

International Activity Now Key to Chem E Success

For Chemical Engineering as a discipline, whether in research or business, international activity is essential to success. The Clemson Chem E faculty and students find it imperative to travel to other countries to interact with researchers who are working in the same field.

Traveling to other countries to work in a laboratory or industrial setting provides opportunity for sharing the latest results as well as techniques. Professional meetings are an excellent way to develop collaborations with other scholars. Having our faculty and students organize sessions, present papers or otherwise participate in international meetings is a great way to increase the department's visibility. It's an excellent graduate student recruitment tool, as well."



Any concerns for Americans traveling abroad have not deterred Clemson's Chem E faculty from taking advantage of international opportunities. Over the past year, a number of faculty and students have visited other countries for professional reasons. Their activities are detailed on inside pages.

Chem E alumni also are part of the international community. In addition to those international students who attended Clemson and remained in the United States, there are numerous Chem E alums living and working in other countries.

We are very interested in hearing from alumni who have traveled to other parts of the world in connection with their business or who are living outside the United States. There may be ways we can learn from each other about our experiences, or provide professional or social introductions. By sharing information about our international experiences, we learn more and become more competitive.

Note: Please email news about your international experiences to che@clemson.edu.

Harcum was ACS Biochemical Technology Division Chair

Associate Professor Sarah W. Harcum served as Program Chair for the Biochemical Technology Division at the 224th National Meeting of the American Chemical Society in Boston. BIOT had more than 200 paper presentations and more than 100 poster presentations at the meeting.

"This was a particularly exciting conference," Harcum said. "The future of biochemical engineering was addressed by leaders in the field to a standing room only audience. Award lectures were given on the latest developments in quantitative biological systems, biosensor developments, and bioseparation economics.

PhD x 7 = Record Tie

The term "Empty-Nest Syndrome" usually refers to parents whose children have left home. But for the Chem E department, it means that seven of our Ph.D. students graduated this year, tying the record set by the class of 1994.



Four of the students came to Clemson with Department Chair Jim Goodwin. Two of them, Bunjerd Jongsomjit and Kandis Sudsakorn, received their degrees in May from the University of Pittsburgh. However, they are still very much a part of the Clemson family after spending more than two years here in Dr. Goodwin's research group. Another member of his group, Joongjai Panpranot, was awarded her Clemson Ph.D. at August graduation; and Sonia Hammache will graduate from Clemson in December.

Shilpa Sankhe, a member of Professor Doug Hirt's research group, received her degree in May, and Aaron Forster, from Professor Michael Kilbey's group, graduated in August. Anthony Cato, a student of Dr. Dan Edie's will graduate in December.

Dr. Anthony Cato is employed by Fluor Corp. in Greenville, SC.

Dr. Aaron Forster is a post-doctoral research associate at the National Institute of Standards and Technology in Gaithersburg, MD.

Dr. Sonia Hammache is a post-doctoral research associate at Sandia National Laboratory in California.

Dr. Bunjerd Jongsomjit and **Dr. Joongjai Panpranot** are lecturers in Chemical Engineering at Chulalongkorn University in Thailand.

Dr. Kandis Sudsakorn is a lecturer in Chemical Engineering at Kasetsart University in Thailand.

Dr. Shilpa Sankhe, as noted in our last issue, is a product development engineer with American Profol, Inc., in Cedar Rapids, Iowa.

All our graduates become ambassadors for the quality of our program. Sending seven new Ph.D.s into the profession is an excellent way to spread the word about Clemson Chemical Engineering, especially since three are now faculty members at major international universities.

A NOTE FROM THE CHAIR

When I left Clemson in 1967, it was a vastly different place from what it is now, and in more ways than the physical changes that have taken place. At that time, there were very few international (we called them “foreign”) students, very few Clemson students had traveled or lived internationally (except for those whose families were connected with the U.S. armed forces), and English -- make that *Southern* English -- was not only the major language but, I think it’s safe to say, essentially the only language spoken by all but a very few students and faculty.

Even then, however, changes were under way. The first television generation was learning more about the ever-smaller world from the evening news; the newly created Peace Corps offered a new way for America’s youth, including me, to gain international experience while serving their country; and of course the Beatles and other international music groups awakened more interest in the world beyond our borders. The Cold War and the war in Vietnam called even greater attention to international affairs, and it became imperative that we try to understand the rest of the world.

I grew up in the small town of Walterboro, SC, then attended Clemson and Georgia Tech. Having spent literally all my life in basically one spot on the globe, I was ready to explore the world. I spent a number of years living abroad, first as a Peace Corps volunteer in Turkey and Liberia before returning to the U.S. to do my Ph.D. work at the University of Michigan. Later I lived in France, spent time in China and traveled extensively. My international experience broadened not only my personal horizons but also my understanding of the Chemical Engineering profession, the different views of education at all levels in different countries and, perhaps most importantly, a firsthand understanding of our culture in the broader context of the intranational community.

Now, of course, Clemson has a very strong international focus that serves students, faculty, alumni and all our constituents very well. The campus is marked by cultural diversity, which we go to some lengths to explore and to celebrate through formal events as well as informal friendships and exchanges. The university goal of having all students participate in some kind of international experience is essential in making our graduates fully competitive in the marketplace. Today business is international. Almost all companies, even those that are based solely in the United States, are involved in some sort of international activity. It is our great responsibility -- and our pleasure -- to encourage our Chemical Engineering students in this important aspect of a full education. International experience may be difficult to fit into the curriculum; it may be expensive; it may be challenging. But it is absolutely essential to our students’ education. Please let me hear from you if you have any suggestions about how to strengthen our department’s international component.



International Faculty Activity

Associate Professor S. Michael Kilbey II spent three months at the Institute for Microsystem Technology at the University of Freiburg, Germany, as the guest of Professor Jurgen Ruhe, Chair for Chemistry and Physics of Interfaces. His time was spent learning new chemical techniques for modifying interfaces with tethered layers of polymers and new experimental techniques for probing the molecular-level structure of the layers. “This time spent abroad opens a new direction in my group’s research, which broadly deals with modifying surfaces with polymers, and fosters an international collaboration,” Kilbey said.



Assistant Professor Scott M. Husson traveled to Berlin, Germany, Oct. 1-4, to participate in the ASEE/SEFI/TUB International Colloquium, “Global Changes in Engineering Education.” Professor Husson pre-



sented results of the department’s NSF-supported work on integration and assessment of teaching and learning strategies based on cognitive growth studies. **Associate Dean of Engineering and Professor of Chemical Engineering Steve Melsheimer** chaired a session of the Colloquium on “Educating Engineering Students in Entrepreneurship.”



Professor Amod Ogale presented an invited lecture on “Radiation Stabilization of Melt-Processed Polyacrylonitrile-based Carbon Fibers at the International Seminar on Advanced Applications for Carbon Materials in South Korea. Following that meeting, he and **Professor Dan Edie** attended the International Carbon Conference in Beijing, China, where Ogale presented a paper on “Nanotube Reinforced



Mesophase Pitch-based Carbon Fibers.” Professor Ogale also presented a paper on “Online Measurements of Microstructure in Blown Film Extrusion of a Linear Low-Density Polyethylene” at the Polymer Processing Society meeting in Portugal.

Professor Mark Thies was part of a select group of 10 U.S. scientists who were invited to lecture at Equifase 2002, the sixth Iberoamerican Conference on Phase Equilibria for Process Design in Foz do Iguacu (Brazil), Oct. 12-16. The trip was sponsored by the National Science Foundation for the purpose of encouraging research collaboration between U.S. and Latin American scientists. Dr. Thies discussed “Mixtures of Petroleum Macromolecules: Their Fractionation, Characterization, and Phase Behavior.”



“It was a pleasure to participate,” Thies said, “and also a wonderful opportunity to interact with colleagues from all over Latin America.”

Faculty

Charles H. Barron, Jr., D.Sc.
Polymer Reaction Engineering

David A. Bruce, Ph.D.
Catalysis, Kinetics, Molecular Sieve Synthesis,
and Molecular Modeling

Dan D. Edie, Ph.D.
Director, Center for Advanced Engineering Fibers
& Films
Composite Materials, High-performance Fibers,
Polymer Processing & Rheology

Charles H. Gooding, Ph.D.
Membrane Separation Processes

James G. Goodwin, Ph.D.
Department Chair
Heterogeneous Catalysis, Kinetic Analysis of
Surface Reactions, Characterization of Catalysts

Sarah W. Harcum, Ph.D.
Biochemical Engineering; Protein Production

Graham M. Harrison, Ph.D.
Fluid Mechanics & Non-Newtonian Flow

Douglas E. Hirt, Ph.D.
Polymer Films

Scott M. Husson, Ph.D.
Bioseparations and Separation Materials Synthesis

S. Michael Kilbey, Ph.D.
Polymer Science; Surface Modification via Self-
Assembly

Stephen S. Melsheimer, Ph.D.
Associate Dean, Engineering & Science
Automatic Control of Process Systems

Andrew T. Metters, Ph.D.
Bioengineering; Polymer Science

Amod A. Ogale, Ph.D.
Experimental & Modeling Issues Related to Fibers,
Films & Composites

Richard W. Rice, Ph.D.
Catalysis, Kinetics, & Chemical Reactors

Mark C. Thies, Ph.D.
Thermodynamic and Supercritical Fluids

Faculty Facts**Sarah W. Harcum, Ph.D.**

Professor Sarah Harcum's description of her cross-country move from New Mexico to Clemson this summer brings to mind the pioneer wagon trains of an earlier age. Harcum didn't just move her family, which consists of a husband and three children ranging in age from 2 to 11. In addition, she brought along her five doctoral students, who are now Clemson students.

"There were 11 of us. We came in two caravans," Harcum said. "In addition to the cars, we had a huge moving van following us and a U-Haul trailer."

In a sense Harcum is a pioneer. Her research area, biochemical engineering with emphasis on protein engineering, represents a whole new direction for the Clemson Chem E department, one she is eager to explore.

"I liked this department, especially the strength of research across the whole department, and I am especially excited about Clemson's collaborative environment. My lab is in the new Biosystems Research Complex, which houses people from chemistry, biological science, genetics, biochemistry and, of course, chemical engineering. The shared space and equipment provide interesting opportunities for cross-discipline collaborations to develop."

Harcum started out thinking she wanted to study medicine but became interested in biochemical engineering as an undergraduate at the University of Michigan where she received a B.S. in engineering science. She earned the M.S. in Chemical Engineering from Colorado State, where she worked on protein folding of a recombinant protein. After marriage, her husband's career took them to metropolitan Washington, DC. Harcum, who had begun her Ph.D. work at the University of Michigan, entered the doctoral program at the University of Maryland, where she worked on stress responses in *E. coli*. She also worked on a family: daughter Erica was born while Harcum was a student; and the day after she turned in the last of the paperwork for the Ph.D., son Emmett was born.

Prior to accepting a faculty position at New Mexico State University, Harcum worked for the Food and Drug Administration's Center for Biologics Evaluation and Research, Division of Monoclonal Antibodies. In New Mexico, she restarted her work on *E. coli* and started looking at protein glycosylation due to some drug applications she had seen at FDA that showed bioprocess conditions affect glycosylation and glycosylation affects efficacy. Because of New Mexico's environmental problems with acid mine drainage sites, Harcum also did some work in bioremediation.

As for that other area in which Harcum is a pioneer (as the first female Chem E faculty member at Clemson), she notes that the department just graduated three female Ph.D. students, and the department's undergraduate population is approximately 30 percent female. More women are entering the profession at the Ph.D. level nationally, so it's just a matter of time before gender becomes a non-issue for Chem E.

In the next issue we will highlight Assistant Professor Andrew T. Metters, our other new faculty member. Look for more faculty profiles in upcoming issues.

FACULTY FACTOIDS*

Professor Mark Thies speaks German fluently.

*Little-known tidbits of TOTALLY USELESS information about the Chem E faculty.

Please note: Dow Chemical Professor of Chemical Engineering Dan Edie is not retiring, as a misplaced headline may have indicated in the last issue. Dr. Edie continues to be a vital part of the Center for Advanced Engineering Fibers and Films and this department.

AIChE News

Party Time

The Clemson student chapter of AIChE has gotten the academic year off to a celebratory start, with a whirl of social, academic and job-search-related activities. The Welcome Back barbecue, Professor Melsheimer's Louisiana Shrimp Boil, and the Homecoming reception for Chem E alumni are always popular events with faculty and staff as well as students.

We appreciate the support provided by corporate sponsors. Dow Chemical sponsored a pizza reception during the annual career fair, and BASF sponsored the Shrimp Boil.

The group's only fundraiser of the year was selling raffle tickets for the opportunity to win a football signed by Coach Tommy Bowden, with the winner announced at Tigerama.

Could This Be A Trend?

For the second time in the history of the department, all the officers of the student AIChE chapter are women. Rebecca Presley is president; Betsy Beach, vice president; Jean Bryan, secretary; and Azi Samadi, treasurer.

"The department's undergraduate student body is approximately 30 percent female now," said Associate Professor David Bruce. "Women students are equally as competitive and productive as male students in all areas, including leadership."



Presley



Beach



Bryan



Samadi

International Student Activity

Graduate student Jared Tatum spent two months this summer conducting research at Cranfield University (the Royal Military College of Science) in Great Britain as part of a collaboration between **Assistant Professor Graham Harrison** and Professor Nick Lawson, who teaches in the department of aerospace and power systems at Cranfield. The two-part research project involves pulse-image velocimetry (PIV) and rheology. Jared worked on the PIV research, and the rheology work will be done here at Clemson by an undergraduate student under Professor Harrison's direction.



Ten ChE undergraduate students spent their summer taking a Unit Operations Lab at the Technical University of Vienna, in a program coordinated by Chem E Professor and Associate Dean of Engineering Steve Melsheimer.

In addition to gaining invaluable international experience, the students received academic credit for their work.

Graduate Students Present Papers at ACS Meeting

Associate Professor Sarah Harcum's graduate students presented papers in August at the Fall American Chemical Society (ACS) meeting in Boston.

Topics were, "Study of Protein Splicing and Intein-mediated Protein Purification in High-Cell-Density Recombinant *Escherichia coli* fermentation," Sharma, S., Chong, S., Harcum S.W., Wang, H.Y., Zhang, A.H.; "Comparison of Glycosylation Gene Levels in CHO Perfusion and Batch Cultures," Clark, K.J.R., Harcum, S.W.; and "Construction and Utilization of a DNA Microarray for CHO Cells," Chen, P.F., Harcum, S.W. Student presenters were **Shamik Sharma**, **Kevin Clark**, and **Peifeng Chen**.



Sharma



Clark



Chen



The group shown above enjoying a Viennese dinner includes (l-r) **Audrey Lytle**, **Lindsay Sims**, **David Lipscomb**, **Jason Vitali**, **Allison Derrick**, **Leo Gumapas**, University of Vienna teaching assistant **Elena Susai**, **Laura Phipps** and **John Clements**. Absent from the photo are **Betsy Beach** and **Adam King**.

Bookmark our website: www.ces.clemson.edu/chemeng

Chem E Family Album



AICHE football raffle at Tigerama



August B.S. grad Morgan Woodward and friend Krista Albright



Tigerama!



Prof. David Bruce (l) with Jeff Allara '00 and guests at the Homecoming drop-in



The 2002 ChE Professional Advisory Board: (L-R) Billy Williams; John Monnier; Kim Bowers B.S. '85, M.S. '87 (IM); Mike Connelly '86; Prof. Umit Ozkan; Mike Apperson '86; Morgan Stokely B.S. '72, M.S. '78; Prof. Jim Goodwin '67. Not pictured: Dean Gerald Holder



Julie Dubnansky '01 (c), with students from Senior Seminar.



Prof. Dan Edie (l) and Prof. Amod Ogale in Beijing, China



Dr. Ed Conner '67 (l), with his former classmate, Prof. Jim Goodwin



BASF graciously sponsored the ever-popular Shrimp Boil.



Graduate students enjoying the view (!) at Raven Cliff Falls in the SC mountains



Prof. Doug Hirt (c) and members of his research group



Beside the Danube: Clemson ChE students who attended the Technical University of Vienna.

Alumni Brief Seniors on Opportunities in Chem E Profession

The 57 students in the Senior Seminar this semester have gotten an education in reality from alumni in various aspects of the Chem E profession. Speakers ranging from entry-level recent graduates to a neonatologist have given students the benefit of their experiences and answered questions about what to expect in the job search process and after employment.

- Megan Najar who graduated in May, joined Ricky Coats, B.S. '86, M.S. '90, for a presentation about their company, Albemarle. They also hosted a luncheon for seniors afterwards.
- Ricky returned a few weeks later for a solo session that provided some serious observations about interviewing and career decisions.
- Julie Dubnansky '01 of ExxonMobil traveled from Houston, TX, to brief the senior seminar students on the realities of the work world and the challenges of financial independence.
- Dr. Ed Conner '67, a neonatologist in Macon, GA, spoke to the seminar students about his career path from an undergraduate Chem E degree to medical school and brought the class up to date on new opportunities for Chem E students in medicine.
- Attorney Tim Williams of the Dority Manning law firm in Greenville, SC, spoke to the students about opportunities in law.

We welcome visits from all alumni interested in sharing information about their professions with our students. Please give us a call at 864-655-2055 if you are interested in speaking.

Congratulations to our newest Ph.D. graduates!



Dr. Aaron Forster and his advisor, Associate Professor Michael Kilbey.



L-R: Dr. Bunjerd Jongsomjit, Dr. Kandis Sudsakorn, and Dr. Sonia Hammache, all are students of Professor Jim Goodwin.



Dr. Anthony Cato is Professor Dan Edie's student.



Dr. Joongjai Panpranot and her advisor, Prof. Jim Goodwin.

CU Chem E Doubly Represented at Brazil Conference

Clemson can claim two of only 10 U.S. scientists invited to speak at Equifase 2002 in Brazil. In addition to Professor Mark Thies of our faculty, Rice University Professor of Chemical Engineering Walter G. Chapman, B.S. '83, also presented a lecture.

Visiting Alumni Welcomed by AIChE

Despite the challenge of not knowing what time the Homecoming game would start in time to notify alumni of our plans, once again Earle Hall was the scene of a get-together for current students, faculty and alumni. The annual event, hosted by the AIChE student chapter, is a tradition that many appreciate, but it is not always convenient for out-of-town alums who have other social (i.e. tailgating) commitments. That's why we want you to know you have an open invitation to visit the department whenever you can. If you are in the area, please stop by anytime and join us for coffee or even lunch. No advance notice is necessary, although if we know you are coming, we can make sure you have a parking pass!

Alumni Association Strengthens Ties with Seniors

Debbie DuBose, associate vice president for alumni affairs and executive director of the Clemson Alumni Association, met with the Senior Seminar to remind our soon-to-be graduates of the importance of the Clemson connection, not only for returning to campus for social activities and football games or other events, but for professional and personal growth.

"The Clemson Alumni Association offers graduates many services; and through the Student Alumni Association, we also offer services to students," DuBose said. "I was pleased to have the opportunity to let this class know what's available to them now as well as after they graduate."

The presentation was the brain child of Chem E senior Amber Myers, who is also president of the Student Alumni Association.

"Since the senior seminar is devoted to issues that seniors will face after graduation, it seemed a good idea to let everyone know about the Alumni Association and encourage our graduates to stay involved with Clemson," she said.



Honor Roll of Donors 2002

We would like to express our gratitude to all whose support helps us to continue to improve the department. During the period from Nov. 1, 2001-Oct. 31, 2002, a total of 221 individuals and corporations made contributions to the department. We are deeply grateful for their generosity.

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A Final Note



Clemson is always spectacular in the fall, and studying (or just relaxing) in the amphitheater is still a favorite tradition this time of year.

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