



DEPARTMENT OF CHEMICAL AND BIOMOLECULAR ENGINEERING

SPRING 2010

DEPARTMENT NEWSLETTER

Welcome to the Spring 2010 issue of the Department of Chemical and Biomolecular Engineering Newsletter. It is with great pleasure to introduce in this issue the new faculty who recently joined our department as well as some of the recent activities, accomplishments, and news. Join us in learning more about our alumni and the events of our student organizations, and enjoy the latest publications patents, and grants as part of the continued excellence in research and teaching of the Department.



Former Department Chair's Birthday to be Celebrated

Dr. Robert (Bob) W. Roberts will be the honored guest at a Birthday Party on July 24, 2010 at The University of Akron, with a reception at 11 a.m. followed by a noon lunch. Alumni, friends and colleagues will gather to celebrate Bob's many years of contribution to the development of the Chemical Engineering Department at The University of Akron.

Telephone calls and e-mails have been sent to all alumni for which we have contact information. If you were not contacted, please let us know if you would like to receive more information about this event or would like to be placed on the invitation list.

We look forward to getting reacquainted with you or meeting you for the first time. If you are unable to attend but desire to send a note or card, let us know as we will be collecting these greetings. Send inquiries to: Marcia Main, main1@uakron.edu or call 330-972-7341.

Departmental News

- The Department will be conducting a search for three additional faculty members to continue development of the department's Corrosion program. It is hoped these positions will be filled by Fall Semester 2010.
- The next Departmental Advisory Board meeting will be held on April 12, 2010.

2009 Donald F. Othmer

Sophomore Academic Excellence Award Winner



Emma Hallett, a junior undergraduate student, was the recipient of the 2009 Donald F. Othmer Sophomore Academic Excellence Award for The University of Akron.

This award is given to the student who has maintained the highest scholastic standing of any member of the AIChE student chapter during their freshman and sophomore years. Her achievement was recognized at AIChE's November 2009 National Student Conference in Nashville, Tennessee.

Departmental Advisory Board Members

Mr. Chris Arrick, Caterpillar, Inc
Mr. Charles A. Clerecuzio, AMEC Inc.
Mr. Roger Cox, The Goodyear Tire & Rubber Company
Dr. Burtron H. Davis, University of Kentucky
Mr. Tom Flynn, The Babcock & Wilcox Company
Mr. Robert Handelman, Chemstress Consultant Company
Mr. Karl Jacob (Chair), The Dow Chemical Company
Dr. Jeffrey S. Kanel, Renewable Algae Energy, LLC
Dr. Brian Kocher, Promerus LLC
Dr. Jacki Laurich, OMNOVA
Dr. Tim Mallow, Merck & Co., Inc
Mr. Oscar Mascarenhas, Next Generation Films, Inc.
Dr. W. Leigh Short, Alternative Environment Strategies, LLC
Mr. Dan Spak, Firestone High School

Department Seminars held in Spring Semester 2010

- On Thursday, February 18, 2010 Dr. Stephen Z. Cheng, Dean, Robert C. Musson Trustees Professor, College of Polymer Science and Polymer Engineering, The University of Akron presented "Utilizing polymer self-assembly to form ordered molecular nanoparticle structures."
- On Thursday, March 4, 2010 Dr. Xuanhong Cheng, Bioengineering/Materials Science and Engineering, Lehigh University presented a seminar on "Microfluidic Devices for Point of Care AIDS Diagnostics."
- On Tuesday, March 9, 2010 Alauddin A. Alauddin, Supervisor, Engineering Section, Ohio-EPA presented "The Year of the Stimulus," An inside look at ARRA and its impact on Ohio's Wastewater Infrastructure.
- On Thursday, March 11, 2010 Joseph W. Bozzelli, Professor of Chemistry and Chemical Engineering, New Jersey Institute of Technology presented "Thermochemistry and kinetics of hydroxyl ethyl and propyl radicals with O₂: reactions in combustion and atmospheric chemistry."

Alumni News

Dr. Jacki Laurich has been appointed by the department to sit on the Chemical Engineering Advisory Board. She received her B.S. in Chemical Engineering from the University of Pittsburgh and her Master and PhD in Chemical Engineering from The University of Akron. After graduation she worked in research and development at Goodyear Chemicals for eight years.

Laurich then moved to OMNOVA Solutions in Fairlawn, OH and held a wide variety of positions. She hired into the OMNOVA pilot plant and worked in latex scaleup. She later accepted a job in marketing, which evolved into New Product Development and became the New Product Development Manager for OMNOVA's paper business unit.

Laurich took on additional responsibilities of managing new process and product development scaleup for OMNOVA's Performance Chemicals Division and began managing the Pilot Plant. Her current role is Director of Technology for Performance Chemicals.



David J. Dougherty, Jr. received his Master of Science degree in Chemical Engineering from The University of Akron in 1967. In a recent telephone conversation, he shared some memories of those days as a student and some insight to his life today.

Marital Status: Married with two small children when pursuing his degree. Today, he and his wife Donna enjoy their family of eight children – Michael, Kristine, Theresa, Suzanne, Anne, Mary, Ruth and Angela.

Popular Place: Trecaso's Restaurant was a hot spot at the edge of campus. Later, one daughter worked at this local restaurant.

Instructor: Dr. Howard L. (Lou) Green was recalled as good instructor who taught unit operations and reactions kinetics. Dougherty did not understand reactions kinetics when an undergrad at Case, but found it interesting here.

Challenging Class: This would be a math class required to be taken at the graduate level through the math department. The class was not only hard but out of a class of around 52 students, 28 dropped out and retook it the following semester. It was hard to compete with math majors.

Football: Dougherty remembers attending some football games and seeing one classmate, Gerard Neugebauer, disguised as the mascot, Zippy.

Secret of M.S. Degree: Apparently when joining the masters program, there was a joke involving the Auburn Science & Engineering Center. If someone took you up to the top level of one tower, by the time you worked your way down through the other tower, you would have enough credits for a degree.

Closing Remarks: Dougherty has spent his entire working career with Firestone Polymers. Within a year after receiving his advanced degree he was made the manager of the Polymer Pilot Plant. "My education paid off well," Dougherty said.



Mr. Frank Pelc has worked in the Chemical Engineering department for 29 years and holds the title of Senior Engineering Technician. He has a Technical Education degree from the University of Akron and an Electrical Engineering Associate degree from DeVry University, Chicago. In 1994 and again in 2008, Frank received the College of Engineering Outstanding Staff Award.

Pelc's primary work with graduate students is on the fabrication of their research projects. When it comes to undergrads, he makes sure the lab experiments are set up and running properly.

A quick look at Pelc's workshop in WHI08 reveals his many interests. This includes hunting, fishing and playing wallyball with graduate, faculty and staff members. For a big rush of excitement, Pelc has driven a NASCAR at the Pocono Raceway in Pennsylvania achieving a speed of 170 m.p.h. , and gone skydiving with graduate students that included jumping out of the plane at 10,000 ft. and free falling for 30 seconds before deploying his chute at 4,500 ft.

Students Organizations

Chem-E-Car Team

At the 2009 National Chem-E-Car Competition in Nashville, Tennessee the UA Chem-E-Car Team placed 5th in the performance competition, stopping only 16.75 inches away from the 77 foot finish line while carrying a specified load of 250ml of water. This marks Akron's second consecutive year placing in the top five nationally after last year's 4th place finish.

The UA Chem-E-Car team also won 1st place in the poster competition, successfully defending last year's poster championship. The vehicle was controlled through a reliable chemiluminescent (light producing) reaction and powered by an Alkaline fuel cell. Last years success would have been difficult to achieve if not for the tremendous support from our newly acquired corporate sponsors: BP America, Inc. and Sunstone Circuits. Recently, the UA Chem-E-Car Team is preparing for the 2010 Regional Competition at Ohio University on April 10, 2010.

Our new project will utilize hand crafted Aluminum-Air batteries and high resolution velocity regulation to stop on the finish line. We hope that you will come and support us in our next race as we compete against the top universities.

Current members of the team include: Marcus Grimm (Captain), James Kirkwood (Electrical Team Manager), Paul Young (Design Team Manager), Bradford Vielhaber (Power Source Team Manager), Chris Denison (Stopping Mechanism Manager), Andy Janish (Webmaster), Phil Stuhldreher, Kyle Hamblin, Xin He, Cory Sauer, Collin Szeles, Michael Williams, Stacey Wise, Phillip Schuld, Todd Simmering, and Evan Kostalek.



AIChE

Early this spring, a dozen students joined the professional chapter members for a seminar featuring Hazard Control Technology, Inc. Their presentation highlighted the importance of fire safety and new methods of fire suppression. The chapter also featured the ChemE Car team at the E-Week events and current president Maureen Cheung was recognized for her services and commitment to Akron's AIChE Chapter.

Later this spring, the professional chapter has invited the students to attend a plant tour of PPG Industries. On April 20th, the chapter looks forward to welcoming Ross Beebe, Technical Fellow of the Lubrizol Corporation, for a technical talk and Q&A session. Additionally, the chapter is looking forward to co-hosting the annual Alumni night and Senior Banquet.



From Left to Right: Logan Mellert, Maureen Cheung, Cory Simon, and Amanda Aikens

Spring Career Fair



Students put on their finest attire to attend the College of Engineering's Career Fair on Thursday, March 25, 2010. Seniors planning to graduate in May include (from above left to right): Eric Coffman, Phil Stuhldreher, Alex Niemiec, Amanda Aikens, Lindsey Ondo, Ross Taylor.

New Graduate Student Organization

The new chemical engineering graduate student organization (currently in the approval process) will be called The CBE GG (The Chemical and Biomolecular Engineering Graduate Group).

This new group will represent the interests of the chemical engineering graduate students, work to build an enhanced network of contacts through industry and alumni, and create a stronger relationship between students and students and faculty.

These goals will be accomplished by providing a common platform to exchange ideas and knowledge between both members and non-members. Such collaboration may take the form of social events, research competitions, and student sponsored workshops to exchange laboratory methods and skill-sets.

ISPE

The student chapter of the International Society for Pharmaceutical Engineering (ISPE) is currently working on a new shared research experience program meant to build a strong network of graduate students sharing their ideas and experiences in a diverse fashion.

Student Awards

These Chemical and Biomolecular students were the recipients of the following awards:

AIChE Senior Award:

Maureen Cheung

Dr. Stephanie Lopina Award:

Andrew Stine

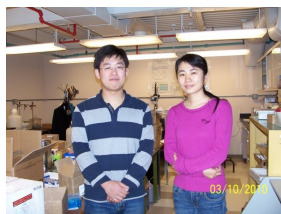
ACS Scholarship Award:

Tanya Lee Miracle

Best Presentation Award for the poster competition of the HealOhio 2009 conference:

Reza Lalani

Departmental awards went to the following graduate students,
Fall Semester 2009:



On Left: Xiang Yu
On Right: Qiuming Wang

Outstanding Research Awards

Xiang Yu, Qiuming Wang, and Amir Vahid

Outstanding Teaching Assistant Awards

Xiang Yu and Qiuming Wang



Amir Vahid

College of Engineering's Honors & Awards Banquet

The College of Engineering's 21st Honors & Awards Banquet will be held April 15, 2010 at 6:00 p.m. in the Martin Center. For the Department of Chemical and Biomolecular Engineering these students will be recognized for the following awards:

Outstanding Graduating Seniors Award (GPA 3.5 or Higher):

Amanda Aikens, Maureen Cheung, Logan Mellert, Alex Niemiec, Christopher Palm, Renee Petty, Zane Shuman,
Cory Simon, Andrew Stine

**Outstanding Co-op Student in Chemical & Biomolecular Engineering (For Commitment/
Performance in Work Assignments):**

Logan Mellert, Lubrizol Corporation, Wickliffe, Ohio

The Chemical and Biomolecular Engineering Faculty Scholarship Recipients:

Alex Niemec and Cory Simon

The Chemstress Outstanding Graduate Student in Chemical & Biomolecular Engineering:

Jak Tanthana

The Chemstress Outstanding Undergraduate Student in Chemical & Biomolecular Engineering:

Nicole Averell

The Larry Focht Scholarship Recipient:

Jen Lilly

Faculty News

New Faculty



Dr. Xi Shan joined the department on November 1, 2009 as a Research Assistant Professor in the Corrosion and Reliability Engineering program. He participates in curriculum development; design and start up of the undergraduate corrosion laboratory and corrosion research laboratories, participation in project development and conduct of corrosion research.

Prior to joining UA, Dr. Shan was Senior Research Associate in Materials Science and Engineering at Case Western Reserve University. His expertise is in corrosion, electrochemistry, adhesion, hydrogen effects on materials, life prediction, surface treatment, protective coating, failure analysis, materials selection, cathodic protection, surface analysis, and hydrogen storage materials.

Dr. Shan received his Ph.D. in Materials Science and Engineering, 2004 Case Western Reserve University, an M.E.; Materials Science and Engineering, 1996 Central Iron and Steel Research Institute, Beijing, China; and a B.E., Materials Science and Engineering, 1993 Tsinghua University, Beijing, China. He has over 20 publications and one patent. Xi is married and has an 8-year-old son, Steven.

Awards

- **Dr. Lu-Kwang Ju** was inducted into the College of Fellows of the American Institute for Medical and Biological Engineering in February 2010. The fellows are recognized as "the outstanding bioengineers in academia, industry and government. These leaders in the field have distinguished themselves through their contributions in research, industrial practice and/or education."
- **Dr. George Chase** will be accepting the American Filtration and Separations Society Lifetime Achievement Award on Tuesday, March 23, 2010. The award honors an individual who has made significant fundamental contributions to the society through research, leadership, mentorship and good citizenship.
- **Dr. Jie Zheng** was awarded a CAREER Award from the National Science Foundation (NSF) Interface Process and Thermodynamics Program. His proposal is titled "Computational studies of the structure and biological activity of amyloid forming peptides", focusing on the misfolding and aggregation of proteins associated with many human neurodegenerative diseases such as Alzheimer's, Parkinson's, Prion Disease, and Diabetes Type II. Dr. Jie Zheng was awarded a CAREER Award from the National Science Foundation (NSF) Interface Process and Thermodynamics Program. His proposal is titled "Computational studies of the structure and biological activity of amyloid forming peptides", focusing on the misfolding and aggregation of proteins associated with many human neurodegenerative diseases such as Alzheimer's, Parkinson's, Prion Disease, and Diabetes Type II.

Zheng's research aims are to develop a multiscale modeling and simulation platform that integrates structural prediction, computational biology, and bioinformatics to establish a direct correlation between oligomer structural transition from the aqueous to the membrane environment and their biological activity in cell membranes, which is important for understanding molecular mechanism of peptide-mediated lysis. The ultimate goal of this project is to rationally design a series of ligands to prevent amyloid formation. The NSF CAREER Award is given to faculty members at the beginning of their academic careers and is one of NSF's most competitive awards, placing emphasis on the excellence in the coordination of outstanding research and education.

Patents

Issued

Dr. Steven Chuang

- Resistant Immobilized Amine Sorbents

Dr. Lu-Kwang Ju / Narayanan Srinivasan

- Supercritical Methods for Biomass Pretreatment

Dr. George Chase / Rahul Bharadwaj

- Electro-wetted Coalescing Filter

Dr. Bi-min Zhang Newby

- Well-spaced Parallel Silicone Strip

Dr. George G. Chase / Sneha Swaminathan

- Crosslinked Polymer Nanofibers

Dr. George G. Chase / Shagufta Patel

- Improved Liquid Drainage from Coalescing Filter Media

Filed

Dr. Steven Chuang

- Low Cost Immobilized Amine-alcohol Sorbents for Sulfur Dioxide Capture
- Sulfur and Nitrogen Compound - Resistant Immobilized Amine Sorbents for CO₂ Capture



Grants Awarded

Dr. Steven Chuang

Ohio Board of Regents, \$20,000 for OBR match (2009-II Biennium) to R8292, Techno-Economic Analysis of Scalable Coal-Based Fuel Cells.

Dr. Edward Evans

US Department of Education, \$167,000 for Developing a Community of Practice in Corrosion and Materials Reliability.

Dr. George Chase

Produced Water Society, \$5,000 for Unrestricted Research Support in Field of Filtration. SWECO, \$32,833. Model to Estimate Fluid Flow Rate through a Vibrating Screen.

Dr. Lingyun Liu

2010 The University of Akron Faculty Research Summer Fellowship for \$10,000.

Dr. Bi-min Zhang Newby & Dr. Gang Cheng

ABIA, \$100,000 for Deep Wound Repair Utilizing Microtubular Scaffolds.



Seminar speaker, Alauddin A. Alauddin, poses with some attendees after his presentation.

Faculty Publications

- Lotus, A. F.; Feaver, R. K.; Britton, L. A.; Bender, E. T.; Perhay, D. A.; Stojilovic, N.; Ramsier, R. D.; **Chase, G. G.** Characterization of TiO₂-Al₂O₃ composite fibers formed by electrospinning a sol-gel and polymer mixture. *Materials Science & Engineering, B: Advanced Functional Solid-State Materials* (2010), 167(1), 55-59.
- Lotus, A. F.; Kang, Y. C.; Ramsier, R. D.; **Chase, G. G.** Investigation of the physical and electronic properties of indium doped zinc oxide nanofibers synthesized by electrospinning. *Journal of Vacuum Science & Technology, B: Microelectronics and Nanometer Structures--Processing, Measurement, and Phenomena* (2009), 27(6), 2331-2336.
- Lotus, A. F.; Kang, Y.-C.; Walker, J. I.; Ramsier, R. D.; **Chase, G. G.** Effect of aluminum oxide doping on the structural, electrical, and optical properties of zinc oxide (AOZO) nanofibers synthesized by electrospinning. *Materials Science & Engineering, B: Advanced Functional Solid-State Materials* (2010), 166(1), 61-66.
- Guzman, Felipe; **Chuang, Steven S. C.** Tracing the Reaction Steps Involving Oxygen and IR Observable Species in Ethanol Photocatalytic Oxidation on TiO₂. *Journal of the American Chemical Society* (2010), 132(5), 1502-1503.
- Singh, Rahul; Guzman, Felipe; Khatri, Rajesh; **Chuang, Steven S. C.** Performance and Byproduct Analysis of Coal Gas Solid Oxide Fuel Cell. *Energy & Fuels* (2010), 24(2), 1176-1183.
- Fisher, James C., II; Tanthana, Jak; **Chuang, Steven S. C.** Oxide-supported tetraethylenepentamine for CO₂ capture. *Environmental Progress & Sustainable Energy* (2009), 28(4), 589-598.
- Miller, Duane D.; **Chuang, Steven S. C.** The effect of O₂ on the NO-CO reaction over Ag-Pd/Al₂O₃: An in situ infrared study. *Catalysis Communications* (2009), 10(9), 1313-1318.
- Chuang, Steven S. C.**; Singh, Rahul; Guzman, Felipe. Catalysis of electrochemical and partial oxidation of CH₄. *Preprints of Symposia - American Chemical Society, Division of Fuel Chemistry* (2009), 54(1), 353-354.
- Vahid, Amir; **Elliott, J. Richard.** Transferable intermolecular potentials for carboxylic acids and their phase behavior. *AIChE Journal* (2010), 56(2), 485-505.
- Emami, Fateme Sadat; Vahid, Amir; **Elliott, J. Richard.** Finitely limited group contribution correlations for boiling temperatures. *Journal of Chemical Thermodynamics* (2009), 41(4), 530-537.
- Pinzon, Neissa M.; **Ju, Lu-Kwang.** Analysis of rhamnolipid biosurfactants by methylene blue complexation. *Applied Microbiology and Biotechnology* (2009), 82(5), 975-981.
- Lo, Chi-Ming; **Ju, Lu-Kwang.** Sophorolipids-induced cellulase production in cocultures of *Hypocrea jecorina* Rut C30 and *Candida bombicola*. *Enzyme and Microbial Technology* (2009), 44(2), 107-111.
- Zhang Qin; Lo Chi-Ming; **Ju Lu-Kwang** Cell immobilization with polyurethane foam for retaining *Trichoderma reesei* cells during foam fractionation for cellulase collection. *Applied biochemistry and biotechnology* (2009), 156(1-3), 12-23.
- Lo Chi-Ming; Zhang Qin; Callow Nicholas V; **Ju Lu-Kwang** Cellulase production by continuous culture of *Trichoderma reesei* Rut C30 using acid hydrolysate prepared to retain more oligosaccharides for induction. *Bioresource technology* (2010), 101(2), 717-23.
- Chang, Yung; Chu, Wan-Ling; Chen, Wen-Yih; **Zheng, Jie; Liu, Lingyun;** Ruaan, Ruoh-chyu; and Higuchi, Akon; *Journal of Biomedical Materials Research* 93A: 400-408, 2010
- Shah, Parth N.; **Lopina, Stephanie T.**; Yun, Yang H. Blends of novel L-tyrosine-based polyurethanes and polyphosphate for potential biomedical applications. *Journal of Applied Polymer Science* (2009), 114(5), 3235-3247.
- Cai, Yangjun; Yun, Yang H.; **Zhang Newby, Bi-min.** Generation of contact-printing based poly(ethylene glycol) gradient surfaces with micrometer-sized steps. *Colloids and Surfaces, B: Biointerfaces* (2010), 75(1), 115-122.
- Yu, Xiang; Wang, Qiuming; Yang, Jui-Chen; Buch, Idit; Tsai, Chung-Jung; Ma, Buyong; Cheng, Stephen Z. D.; Nussinov, Ruth; **Zheng, Jie.** Mutational Analysis and Allosteric Effects in the HIV-I Capsid Protein Carboxyl-Terminal Dimerization Domain. *Biomacromolecules* (2009), 10(2), 390-399.

Have a great spring and summer by passing this e-mail to alumni and work associates. It is wonderful to hear from you, please keep us up to date with news that you may want to share. To be included in the next issue please send your information to Marcia D. Main at mainl@uakron.edu