



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
Betty Frazier, bfrazier@utk.edu, (865)974-2421

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May 2007 Meeting – Joint Meeting with ANS

Date: Tuesday, May 22, 2007

Cost: \$15

Location: Sagebrush Steakhouse & Saloon - 390 South Illinois Avenue, Oak Ridge, Tennessee

5:30 pm AIChE Executive Committee Meeting (All members welcome),

6:00 pm Dinner – Choice of chicken, beef, pork, or catfish, with sides, dessert, and soft drinks, tea or coffee

7:00 pm Program – Mike Simonson, Center for Nanophase Materials Sciences

Abstract - The Center for Nanophase Materials Sciences is a new user facility at ORNL for fundamental research and discovery in nanoscience and nanomaterials. Located on the Chestnut Ridge site next to the Spallation Neutron Source, the CNMS is supported by the DOE Division of Scientific User Facilities to provide a broad range of capabilities and expertise to benefit the nanoscience user community, and to establish a forefront intramural and collaborative research program driving advances in nanoscience. With over 70 staff members and scientific associates, the CNMS carries out research in macromolecular and catalytic nanomaterials; nanomaterials theory; functional nanomaterials including metal oxide and carbon-based structures; nanophysics including correlated-electron materials and advanced characterization techniques; nanofabrication and nanobiological systems research; and studies of nanoscale structure and dynamics including a range of diffraction and spectroscopy capabilities. An active and productive user research program is supported through periodic calls for proposals and rapid access capabilities for breaking research opportunities.

Bio - Michael Simonson is the group leader for Nanoscale Structure and Dynamics at the Center for Nanophase Materials Sciences. He specializes in experimental and modeling studies of solution structure, thermophysics, and chemical equilibria over wide ranges of conditions. His current experimental work focuses on studies of aqueous electrolytes including determination of hydration and speciation structures of simple ionic and polyelectrolyte solutes and fundamental interactions governing membrane separations, and determinations of nanoscale structures under varying environmental conditions. Mike received a Ph.D. in chemistry from the University of California, Berkeley in 1983.

Please make your reservations as soon as possible, but no later than noon on May 22, 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

Job Postings Update

Job opportunities are continuing to be posted on the new Area Jobs Listing page on the local section's web site. The new page provides a listing of primarily chemical engineering related employment opportunities in the region. The following address can be used for more information on the current job listings:

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

Also, please give us any feedback (positive or negative) on your efforts to explore any of the posted opportunities.

The following new listing has been posted:

1. **Process Safety Engineers**

Qualifications:

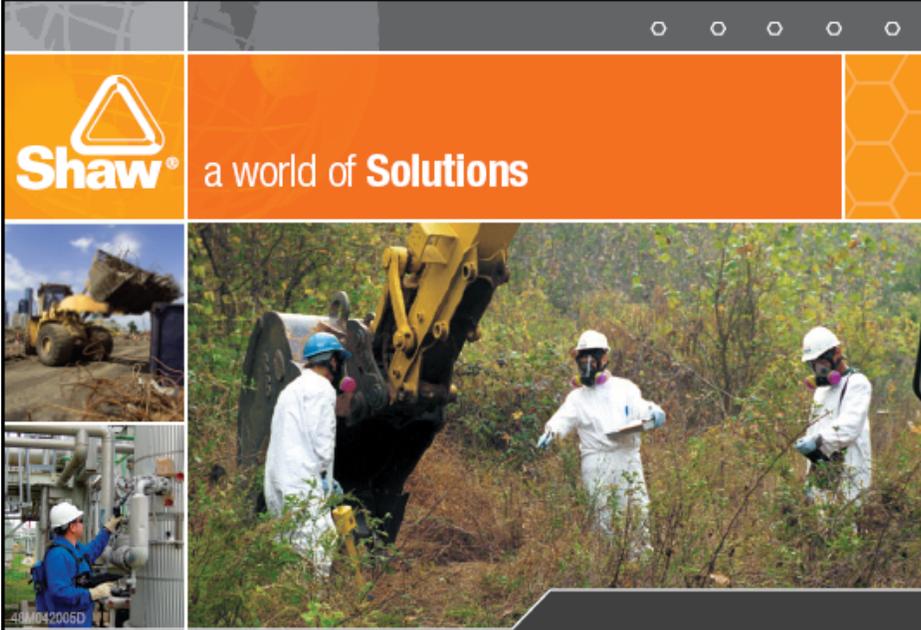
Full-time and/or part-time at all levels (junior, senior, retired) Chemical or Mechanical Engineering; At least 3 to 5 years of experience in implementing process safety desired. Experience in providing training is a plus. Must be outstanding performer with excellent technical, interpersonal, and communication skills. Background desired in OSHA's process safety

management (PSM) regulation (29 CFR 1910.119) and EPA's rule on risk management programs (40 CFR 68) (conducting compliance audits, leading PHAs, implementing mechanical integrity, etc.). Location: ABS Consulting Knoxville, TN (posted April 20,

2007). Compensation: Excellent compensation and challenging career and travel opportunities. Contact: Send résumé, college G.P.A., and salary requirements to dwhittle@absconsulting.com or fax (865) 966-5287. For more information, visit our Web site at:

www.abs-group.com/employment.html

Disclaimer: The posting of employment opportunities and employer information on the local section's website does not necessarily constitute or imply the endorsement, recommendation, or favoring by the Knoxville-Oak Section of American Institute of Chemical Engineers.



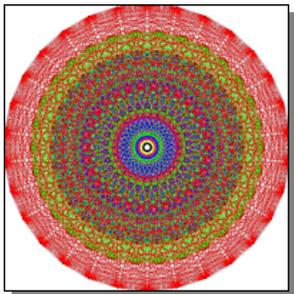
Solutions for Knoxville

Shaw offers a world of solutions to our industrial, commercial and governmental clients worldwide. Shaw's Environmental & Infrastructure local office has been an integral part of the Knoxville community for over 30 years and is proud to employ over 300 people locally.

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UT-Farragut High School Student Research Program Planned



"The future belongs to those who believe in the beauty of their dreams."

Eleanor Roosevelt

A pilot Student Research Program is being planned between The University of Tennessee Knoxville (UTK) and Farragut High School.

Under this program, high school students are given the opportunity to work in a research lab/project at the College of Engineering for a semester (or more) and use the experience for high school senior credit. Some students may be available for participation in this program as soon as this summer.

The plan is limited to selected students with high interest and good academic record. This program is envisioned to play an important role in recruiting high quality students to UTK's engineering honors program.

A collection of possible research projects is presently being compiled by Masood Parang, Associate Dean and Professor Student Affairs. The information on the proposed projects will then be matched with that of the students.

Chemical Engineering Students Compete for Phase II Grant in EPA's "P3 Student Design Competition for Sustainability"

Chemical Engineering students **Nickyla Alliove**, **LaToya Thompson**, **Linda Macdonald**, and **Mehrsa Raeiszadeh**, and Biochemistry and Cellular and Molecular Biology student **Chris Lowe** competed in Washington, D.C. April 24-25th for a Phase II grant in EPA's "P3: People, Prosperity and the Planet Student Design Competition for Sustainability." The objectives of their project were to construct a lab-scale biohydrogen production reactor using algae and to complete a design study for a biohydrogen production facility to provide

transportation fuel for a small city. Drs. Paul Frymier, (ChE), Pete Counce (ChE) and Barry Bruce (BCMB) were co-PIs on this project. Although the team did not win the Phase II award, the students were interviewed for local media coverage and were broadcast on the local DC NPR affiliate, WAMU 88.5. The broadcast will be available for a short time at <http://www.wamu.org/news/> under the heading "Sustainable Design Expo." (Reprint from College of Engineering weekly newsletter, April 27, 2007)

Dr. John W. Prados Receives ASEE Lifetime Achievement Award

Dr. John Prados, professor emeritus of chemical engineering, received the 2007 Lifetime Achievement in Chemical Engineering Pedagogical Scholarship Award of the American Society of Engineering Education (ASEE), the society's highest and most prestigious honor. Prados has devoted 50 years to Chemical Engineering education. He has been a leader in engineering education reform and the development of meaningful assessment criteria for academic programs through the modernization of accreditation processes to encourage innovations in engineering education. He has worked to secure the resources for development and institutionalization of engineering educational innovations as coordinator of the Engineering Education Coalitions program. He has also been a long-time proponent of ensuring engineering educational research that meets the same standards of rigorous scholarship expected in scientific research through his editorship of *Journal of Engineering Education*.

Dr. Prados' 50 years of devoted service to Chemical Engineering education are a great testament to his belief that the heart and soul of our profession are rooted in the early, formative stages of our careers, wherein our teachers and mentors play a major role in shaping our technological expertise and ethical values for the duration of our careers. For over five decades, John has been an inspiration to students and professors alike, and even today, some six years after his official retirement; John continues his service to chemical engineering students and faculty at the University of Tennessee-Knoxville. He is still the most highly rated professor in the College of Engineering at our university, and he remains a great source of pride for us. Indeed, even today he remains an indispensable resource for advancement of chemical engineering education.

John's work in modernizing the engineering accreditation process began over 35 years ago, when he became a chemical engineering program evaluator in 1971. He joined the Engineering Accreditation Commission in 1978, and served in that post for 8 years, holding the title of Chairman for the final 2 years. He then served on the Board of Directors for 5 years, before chairing the Accreditation Process Review Committee from 1992-1997. He then became President in 1991-1992. Over this extended time period, John was one of the instrumental leaders who transformed the archaic, unsystematic, and often unwieldy and "anti-innovation" accreditation process into the modern, adaptive, and innovation oriented process that exists today.

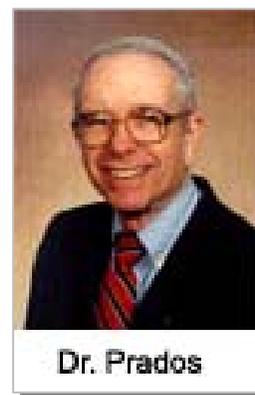
As editor of the *Journal of Engineering Education* from 1995-2001, John worked tirelessly to establish for ASEE a publication of archival quality that focused on engineering education. Under his editorship, manuscripts submitted to this journal were subjected to the same standards of peer review expected in technical and scientific journals. As a consequence of his efforts, the journal became a resource not only for research on engineering educational pedagogy, but also became a high-profile venue for more academically oriented (as opposed to research oriented) faculty members in the engineering disciplines to showcase the results of their educational initiatives. Furthermore, this journal became a viable resource for assessing the quality of engineering programs as well as individual faculty members.

John has also performed much service to the ASEE over the past 50 years, in addition to his service to the *Journal of Engineering Education*. He was the chair of the University of Tennessee Branch of ASEE in 1960-1961. He became a fellow in 1999, and still serves on the Advisory Board, beginning in 2001. Indeed, he served as the Chair, Academy of Fellows, from 2004-2006.

Over the past two decades, John has won many awards for his outstanding service to the profession of chemical engineering. He was elected to the status of Fellow, Accreditation Board for Engineering and Technology in 1988, and received the Linton E. Grinter Award for Service to Engineering Education, the highest ABET honor, in 1993. He was elected as the Faculty Macebearer, University of Tennessee in 1997-1998, which is the highest University of Tennessee faculty honor. He was elected as Fellow, American Society for Engineering Education, in 1999, and he won the James T. Rogers Distinguished Leadership Award, Commission on Colleges, Southern Association of Colleges and Schools (highest Commission on Colleges honor), in 2004.

For all of the reasons cited above, Professor John W. Prados deserves to be recognized with the 2007 *Lifetime Achievement in Chemical Engineering Pedagogical Scholarship Award*. John's service to chemical engineering education, and ASEE in general, has had a far more influential effect than can be succinctly summarized above. Only such an award as this one can bestow the proper thanks due to John for all of his selfless, tireless devotion and service to the heart and soul of the chemical engineering profession.

(Reprint of ASEE announcement April 2007)



Atoms for Ethanol

ORNL researcher says nuclear plants' steam is handy energy for ethanol production

In the near future, nuclear power plants and ethanol production plants should work side by side, with the power plant lending steam to the ethanol plant for its distillation process. It's an idea, Corporate Fellow Charles Forsberg believes, that will give an extra kick to an already burgeoning ethanol industry.

If you are familiar with the Nuclear Science & Technology Division senior researcher and his international stature in nuclear engineering and policy, you are probably wondering why Charles is even thinking about ethanol.

But you should also know that he is from Minnesota, the heart of the nation's Corn Belt.

"They know corn in the Midwest," says Charles.

Charles' proposal, which was recently published in the trade journal *Nuclear News* with DOE co-authors Samuel Rosenbloom and Richard Black, is to co-locate ethanol plants with nuclear power generation plants to take advantage of the nuclear plant's bountiful production of steam.

The symbiotic relationship—symbiotic because the plan would give nuclear power a role in the transportation sector—would pay great dividends for ethanol producers, Charles says, because distilling alcohol, or ethanol, from the fermentation mash—a mixture of water and ethanol—requires heat. Nuclear plants excel at producing low-cost steam heat; better yet, they produce that heat

without contributing to the carbon cycle.

An ethanol plant typically uses natural gas or coal to produce the required steam.

"After the feedstock—the corn—steam is the biggest cost in producing ethanol," Charles says. "Existing nuclear plants are big steam producers. It makes sense to build ethanol plants near utilities located in the Corn Belt, where the corn is nearby and can be transported to the plant cheaply."

Nuclear power plants produce high-pressure, high-temperature steam. The steam goes first through the high-pressure turbines and then the low-pressure turbines, with the turbines producing electricity. Only low-pressure, low-temperature steam (approximately 180°C at 150 psi, about the same as a building's steam-heat system) is required by ethanol plants; thus, much of the energy value of the steam would be used for electricity production before the steam was sent to the ethanol plant.

"This low-temperature steam is of lower value for electricity production, but it could significantly improve ethanol economics, create an expanded market for nuclear energy, reduce greenhouse gas emissions, and reduce foreign oil imports," says the *Nuclear News* article.

President Bush has called for standards requiring 35 billion gallons of renewable fuel production by 2017. Charles says if ethanol is used to meet that goal, it will require almost 30 gigawatts of low-temperature steam. A readily available source of that steam, obtained without burning fossil fuels, is an already existing nuclear plant in the Corn Belt.



The map shows the proximity of steam-generating nuclear plants to ethanol production sites in the upper Midwest, a situation Charles Forsberg believes is ideal for cheaply producing ethanol.

Only a few years ago ethanol was a niche fuel without much demand. Beyond the desire to reduce oil imports, which is frequently dampened by oil price drops, recent events have created a new market for ethanol.

Reason one, Charles says, is a "biotech revolution." Turning corn into alcohol is a slow process involving enzymes that break corn down to sugar and then alcohol. It takes time, as any brewer will attest. People have been trying to speed up the process for centuries, and although Charles cites individuals—Jack Daniels, for instance—who became very accomplished at the distillation process, it always has been slow going.

"About 10 years ago an enzyme was developed that could break down corn into sugar and thus make alcohol very quickly simply by adding it to the mash. Suddenly, a small facility could make lots of ethanol," Charles says.

Secondly, Congress enacted tax incentives for ethanol production. "Always helpful," Charles observes.

Finally is the MTBE issue. Methyl



Forsberg

“Existing nuclear plants are big steam producers. It makes sense to build ethanol plants near utilities located in the Corn Belt, where the corn is nearby and can be transported to the plant cheaply.”

tert-butyl ether is used as an additive in unleaded gasoline to boost octane. MTBE was developed as a replacement for lead, a toxic metal that crept into the environment as a result of gasoline combustion. Regulators banned lead from gasoline.

However, MTBE itself has turned up in groundwater, provoking environmental concerns. California outlawed its use and MTBE's days nationally as an additive are numbered. Ethanol, which also is an octane booster, is a promising and environmentally benign replacement.

“We can do ethanol today. The market has appeared,” Charles says.

His proposal doesn't stop at mere ethanol production. In a second phase of the plan, which could be realized in several decades, nuclear-produced hydrogen could be added to biomass to produce liquid fuels such as gasoline and diesel, increasing the energy value of the fuel per unit of biomass by a factor of three or four. This would enable the U.S. to produce all of its liquid fuels from biomass.

Ultimately, hydrogen itself, produced by nuclear plants, would become the dominant fuel, once the storage and transport challenges are solved and the infrastructure is established. This is the touted hydrogen economy.

“The two real problems we have are dependence on foreign fuel and climate change,” Charles says. “There is a nuclear-biomass option, but first one must learn to crawl—ethanol—then walk—hydrogen and biomass for liquid fuels—and then run—hydrogen as the fuel.”

In the meantime, Charles sees using the available low-temperature steam from existing

nuclear power plants to encourage an already accelerating ethanol market as a simple step in the right direction. The payback is a cheaper and mostly carbon-neutral energy source that offers an alternative to imported oil.

Increased ethanol production holds an added advantage for the farmer: More milk from contented cows.

In the ethanol process, the enzyme converts the sugars in the corn kernel's starchy cotyledon into alcohol. The embryo, on the other hand, remains in a protein-rich mash. These leftovers are an ideal livestock feed.

“For some reason, dairy cattle love the stuff,” Charles says

(Reprint from Oak Ridge National Laboratory Reporter, No. 87, April 2007)

Activities Calendar

Date	Time	Topic	Speaker	Location
22 May	5:30 PM	Center for Nanomaterial Science	TBD	Sagebrush Steakhouse & Saloon
8-10 June		Leadership Development Conference		Boston, MA, Courtyard Marriot Tremont Street
August	TBD	2008 Local Section Planning Meeting		TBD
4-9 November		AIChE 2007 Annual Meeting		Salt Lake City, UT

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!



"Success usually comes to those who are too busy to be looking for it."

*Henry David Thoreau
US Transcendentalist author
(1817 - 1862)*

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We're on the Web!

See us at:

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

About Our Organization – Career Tools Plus!™

As an AIChE member, you can sign up FREE for CareerToolsPLUS!™, where you will find jobs, online resources to help you build your resume, define your career stage and direction, make a career change, create a new business, and manage your success at every stage of your ChemE career.

The following are a few of the CareerToolsPlus! Options:

- **Find a Job** Resume-ready? Then get right to it on CTPLUS! homepage click "**My Tools/Search for Jobs**" and reach your target audience - you'll find the right job for you in the centralized job boards and directories, message boards and also using **LeadLink** to connect with thousands of job opportunities world-wide from corporate Web sites, Lee Hecht Harrison Job Market Consultants, and individual hiring managers.

Resume Reserve on the "My Tools/Search for Jobs" page to load your resume and your credentials where they are presented to tens of thousands of registered human resources professionals.

ResumeMaker

Go from homepage to "My Tools/Resume Resources" for this online resume and cover letter making tool that lets you create your resume in a variety of formats and styles, with a variety of sections for various needs.

• **Develop Your Career** For every stage of your career - entry, mid, and new again - The five step Career Lifecycle model guides you through career changes and challenges, including how to put your best foot forward in a new position, staying on top of your profession, handling and successfully making career changes, and developing a career plan. Includes a downloadable Career Development Plan.

Also, use the **Research Resources** from the CTPLUS! homepage: research industries, get corporate background and market profiles before you make your professional commitment! Find out about a local job market, use the library for job research and get help and advice for finding and using information to help you change careers, and much more.

And if this is in your plan, check out "**Your Own Business**" for over 60 pages of detailed advice and business plan creation guides for four types of businesses: Consulting, Franchising, Buying an existing business, or starting a business from scratch.

Students and young professionals, also, have access to AIChE's exclusive career and employment services, including CareerToolsPLUS! for job search advice and [CareerEngineer](#), AIChE's premier Chemical Engineer resume database.

(Excerpt from AIChE web site at: <http://www.aiche.org/CareersEducation/CareerDevelopment/CareerToolsPLUSaccess.aspx>)

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