



American Institute of Chemical Engineers Knoxville-Oak Ridge Section

For additional information see our Web site at: <http://www.ornl.gov/sci/aiche/>
Or contact: Linda Puckett, puckettlf@ornl.gov, (865)574-6984 or
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November 2006 Meeting – Joint with AWMA

Date: Friday, November 17, 2006
Cost: Per person charge (~\$10)
Location: Sagebrush Steakhouse & Saloon - 390 South Illinois Avenue, Oak Ridge, Tennessee

Menu: Individual selection

11:00 am Executive Committee Meeting (All members welcome)
11:30 am Dinner
12:00 pm Program - **Dr. John M. Storey**, National Transportation Research Center
- **The Watt Road Environmental Laboratory Initiative**

Abstract - The U.S. Department of Energy's (DOE) Watt Road Environmental Laboratory Initiative (WRELI) is a comprehensive outdoor laboratory devoted to the study of highway emissions of nitrogen oxides (NO_x), particulate matter (PM), and air toxics (MSATs) from passenger vehicles and trucks. The outdoor laboratory sits within one of the busiest truck traffic corridors in the Eastern U.S. and provides an ideal location for monitoring emissions from the mixed on-road fleet under realistic conditions. Oak Ridge National Laboratory (ORNL) and The University of Tennessee (UT) researchers examined ambient air quality for a truck stop site, a near-road site, and a background site. In addition, special remote sensing instrumentation is used to identify individual truck emissions of particulate matter (PM) and NO_x. As a result of the research, the Environmental Protection Agency (EPA) uses the Watt Road site as an example of a localized "hotspot" (in space and time) for NO_x, PM, and air toxics. In his presentation, Dr. Storey will briefly describe the history of WRELI and the partner institutions involved. He will also summarize key findings to date and plans for future research.

Bio - Dr. Storey has been the leader of the emissions characterization activities at ORNL's Fuels, Engines, and Emissions Research Center (FEERC) since 1994. He has a Ph.D. in Environmental Science and Engineering from the OGI School of Science and Engineering of the Oregon Health Sciences University (1993) and an M.S. in Environmental Engineering from Duke University (1986). His specific research interests include unregulated emissions from advanced emission controls, engine particulate-matter chemistry, on-line emissions instrumentation, and catalytic emissions control. He has authored over fifty conference and journal papers and has two patents.

Please make your reservations by noon, **November 16**, by contacting

Linda Puckett, puckettlf@ornl.gov, (865)574-6984 or
Betty Frazier, bfrazier@utk.edu, (865)974-2421.

The Section will subsidize up to 15 students.

Department of Chemical Engineering at the University of Tennessee-Knoxville (UTK)

Chemical Engineering education is at the threshold of significant changes, which have been brought about by recent advances in the life sciences and nanotechnology. We are transitioning to embrace and utilize fully these changes in order to meet global challenges in health care, the environment, renewable energy sources, national security, and economic prosperity. Specifically, our educational and research focuses must be revised to emphasize biological systems and micro- and nano-structured materials, as well as energy and environmental issues. The details of the new focus areas for the Chemical Engineering Department are illustrated in the figure below.

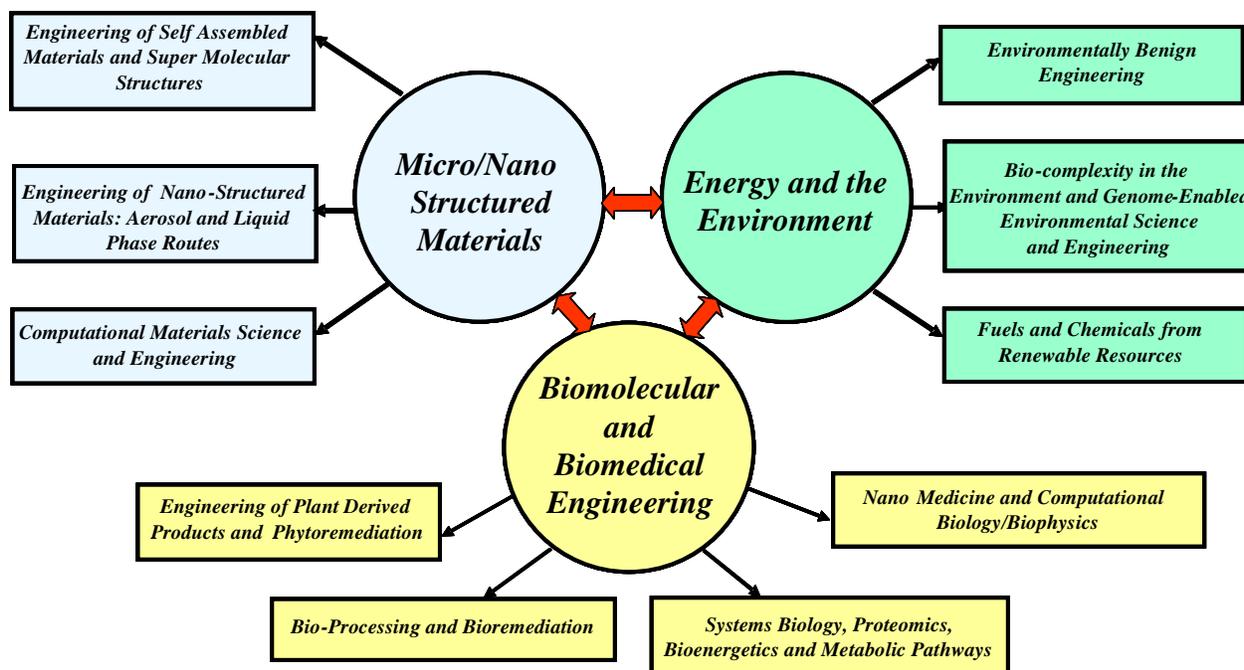
Full implementation of this new paradigm requires willingness to cross boundaries in our research and teaching programs. To this end, we are in the process of instituting innovative partnerships with other disciplines at UTK, such as medical, life, and physical sciences, as well as with the College of Business. Furthermore, we are also

establishing collaborations with nearby industries and Oak Ridge National Laboratory. In 2007, we will adopt a new name for the Department, Chemical and Biomolecular Engineering, to reflect these changes.

Hopefully this brief overview has detailed the critical issues of this exciting transitional time in the Chemical Engineering Department at UTK. Please offer us your support as we begin this crucial and timely transition, in which we strive to educate students for leadership roles in the vital technologies of the future.

“Graduates as leaders and innovators, not just highly skilled specialists”

(Bamin Khomami, Armour T. Grainger and Alvin & Sally Beaman Professor and Department Head)



"Dictionary is the only place that success comes before work. Hard work is the price we must pay for success. I think you can accomplish anything if you're willing to pay the price."

Vince Lombardi

Othmer National Scholarship Winner at TTU

Jennifer Pascal, a senior student in Chemical Engineering at Tennessee Technological University (TTU), has been awarded one of 15 nationwide Donald F. and Mildred Topp Othmer National Scholarships through the AIChE. Jennifer received a \$500 stipend and will be

honored at the National AIChE meeting in San Francisco in November.

Her selection was based on academic performance, outstanding participation in student chapter activities, and commitment to her profession, as exemplified

in an essay she prepared for the competition.

Jennifer will graduate in December 2006 with a BS in Chemical Engineering and plans to continue to graduate school.

Do You Know Who Last Year's National AIChE Chem-E-Car Championship Winner Was?

Like many of us, you may not be aware that the Chem-E-Car team from Tennessee Technological University (TTU) in Cookeville, TN was the 2005 national champion winner. The following includes excerpts from a TTU Press Release, posted in November 2005 by Karen Lykins.

The "Screaming Eagle" Chem-E-Car powered its way past all competitors to deliver a national championship to TTU, courtesy of a team of chemical engineering students.

To win the American Institute of Chemical Engineers' National Chem-E-Car title, the TTU team defeated 30 teams at the Cincinnati site, including second-place Oklahoma State University, Vanderbilt University, Virginia Tech, Berkeley, Ohio State and Penn State. The victory improved on TTU's second place finish in the previous competition.

"We knew it was going to be a tough competition," said TTU team member Regan Chandler. "This has been great. We learned so much about alternative fuels from this experience."

At a time when the United States is seeking alternative fuels, the Chem-E-Car competition has become an important venue for college students to use chemical reactions to power vehicles. The competition challenged chemical engineering students to test their classroom knowledge by building shoebox-sized cars powered by controlled chemical reactions. The small cars had to transport a payload a specified distance – and students didn't learn until 60 minutes before the competition what that payload and distance were.

The "Screaming Eagle," powered by a zinc air fuel cell, best met the

challenge to transport 300 milliliters of water 79 feet. The car came closer than any of its challengers, missing the mark by only one inch. It carried the water 78 feet 11 inch in 2 minutes.

"We were stunned," team member Braxton Sluder said. "We just stood there staring at the car for a minute, and then we jumped into the air."

Last year's team (2004) finished second after qualifying for the national championship for the first time. Those students predicted that this year's competition would be a time to shine.

The National AIChE awarded the TTU Chem-E-Car Championship team \$2,000 in prize money.



TTU team members included Jesse Cates, Regan Chandler, Ricardo Chang, Haley Hunter, Jason Miller, Jennifer Pascal, Jonathan Phillips, Robert Phillips, and Braxton Sluder.

Dr. David A. Tirrell to Present Lectures on November 16-17

The East Tennessee Section of American Chemical Society (ACS) has announced that Dr. David A. Tirrell of Cal Tech has accepted an invitation to be the 2006 S.C. Lind Lecturer (<http://www.chem.utk.edu/acs>). He will be at The University of Tennessee Knoxville (UTK) Department of Chemistry, SERF 307 at 5:30 pm on Thursday, November 16, presenting the lecture, "New Ways of Thinking about Polymers and Proteins." The abstract for this lecture follows:

Macromolecular chemistry has traditionally been divided into two fields, with biochemists and

biochemical engineers working on proteins while polymer chemists and materials scientists concerned themselves with synthetic polymers. These two classes of macromolecules are quite different from one another; proteins are uniform, well-folded, and evolvable, whereas polymers are heterogeneous and for the most part adopt random-coil conformations. The advantage held by synthetic polymers is their compositional diversity; thousands of different monomers are available to the polymer chemist, while proteins are made from just twenty amino acids. This lecture will describe

an ongoing attempt to bridge the gap between polymers and proteins by devising methods to build proteins from non-standard amino acids. Implications for biomaterials science, protein therapeutics, protein evolution, and proteomic analysis will be explored.

Dr. Tirrell will be at the Roane State Oak Ridge Campus "City Room" auditorium on Friday, November 17 at 4:00 p.m., presenting the lecture, "A Polymer Chemist's View of Protein Synthesis and Design." The abstract for this lecture follows:

Conventional polymeric materials are made by chemical polymerization processes that give rise to complex mixtures of chains. Chain length, sequence, and stereochemistry are widely variable in such mixtures, and the chemist often has very limited control of even the average properties of the chain population. This lecture will examine an alternative approach to macromolecular synthesis and design, an approach that relies on microbial expression of artificial genes that encode artificial proteins with potentially useful material properties. We will explore the controlled assembly of polymeric crystals, liquid crystals and gels; incorporation of non-canonical amino acids into proteins in vivo; and design of functional biomaterials that combine biological and material

properties in new ways.

A dinner will be held on Thursday, November 16 at 7:30 p.m., at the McEwan Restaurant at the Cumberland House Hotel, 1109 White Avenue, Knoxville. For reservations: Please contact Jan McGuire at jmcguire@utk.edu or 865-974-5052 (Dept. of Africana Studies).

Bio – Dr. David A. Tirrell is the Ross McCollum William H. Corcoran Professor and Chairman of the Division of Chemistry and Chemical Engineering of the California Institute of Technology. His most important research contributions have come in three areas: 1) radical copolymerization mechanism, 2) biomimetic membrane chemistry; and 3) development of molecular biological approaches to new macromolecular architectures. For additional information on Dr. Tirrell, see his web site at:

<http://www.cce.caltech.edu/faculty/tirrell/index.html>.

(Excerpt from an Announcement by the American Chemical Society, East Tenn. Local Section)

"If I have ever made any valuable discoveries, it has been owing more to patient observation than to any other reason."

Isaac Newton



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Biodiesel Production Pilot Plant at UT



UT Biodiesel Processor



Waste oil bin outside the University Center

"Biodiesel is an alternative diesel fuel that can be made from vegetable oil or rendered animal fat. In the US, the most common feedstock for biodiesel is soybean oil.

Other good biodiesel feedstock's include canola oil, jatropha, and waste vegetable oil.'



Student working on the Biodiesel Hauler

The Biodiesel Production Pilot Plant at the University of Tennessee started when the Society of Automotive Engineers (SAE) was awarded a grant under the UT Environmental Semester environmental project competition in 2005. The idea was to take waste cooking oil from Dining Services on campus and turn it into a cleaner burning diesel substitute for use in diesel vehicles on campus. This was soon to be known as a model for campus sustainability.

Biodiesel is an alternative diesel fuel that can be made from vegetable oil or rendered animal fat. In the US, the most common feedstock for biodiesel is soybean oil. Other good biodiesel feedstocks include canola oil, jatropha, and waste vegetable oil.

Biodiesel is most commonly produced during a chemical reaction between the oil and alcohol and lye. This transesterification reaction results in the production of glycerin and methyl esters which are known as biodiesel. Glycerin is drained off and the biodiesel is then washed to remove excess methanol and lye using water. Biodiesel produced from vegetable oil or rendered animal fat is also called Fatty Acid Methyl Esters (FAME).

Scott Curran and Sean

Peterson, both seniors in mechanical engineering, worked full time over the summer of 2006 to bring this idea to life under the supervision of Dr. David Irick from the department of Mechanical Aerospace and Biomedical Engineering. After scrapping the plan to buy a commercial biodiesel processor, one was built from the ground up using readily available, open-source plans with minor adjustments for safety and reliability. The processor is currently set up to produce 40 gal of B100 per batch while being easily expandable to 80 gal per batch.

The biodiesel team takes a strong stance on the quality of biodiesel. Any potential grease is tested for initial quality. If it passes, it then undergoes multi-stage filtration and is later tested again. Oil that passes all the tests will later become fatty acid methyl esters (FAME). Only after the FAME has passed quality testing will it be called biodiesel and used in a diesel vehicle. The team does not recommend anyone to use untested biodiesel in their vehicles.

The team is also very active with their outreach activities. Some of these activities include:

- Information booth(s) at multiple alternative fuel and sustainability events.

- Biofuels Collaborative between the East Tennessee Clean Fuels Coalition and UT students to make information about diesel easily accessible to students.
- Business cards with alternative fuel information and biofuel station locations to hand out or leave on vehicles capable of using alternative fuels.

The SAE is also working on refitting a 2001 Chevrolet Suburban, a former FutureTruck competition vehicle, with a diesel engine for use as the Biodiesel Hauler. This vehicle will be used to collect waste vegetable oil, deliver biodiesel to Facilities Services and for outreach activities all while running on the student produced biodiesel.

For more information on this project, please see the following websites:

UT Biodiesel
<http://apcsi.tennessee.edu/SAE/utbiodiesel.htm>

Biofuels Website
<http://biofuels.utk.edu/>

(Courtesy of Sean Peterson and the UT Biodiesel website)

N₂ clean

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Nominations for 2007 Local Section Officers and Directors

Tom Busmann is chairing the Knoxville-Oak Ridge Section Nomination Committee and is looking for individuals to run for office for the Section for 2007.

Per the By-Laws, the following offices are elected each year: Chair-Elect, Secretary, Treasurer, and two Directors. The Chair-Elect is a three-year commitment. Directors serve for a two-year term. Secretary and Treasurer serve for one year.

If you are willing to serve your Section, please give your name to Tom soon (tbusmann@charter.net).

Elections are in December and the terms begin in January 2007.

"A lot of people are waiting for Martin Luther King or Mahatma Gandhi to come back -- but they are gone. We are it. It is up to us. It is up to you."

Marian Wright Edelman

Activities Calendar

Date	Time	Topic	Speaker	Location
12-17 Nov		2006 Annual Meeting		San Francisco, CA
16 Nov	5:30 PM	New Ways of Thinking about Polymers and Proteins	David A. Tirrell – Cal Tech	UTK Department of Chemistry, SERF 307
17 Nov	11:00 AM	The Watt Road Environmental Laboratory Initiative	John Storey - NTRC	Sagebrush Restaurant, Oak Ridge
17 Nov	4:00 PM	A Polymer Chemist's View of Protein Synthesis and Design	David A. Tirrell – Cal Tech	Roane State Oak Ridge Campus
5 Dec	5:30 PM	Forensic Science	William Bass – UT	Italian Market & Grill, 9648 Kingston Pike, Knoxville, TN
16 Jan	5:30 PM	Scintillation Materials	Chuck Melcher – Director of the Scintillation Materials Research Center	TBD
15 Feb	5:30 PM	Bio-based Products from Wood	Tim Rials – UT Forest Products Center	TBD
7 March	5:30 PM	Heterogeneous Catalysis	Larry Campbell – Advanced Catalysts	TBD
17 or 19 or 24 April	5:30 PM	UT Student Design/Awards	Student Teams	TBD
April 22-26		AIChE National Spring Meeting		Houston, TX
18 May	11:00 AM	Center for Nanomaterial Science	TBD	TBD

Sponsoring Opportunities

We continue to accept advertising in the newsletter in order to provide funds to support student participation in the meetings.

Rates per newsletter are:

\$80 full-page advertisement

\$45 half-page advertisement

\$25 quarter-page advertisement

The section will also continue to accept individual or corporate sponsors to provide student meals at Section meetings. The sponsor

will be recognized at the meeting and in the Newsletter.

The cost to sponsor one meeting is **\$200**. It's a great way to encourage students to attend the local meetings and become future members in the Institute!

Officers

Chair:	Ben Lewis	574-4091	lewisbejr@ornl.gov
Chair-Elect:	Mark Swientoniewski	574-1150	swientoniemd@bechteljacobs.org
Secretary:	Doug Hayes	974-7991	dhayes1@utk.edu
Treasurer:	Steve McCoy	220-4730	mccoys@ttnus.com
Directors:	Tom Busmann	694-7517	tbusmann@focusenv.com
Term ends 2006	Sharon Robinson	574-6779	robinsonsm@ornl.gov
Term ends 2006	Ed Alperin	694-7335	Ed.alperin@shawgrp.com
Term ends 2007	Stuart Daw	946-1341	dawcs@ornl.gov
Term ends 2007	Charles Forsberg	574-6783	forsbergcs@ornl.gov
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WWW:			http://www.ornl.gov/aiche



"The greatest danger for most of us is not that our aim is too high and we miss it, but that it is too low and we reach it."

Michelangelo

Knoxville - Oak Ridge Section

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We're on the Web!

See us at:

<http://www.ornl.gov/sci/aiche/>

About Our Organization...

As a member of the AIChE, did you know that you have free access to the AIChE eLibrary?

The AIChE eLibrary brings selections from the most relevant engineering and scientific references, handbooks, and databases to your PC. You can then manipulate and search for content across the entire collection.

- Navigate through e-References page by page

- Search across the site
- Manipulate interactive tables, graphs, equations, spreadsheets and other structured information
- Draw the chemical compound before searching using the chemical structure-searching feature

As an AIChE member, you can access "flagship" chemical engineering content like the Plastics Design Library Series, ChemEssentials, Lange's *Handbook of Chemistry*, and Perry's *Chemical Engineering Handbook*, as well as books in the AIChE Center for Chemical Process Safety Guidelines Series.

(Excerpt from the National AIChE web site at:

<http://www.aiche.org/JoinNow/Benefits/Knovel.aspx>)

Mark Your Calendar

Dr. William M. Bass, DABFA (Diplomate of the American Board of Forensic Accounting) - Founder of the Forensic Anthropology Center, Professor Emeritus, University of Tennessee, will be the speaker at the December 5th meeting of the Knoxville-Oak Ridge Section of the AIChE. The meeting will be held

at the Italian Market & Grill beginning with dinner at 6:00 pm and Dr. Bass' lecture at 7:00 pm.

Dr. Bass will show slides of three forensic cases illustrating how positive identifications are made from bone and teeth. In addition, he will show how death scene evidence leads to the determination

of the manner of death, and the sex, age, and the race from human skeletal material.

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