Notes from the Chairman

Dear Friends:

This has been an exciting year for the Department of Chemical and Biomolecular Engineering. We continue to make progress toward our objective of being recognized as a preeminent Department in both research and teaching. We have a wonderful group of young faculty who have brought new vigor and new ideas to the Department. Our undergraduates continue to receive an excellent education, one that combines individualized teaching with the opportunity to participate in forefront research. Our strategic initiative to make Biomolecular Engineering an intrinsic part of our program is being realized with the implementation of new courses at the undergraduate level and a number of new and exciting research projects. At the graduate level, our students are being trained in forefront research areas through significant collaborations with the physical sciences and the life sciences.

In this edition of our newsletter, you will be introduced to two new members of our Department, Dr. Henry Ashbaugh (Hank) and Dr. John Prindle. Hank comes to us from Los Alamos and he brings a tremendous expertise in computation and simulation. He has already developed several collaborative projects with the other faculty. John who joined us from Albemarle Industries is a wonderful teacher having taught at Tulane on an adjunct basis a few years ago. He will be invaluable in our teaching of Process Control, Process Design and the Undergraduate Laboratories.

We have focused this newsletter on a major project that we are embarking on – the renovation of the Francis Taylor Laboratories. We have included a description of the renovation, and have now obtained a plan for the new building. Fundraising will start in full swing early next year with a kickoff event in Houston where many of our alumni reside. This is a project that will bring us much closer to our goal of achieving national recognition for our research and teaching. The renovated building will provide significant space for research laboratories and will include state-of-the-art teaching laboratory facilities. In particular, we will name the teaching laboratories in honor of Deans Ray Bailey and Sam Sullivan who dedicated their careers to the Department and the School. To stir the collective memories of your experiences at the Taylor Laboratory and the Practice School, we have also provided with this newsletter, a 1952 article about the early Practice School.

Inside This Issue:
- Faculty News
- 2004 Outstanding Researcher Award – Yunfeng Lu
- Materials Research Society Gold Award – Donghai Wang
- Alumni News - Early Practice School
- New Faculty Member – Henry S. Ashbaugh
- New Staff Member – John C. Prindle, Jr.
- Taylor Laboratory Renovation

We would love to hear more reminiscences directly from our alumni and will be glad to include them in future editions of our newsletter.

On behalf of our students, I will also express our heartfelt gratitude to those of you who have been so tremendously helpful in terms of helping our students secure internships and employment. Please continue to help us in this respect.

I wish you all the happiness of the season and the best wishes for the coming year. Please do keep in touch.

With very best regards,

Vijay John
Professor and Chair

Faculty News

Brian S. Mitchell was elected Second Vice Chair of the Materials Engineering and Science Division (MESD) of AIChE. In addition to coordinating MESD programming for the 2006 Annual Meeting in San Francisco, he will progress to the MESD Chair in 2006. In June, Brian presented a paper at the 7th International Conference on Nanostructured Materials in Weisbaden, Germany. He also gave an invited lecture at the University of Louisiana-Lafayette, presented two papers at the AIChE Annual Meeting in Austin, TX in November, and gave a Speaking of Science Presentation at Airline High School in Bossier City in October.

Vijay John, Brian Mitchell and Yunfeng Lu jointly received a $430,000 grant from the National Science Foundation for the acquisition of a Field Emission Scanning Electron Microscope. The instrument will be operated by Tulane’s Coordinated Instrumentation Facility, and will be invaluable to the Department's research on Nanotechnology.
Yunfeng Lu - 2004 Outstanding Researcher Award Recipient

Recognizing the need to honor deserving scholars and to increase the visibility of the school’s research activity, the Outstanding Researcher Award was established in 2001 by the faculty of the School of Engineering upon the recommendation of the School of Engineering Research and Graduate Studies Committee. The Award is given according to the following criteria:

- The quality and quantity of publications, with particular emphasis given to archival publications, research treatises and citations of published work.
- The total amount of research funding.
- The contributions to the mission of the university in graduate education, training and mentoring, including graduate students and post-doctoral scholars.
- National and international recognition as evidenced by honors and awards, journal editorships and participation in editorial boards, national and international scientific committees and boards, and professional patents.

Yunfeng Lu was the first recipient of the Presidential Early Career Development Award in 2003, which honors outstanding Tulane scientists and engineers who show exceptional potential in the early stages of their career.

Dr. Lu is an assistant professor of chemical and biomolecular engineering. He received his bachelor's degree from Jilin University (1991), masters from Chinese Academy of Sciences (1994) and Ph.D. from the University of New Mexico (1998). Since joining the faculty of engineering in January 2001, he has been awarded more than $1.5 million in research grants from external funding agencies.

The focus of Dr. Lu’s research is on nanotechnology and nanostructured materials. He has been instrumental in applying nanotechnology for the development of novel sensors. His discoveries are being used by National Laboratories (Sandia Laboratories) to make microdevice sensors for chemical and biological defense. Dr. Lu has also developed sensors for biological applications such as glucose sensing.

Dr. Lu has been honored by national and international organizations. In 2003, the Office of Naval Research selected him as one of its Young Investigators – the first ever for a Tulane faculty member. He was one of 30 young Chinese students working overseas to be honored and awarded significant grants by the Chinese National Natural Science Foundation. The National Science Foundation chose Dr. Lu to join a 12-member exchange delegation to Japan for the purpose of paving the road for future collaborations. The delegation consisted of young faculty members in all engineering disciplines whose work in nanotechnology shows extreme promise and distinction. The National Science Foundation also awarded Lu its CAREER award for faculty early career development. Dr. Lu has published over 40 journal articles (including five in the prestigious journal, Nature), one book chapter and has 17 patents and patents-applied-for.
Two Tulane University students, Thomas Farmer (left) and Gaston Beauclair, are among the six students attending the practice school at Destrehan arranged by Pan-Am and Tulane. Here the students gauge a tank.

CAT CRACKERS ARE THEIR CAMPUS

(See Page 14)
Cat Crackers Are Their Campus

Pan-Am's Destrehan Refinery has become a classroom laboratory for six Tulane University undergraduate students. Under a program arranged between Pan-Am and Tulane, outstanding students will have an opportunity to study some of the technical problems faced by refineries. Below is Sidney Cauvin of New Orleans.

Tulane, Pan-Am form practice

Fledgling chemical engineers began sprouting their first wings at Pan-Am's Destrehan Refinery this month.

These were six undergraduate students from Tulane University's chemical engineering department, who began a practice school program at the Destrehan Refinery.

The program has been arranged jointly by Pan-Am and Tulane and once more the Company is pioneering—this time by assisting one of the Nation's leading educational institutions in offering opportunity for the practical training of its students.
Under the guidance of Dr. M. M. Gilkerson, second from left, Tulane University undergraduate students this month began studying at Pan-Am’s Destrehan Refinery. Above, they consult a map of the refinery. From left are John Coleman and Jacob Fritz, both of New Orleans, and Harry Osment, a native of Birmingham, Ala.

school at Destrehan for undergraduates

The school is the first of its kind in the South for chemical engineers and is one of the first in the Nation. It will be offered as an option to outstanding students in Tulane’s chemical engineering department.

Under the program, students will spend the last half of their senior year in quarters specially provided for them by Pan-Am at the Refinery. They will work the regular hours of the Refinery—8:00 a.m. to 4:45 p.m., five days per week.

Under the supervision of Dr. M. M. Gilkerson, assistant professor of Chemical Engineering at Tulane and Howard A. Parker, Director of Pan-Am’s Technical Department, the students will be assigned original investigations of a developmental or technical nature.

The problems will not be routine, but will be problems actually confronted in the operation of Destrehan’s Refinery. Members of Pan-Am’s technical department will cooperate with them by making available material to work toward a solution of the problem at hand.

The students will be closely supervised, however, and will not be permitted to interfere with the operation of the refinery or interrupt Southerners in their work. When students do wish to confer with particular workers they will first confer with Dr. Gilkerson and Mr. Parker. Only after a conference between Mr. Parker and the particular operator will the student be permitted to confer with the operator.

Roy J. Diwoky, Pan-Am’s Executive Vice-President who announced the program jointly with President Rufus C. Harris of Tulane, said, “Progressive industries recognize the importance of cooperating with and working with educational institutions in improving their educational opportunities.”

“When the Destrehan expansion program is completed it will offer
outstanding, modern-type, commercial-sized operation facilities to study,” he said, “a full-scale industrial laboratory in place of limited small-scale classroom equipment.”

Mr. Diwoky said that students would also have an opportunity to meet and discuss typical refinery problems with Southerners whose invaluable and irreplaceable experience over the years can enlighten students on the practical side of refining—which in many instances has disproved theoretical instruction.

From Pan-Am’s standpoint, Mr. Diwoky said that the students through their work on specific problems, will undoubtedly uncover information that will be of considerable assistance in the operations at Destrehan.

Six students began the first school during February. However, Pan-Am and Tulane are looking toward an expansion of the program in the future, when from 15 to 20 students may be in attendance.

These are the men responsible for arranging the practice school, first of its kind in the South. From left are Dr. Francis M. Taylor, Tulane Professor of Chemical Engineering; Howard A. Parker, Director of Pan-Am’s Technical Department; Richard T. Colquette, Vice-President of Pan-Am; Dr. Raymond V. Bailey, Professor and Head of the School of Chemical Engineering; Roy J. Diwoky, Executive Vice-President of Pan-Am; Henry Heiss, Destrehan Refinery Director; Dr. Lee Johnson, Dean of Tulane’s College of Engineering; and Dr. M. M. Gilkerson, Assistant Professor of Chemical Engineering at Tulane and Supervisor of the School. The school officially opened in February.
New Faculty Member Profile - Henry S. Ashbaugh (Hank)

The most recent addition to the faculty of Chemical and Biomolecular Engineering is Dr. Henry (Hank) S. Ashbaugh, arriving in July 2004. Hank received his Ph.D. in Chemical Engineering from the University of Delaware in 1998 under the auspices of professors Michael E. Paulaitis and Eric W. Kaler. His dissertation, entitled “The Hydration of Amphiphilc Solutes: A Theoretical and Modeling Perspective,” generated seven first author papers. This work was performed under the prestigious National Science Foundation and Dupont Fellowships. After completing his dissertation, Hank accepted post-doctoral positions at Lund University in Sweden, characterizing surfactant-polyelectrolyte gels, with Prof. Bjorn Lindman and Princeton University, working on the recovery of waxy crude oils from deep sea reservoirs, with Prof. Robert Prud’homme. Before coming to Tulane, Hank spent three years at Los Alamos National Laboratory in New Mexico as a Director’s Fellow collaborating with Drs. Lawrence Pratt and Chris Jarzynski on modeling the aqueous driving forces for molecular self-assembly.

The overall theme of Hank’s research at Tulane is the application of thermodynamic theory to condensed phases. Specific research interests include the multi-scale simulation and theory of self-assembly and hierarchical organization in complex fluids including surfactant solutions, polymer melts and solutions, and biopolymer gels and networks to advance self-assembly as a labile tool for building tailored nanostructured materials.

Hank actively participates in the American Institute of Chemical Engineers at the national level working on session organization, and at the local level acting as the advisor for the undergraduate student chapter. In the spring 2005 semester Hank is teaching a class in statistical thermodynamics with an eye on applications which compliment the departmental strengths in colloid and biomolecular sciences.

Building Bridges from the Microscopic to Macroscopic World

The folding of proteins and spontaneous assembly of intracellular components provides an existence proof of a viable nanotechnology. Making nanotechnology practical, however, is a key research challenge. Self-assembly is clearly an essential tool to realize practical and economical nanoscale structures. One of the primary challenges in modeling self-assembly is the multiple length and time scales involved, from those associated with electronic degrees of freedom and molecular motions, to aggregate formation and shape fluctuations, to the macroscopic continuum/hydrodynamic response. Research in Professor Ashbaugh’s lab uses the tools of statistical mechanics and large-scale computer simulations to study surfactant organization, polymer and biopolymer assembly, and structure-function relationships with the overall objective of advancing self-assembly as the primary tool for building tailored nanostructured materials.

The aqueous milieu in which supramolecular assembly takes place invariably plays an intimate role in organization and function – water is an active and essential participant. Surfactant aggregation and protein folding are governed by a delicate balance of hydrophobic and hydrophilic interactions. Phenomenological descriptions of these forces often defer to the persistence of tetrahedral ice-like structures in liquid water. Experimental conformation of this picture, however, is tenuous due to the difficulty of probing these fleeting aqueous structures and the subjective nature of what constitutes “ice-like.” As part of our interest in understanding self-assembly phenomena from a molecular perspective, we are performing multi-scale simulations that probe the boundary between molecular representations of water and macroscopic mean-field/continuum descriptions of hydration, for which molecular details are averaged to simplify and, in most cases, permit computations at the length scales at which assembly occurs. This research provides a theoretically sound framework for mesoscale simulations and tests molecularly founded approximations for predicting supramolecular structure and phase behavior.

New Staff Member Profile – John C. Prindle, Jr.

Before joining the Department, Dr. John Prindle was technical advisor and director of Albemarle Corporation’s Chemical Engineering Fundamentals Laboratory. John joined Ethyl Corporation in 1989 and remained with Albemarle during its spin-off from Ethyl in 1994. His 15 years of industrial experience span a broad range of topics including fundamental research, product development, process design, and process safety. Through his techniques for solving industrial problems, John made significant contributions to many of Albemarle’s processes. These contributions resulted in his receiving several patents, corporate technical achievement awards, and corporate research grants.

John received B.S. degrees in both chemical engineering and mathematics from Texas Tech University and a Ph.D. in chemical engineering from the University of Wisconsin. He is also a licensed professional engineer in the state of Louisiana. He will be teaching the Process Control course during the spring semester; a course he taught in the department as an Adjunct Associate Professor four years ago. His primary research interests include Process Design, Process Dynamics, and Process Control.
**Taylor Lab Renovation**

The renovation of the Taylor Laboratory is a joint project between the Department of Chemical and Biomolecular Engineering and the Department of Chemistry. The effort signifies the mutual support that both departments extend to each other in their ambition to become pre-eminent teaching and research departments in the Chemical Sciences and Engineering.

The objective of the renovation is to realize three floors of teaching and research laboratories. This $5 million project will provide Tulane’s students in the Chemical Sciences and Engineering with the hands-on experience and guidance to become highly competent professionals. The renovated laboratory will house state-of-the-art teaching equipment and highly sophisticated facilities in forefront research areas.

There are several naming opportunities available for each of the teaching and research facilities within the Taylor Laboratory. Individual contributions will help ensure that the coming generation of students will be recognized throughout the country as among the most advanced and effective professionals in fields as distinct as biotechnology, petroleum refining, semiconductor fabrication, pharmaceutical production, and polymer engineering. Formal fundraising for the project will begin in Spring 2005.

Department of Chemical and Biomolecular Engineering
New Orleans, LA 70118