoring. Since the fermentation and aging takes a few weeks, the class will have to wait a while for product evaluation.

No dinner will be served, although some munchies will be provided.

Cost: \$2, covers all course materials

Reservations:

We are limited to a class of 25. To be sure that you're not left out, make reservations as soon as possible with Sancy Hail 974-2421 or Linda Puckett 574-2210; fil@ornl.gov.

Contacts

Awards

Hank Cochran
(574-6821; hdc@ornl.gov)

Incineration Symposium

Sal eem Zwayyed
(690-3211;
szwayyed@ITCRP.COM)
Jan Berry
(241-1939; vnb@ornl.gov)

Membership

Paul Taylor
(574-1965; tap@ornl.gov)

Outreach

Tse-Wei Wang
(974-6769; twang@utk.edu)

Professional Development

Steve McCoy
(220-4730; mccoys@ttnus.com)

Publicity

Tse-Wei Wang
(974-6769; twang@utk.edu)

Section Bylaws

Ken Plummer
(574-7069; pek@ornl.gov)

Section Web Site

Thomas Klasson
(574-6813; kt9@ornl.gov)

WATtec

Bob Hightower
(574-6777; jrh@ornl.gov)

February Meeting

Our February meeting was held at Naples Italian Restaurant. A near-capacity crowd of 50 enjoyed an excellent meal (both the eggplant parmigiana and the dessert were fabulous). The Public Service Award was presented to Bob Hightower. Tse-Wei Wang and Paul Bowers, vice-president of the UT AIChE student chapter, described their successful involvement in the Knox County "Schooled for Success" career fair (see p.4).

The featured speaker was Dr. Timothy C. Scott, senior scientist at Photogen Technologies, Inc. His presentation, "Photogen Technologies, Inc.: The Science and Business Behind a High-Tech Medical Start-Up," provided an illuminating look past our traditional views of chemical engineering. Chemical engineers are increasingly making contributions in innovative growth areas like biomedical applications (two of the five originators of Photogen are chemical engineers), and much of this activity is taking place in entrepreneurial high-tech firms.

Photogen Technologies is a small company headquartered in Karns. The company was initially formed in October, 1996, based on the idea of using simultaneous two-photon excitation (TPE) of photoactive drugs to treat deep-tissue cancer tumors and to image deep-body tissues. The company technology base has expanded to embrace the more general approach of minimally invasive therapies for diagnosis and treatment of disease. However, the focus is still predominantly on the use of photochemistry to solve biological problems.

Tim first discussed the business aspects of starting a high-tech company. Engineers tend to concentrate on the technical aspects of innovative technology; a hard lesson for many is that potential investors are primarily concerned with the business skills of the management, potential market size, return on investment, and intellectual property packaging. There are plenty of people with good ideas; in order to attract investors, you need to convince them that you can be trusted with their money and stand a reasonable chance to give them a large return. Photogen has drawn upon critical financial, legal, and technical resources from throughout the country to meet these needs.

The second half of Tim's presentation highlighted technical aspects of Photogen's work. There have been for some time therapies based on photoactive drugs, in which molecules that are relatively harmless in their base state are injected into a patient. Upon activation with photons of a specific wavelength, these photoactive drugs are converted into a reactive excited state that can deactivate cells in the illuminated region. The commonly used "single-photon excitation" methodologies have several potential problems, including poor penetration depth and collateral damage outside of the target area. TPE involves a high photon flux at twice the wavelength of normal

absorption, exciting the molecules through nonlinear processes. Among the advantages of this developmental technique are deeper penetration and greater spatial control. Tim showed impressive results of *in vivo* testing of mice for liver tumors and melanoma. Photogen has several patents on this and related technologies that are at various stages of approval, and currently has research agreements with major hospitals for ongoing testing.

You can learn more about this exciting field and Photogen Technologies at www.photogen.com.

Lightfoot Seminar

We were privileged to hear one of the giants of chemical engineering when E. N. Lightfoot, of *Transport Phenomena* fame, presented a seminar at the University of Tennessee on Feb 18. His presentation, titled "Fostering Creativity: If We Knew What We Were Doing, It Would Not Be Research," was a thought-provoking analysis of the advancement of technology, with several examples drawn from chromatography. After stating that invention is usually evolutionary, Prof. Lightfoot gave a fascinating overview of several cases of convergent evolution in nature – unrelated animals from quite different origins share many common features. He asserted that the pioneering papers on the analysis of chromatography by him and his contemporaries in the 50's and 60's were actually relatively useless in improving the technology since they were idealized applied math (they have, however, proven to be very valuable recently). In retrospect, he claims that efforts would have been much better aimed in truly directed evolution; that is, making large improvements through scaling analyses, then making further refinements through more detailed study as necessary. But, he stated, by emphasizing science they concentrated on trivia. To illustrate his point, he presented scaling analyses of chromatography, where there is a balance between momentum and mass transport; unfortunately, both scale with the packing radius. He presented progress on five different approaches toward improving chromatography and related their improved performance to the scaling analyses. It remains to be seen which of the approaches perform the best, and which of them will become evolutionary dead-ends.

We thank Prof. Lightfoot for sharing his insights with us and thank his UT hosts, Georges Giochon of Chemistry and Peter Cummings of Chemical Engineering for inviting the AIChE section to the seminar.

At the request of AIChE, UT videotaped Professor Lightfoot's seminar. We will try to get a loan copy for our members (viewing will qualify for PDHs); contact David DePaoli (574-6817; ddi@ornl.gov) to see the video.

Continuing Professional Education

Most states, including the State of Tennessee, now require registered engineers to obtain Professional Development Hours (PDHs) to retain their active status. Tennessee requires that engineers obtain 12 PDHs per year, while other states (Georgia and North Carolina, for example) require 15 PDHs per year. The featured presentations at our monthly AICHe meetings typically satisfy the requirement for a PDH and last year the local chapter began providing certificates to those in attendance. At the February meeting, nine certificates were distributed to interested engineers. So if you are a registered engineer, attending the monthly meetings is an excellent way to obtain PDHs and maintain your active status!

Note: If you attended a meeting in the 1998 and didn't receive a PDH certificate, Steve McCoy can provide you one. Either see Steve at the next meeting or contact Steve (phone: 220-4730, email: mccoys@ttnus.com) and provide your mailing address to have a certificate sent to you.

Minority Scholarships

The Minority Affairs Committee of AICHe is seeking nominations for minority scholarship awards of three types:

- Incoming College Freshman Scholarship Award,
- College Student Scholarship Award, and
- Outstanding Scholastic Achievement Award.

It has become easier for local section members to help locate candidates for these awards. Local sections are now asked only to distribute scholarship nomination forms to local high schools that are attended by minority students likely to meet the award qualifications. Nominees and/or their school counselors will forward completed nomination packets directly to AICHe as directed in the nomination form without going through the local section as previously required. The forms are available as PDF forms from the AICHe web site.

If you have any questions please contact Andrew Triana at 212-591-7478

Local Section Awards

The Knoxville-Oak Ridge Section presents awards on an annual cycle in six categories. The most recent recipient is **J. Robert Hightower**, who was presented the Public Service Award at the February meeting. Bob was cited for "his dedicated efforts as the Section's representative on the WATtec board which resulted in a highly successful AICHe session at the 1998 WATtec Conference."

Nominations may be submitted to any section officer by the time of the meeting of the Executive Committee according to the schedule below. Nominations must consist of at least a citation of not more than two sentences. Additional supporting material may be submitted.

Award	Nomination Due	Presented	Previous Winner
Professional Service	Oct.	Nov.	Prados
Young Engineer	Nov.	Dec.	DePaoli
Research	Dec.	Jan.	Cochran
Public Service	Jan.	Feb.	Hightower
Technical Achievement	Feb.	Mar.	Collins
Engineer of the Year	Mar.	Apr.	Collins

Professional Service - for outstanding professional service as a chemical engineer.

Young Engineer - to be presented to an engineer under the age of 40 for outstanding contribution(s) of any kind.

Research - for outstanding contribution(s) through chemical engineering research.

Public Service - for outstanding public service as a chemical engineer.

Technical Achievement - for outstanding technical achievement in chemical engineering.

Engineer of the Year - to an engineer for outstanding contribution(s) of any kind.

Section Web Resources

Home Page: <http://www.ornl.gov/aiche/>
 e-mail : aiche-chat@chem.engr.utk.edu
 (directions: <http://www.ornl.gov/aiche/mail.htm>)

New Features of Section Web Site:

Current bylaws: **contact Ken Plummer with comments**

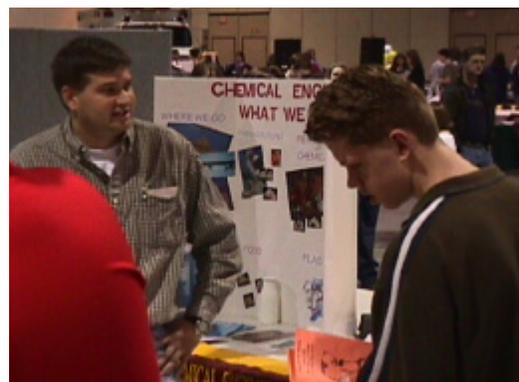
Job Opportunities: **coming soon; contact Thomas Klasson with openings to post.**



Section and Student Chapter Participate in Knox County Career Fair

The section was involved in helping the UT student chapter put together a booth for the Knox County School's "Schooled For Success" career fair on Feb. 2. Professor Tse-Wei Wang and Paul Bowers of the student chapter coordinated the effort. Eight chemical engineering students participated at the Fair. They made a poster showing the different jobs chemical engineers hold, and displayed various materials from consumer goods to a prototype artificial heart

(on loan from Dr. Benson of the Materials Department). The students also used materials contributed by Frank Van Breedam of Thermatrix Inc. and Harold Hartman of Bechtel Jacobs in their exhibit. The students had a hands-on demonstration at the booth, taking the pH of students' saliva, explaining what pH is, why it is important in general, and what the role of pH is in chemical reactions. Over 1000 eighth graders and their parents attended the fair. Professor Wang and the students appreciate all the help the section members provided to make this a success.



Knoxville-Oak Ridge Section
American Institute of Chemical Engineers
P.O. Box 2008, Bldg. 3017
Oak Ridge, TN 37831-6044

Group Exemption No. 2602
Tax exempt under Section 501 (c)(3)
of the Internal Revenue Code of 1954