XCurrents

MIT CHEMICAL ENGINEERING ALUMNI NEWS

Professor Paula Hammond explains her energy research to President Obama. (Page 15)

Letter from the Department Head

Welcome to the Spring 2010 MIT Chemical Engineering News. The theme for this edition is energy, specifically efforts at the Institute and Department levels to address the world's energy challenges. Our Professor Bob Armstrong, deputy director for the MIT Energy Initiative (MITEI), describes the many different projects set in motion by MITEI with Chemical Engineering as a major participant; the newsletter also includes examples of research going on in the Department – from paper-thin solar cells to virus-created batteries to math models that can optimize natural gas production. Our students also get involved outside the classroom; they've showcased their energy research through the student-run Energy Club and launched an award-winning on-campus bio-diesel initiative. Many have gone on to work in the energy realm.

You may have noticed President Obama on the cover. When he visited the MIT campus in October 2009 to make a major presentation energy policy, Professor Paula Hammond (along with Professor Angela Belcher, Departments of Biological Engineering and Materials Science & Engineering) had the oppor-

HIGHLIGHTS

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Massachusetts Institute of Technology

Letter from the Department Head continued

tunity to show him work using genetically engineered viruses to produce self-assembling solar cells and batteries (page 15).

On Friday, December 4th, Professor William Koros, a leader in membrane-based gas separation strategies to reduce the energy intensity of chemical processes, gave the annual Hoyt C. Hottel Lecture (page 21). At the start of the lecture, Professor Bill Green was introduced as the new the Hoyt C. Hottel Professor of Chemical Engineering. Bill follows the energy focus set by the late Professor Hottel. His research area, accurate predictive kinetic models for energy-related applications, is critical to the development of new energy technologies. Bill has dramatically broadened the range of systems that can be accurately predicted. He developed new methods and a large set of associated software tools making it feasible for the entire global kinetics community to work cooperatively to improve the accuracy of chemical kinetics simulations. His expertise in chemical kinetics is internationally recognized by his position as editor-in-chief of the International Journal of Chemical Kinetics. Bill plays an important role in the MIT Energy Initiative and has significant impact on the Department's educational programs at many levels. A long time supporter of and participant in the Hottel lectures, Mr. John Grover '48, attended the Hottel Lecture, and while at MIT spent some time with current and past Grover Fellows, chemical engineering graduate students who were financially supported through his fellowship during their first years in the Department. During lunch, the students, Kevin, Ken and Everett, shared with Mr. Grover some of their thesis topics.

Course X alumni and faculty share a dinner during the Institute Alumni Leadership Conference September 25th, 2009.

Fellowships for our graduate students continue to be crucial for our ability to provide outstanding education and research at the forefront of the discipline. Your donations, like Mr. Grover's, help us continue to support our students and keep a strong educational focus through changes in the economic climate. The faculty and I are grateful for the strong support that you and other alumni consistently provide the Department. Your support is a considerable leverage for us as we continue our proud tradition of excellence and leadership in chemical engineering education and research.

Greg McRae has become the Hoyt C. Hottel Emeritus Professor, as he retires to continue his work at Morgan Stanley, where he is addressing a wide range of exciting energy related issues. Jeff Tester (PhD '71) has also retired to return to his undergraduate and MSc alma mater, Cornell, as the David Croll Professor of Sustainable Energy Systems, and associate director of the Cornell Center for a Sustainable Future. More information on their retirements can be found on page 11. We are deeply grateful for their many outstanding contributions to the Department and wish them the very best in their future endeavors.

In January 2010, the Department welcomed one of our undergraduate alumni, Bradley Olsen '03, as a new faculty member: Brad's research focuses in the areas of polymer physics, functional polymer nanopatterning, and self-assembly. He received his PhD from UC Berkeley and did his postdoctoral work at Caltech, studying protein polymer hydrogels. At MIT, he will apply his expertise in polymer science to develop a fundamental understanding of protein-based nanostructured materials for applications in solar energy and sustainable materials (more on page 12).

Among the many accolades bestowed on the faculty, Professor Edward Merrill (ScD '47) received the 2010 Pierre Galletti Award of the American Institute of Medical and Biological Engineering (AIMBE). The Galletti Award is the highest honor that AIMBE bestows on an individual, and is considered one of the highest recognitions in the bioengineering field. Ed is being recognized for "seminal contributions to biomaterials, medical devices and artificial organs and for his visionary leadership of biomedical education and research over the last 60 years."

In recognition of his 60 years on the MIT faculty, the Department will host a symposium to honor the life and work. We hope you will be able to join us for this great event (http://web.mit.edu/cheme/news/merrill.html). As the newsletter was going to press, Professor Robert E. Cohen was elected to the National Academy of Engineering – an honor among the highest professional distinctions accorded to an engineer. Bob is being recognized for his research on polymer morphology and surfaces, commercial products and processes, successful entrepreneurship, and novel educational programs. Congratulations also to Greg Stephanopoulos for receiving the 2010 ACS E. V. Murphree Award in Industrial and Engineering Chemistry, and Michael S. Strano, who in October 2009 was named one of Popular Science's "Brilliant 10."

John Grover '48 lunches with former and current recipients of the Grover Fellowship.

This past fall we started two new educational programs: The Associate Advisor Program and ACCESS. Associate advisors are current Chemical Engineering juniors and seniors who help incoming undergraduate students as they become part of the Chemical Engineering community. We've gotten great feedback from both the student advisors and advisees, and plan to continue the program next year (page 18).

ACCESS stands for "A Community in Chemical Engineering Select Symposium," which is a two-day event intended to introduce talented under-represented minority undergraduate students to the benefits of a graduate chemical engineering education and related career opportunities. Through workshops, hands-on activities and tours, participants were introduced to the chemical engineering graduate student community and its network of support, as well as life outside the lab through the rich environment and culture of the Boston area. ACCESS was developed with the support of The Dow Chemical Company and its award-winning BEST program to demonstrate our commitment to a diverse chemical engineering community. The inaugural ACCESS weekend was October 23rd and 24th, 2009, appropriately the same time President Obama visited campus, and I believe it was a great success. More about ACCESS can be found on page 19, as well as information on how a current chemical engineering undergraduate could be a part of the next ACCESS class.

Finally, one cannot discuss energy without addressing environmental impact. In the planning of this newsletter, we did much thinking on how we can make the environmental footprint of what you currently hold in your hands as small as possible. We elected to continue with a hard copy version of this newsletter for two main reasons: it is also used as a sort of "information sheet" for the Department and a portion of our audience does not have easy access to online content. If you prefer, please feel free to "opt out" of receiving a hard copy version by emailing our editor at melmils@mit.edu. We would be happy to send you an electronic version instead. Also for the first time, you can find us on Facebook (MIT Chemical Engineering) and Twitter (MITChemE) for live updates on the goings on around the Department and the Institute.

We hope you enjoy this issue of the newsletter. Please do write to us to let us know how you are doing and how we can continue to improve. Thank you for your support and best regards.

Klavs F. Jensen
Department Head
MIT Chemical Engineering Department

2009 Chemical Engineering Fellowships

Graduate financial support continues to be an essential ingredient for maintaining the quality of our graduate programs. This funding helps MIT recruit the very best students by providing support for the first academic year so they can concentrate on core graduate level coursework, free of the demands of teaching and research. The result is a firm base in engineering science on which to build future graduate studies.

Fellowships come from many different arenas: industrial and research organizations, as well as alumni individuals and groups. We are very grateful for this support!

Shown at right, attending President Susan Hockfield's Reception for 2009 Presidential Fellows, are the MIT Chemical Engineering 2009 Presidential Fellows (l to r) Jonathan Gilbert, Caleb Class, Timothy Politano, Carla Thomas, Cary Opel and Stuart Harwood.

Adel F. Sarofim ('62) Fellow
Katie Quinn
U. of Queensland

Alkermes Fellow
Siddharth Srinivasan
IIT Chennai

Arch Chilton Scurlock ('43) Fellow
Ethan Gillett
Tufts

Bayer Professorship Fellow
Matthew Glassman
CalTech

BP MIT Energy Fellow
Jonathon Harding
NC State

Charles and Hilda Roddey Fellow
Diviya Sinha
IIT Kanpur

ChE Practice School Fellows
Lu Chou
UC Berkeley
Su Zhu
U. of Oklahoma

David H. Koch ('62) Fellows
Chih-Jen Shih
National Taiwan University
Muzhou Wang
CalTech

Edwin R Gilliland '33 Fellow
Kamil Khan
Princeton

Frank Hall Thorp Fellow
Glenn Ferreira
Tufts

Frederic A. L. Holloway '39 Fellow
Nicholas Wren
Carnegie-Mellon

Wm. & Margaret Rousseau Fellow
Rong Yang
Tsinghua University

R. C. Reid ('54) & G. Williams Fellow
Matthew Glassman
CalTech

General Sir John Monash Award
Katie Quinn
U. of Queensland

George M. Keller ('48) Chevron Fellow
Alexander Papageorge
MIT

George M. Keller (1948) Fellow
Rathi Srinivas
Columbia

Haas Family Fellow
Nicole Yang
Stanford

H. ('53) & L. Stern Prac. School Fellow
Nigel Reuel
Brigham Young

Jerry ('40) & Geraldine Mcafee Fellow
Hyomin Lee
Seoul Nat'l U.

John C. Sluder ('41) Fellow
Everett O'Neal
Vanderbilt

John Henry Grover ('48) Fellow
Everett O'Neal
Vanderbilt

Keith & Helen Rumbel Fellow
Amanda DiIenno
Carnegie-Mellon

Landau ChE Practice School Fellows
James Backman
MIT
Jacqueline Douglass
MIT

MITSCEP 1936 Course Xa Fellow
Nisarg Shah
Johns Hopkins

Saudi Aramco MIT Energy Fellow
David Borelli
U. of Rochester

Walsh ('37) Memorial Pres. Fellows
Cary Opel
UC Berkeley
Carla Thomas
Wisconsin-Madison

Robert T. Haslam ('11) Pres. Fellows
Jonathan Gilbert
Johns Hopkins
Caleb Class
Purdue
Stuart Harwood
Northwestern
Timothy Lauer
UMass Amherst
Timothy Politano
Notre Dame

Rosemary Wojtowicz Fellow
Nicole Yang
Stanford

Samsong Fellow
Hyomin Lee
Seoul Nat'l U.

Siemens MIT Energy Fellow
Brandon Reizman
Illinois Urbana-Champaign

Tae-Sup Lee Graduate Fellow
Dong sook Chang
Seoul Nat'l U.

Taiwan Government Fellow
Chih-Jen Shih
Nat'l Taiwan U.

Wechsler Graduate Fellow
Amanda DiIenno
Carnegie-Mellon

GEM Fellow
Ethan Gillett
Tufts

NSF & NDSEG Fellow
Jonathan Gilbert
Johns Hopkins

NSF Fellow
David Borrelli
U. of Rochester

Eni MIT Energy Fellows
Shamel Merchant
Univ. Inst. Of Chem. Tech.
Steven Shimizu
UC San Diego

Alumnus Highlight

Philip R. Westmoreland (PhD '86)

In 2009, Phil Westmoreland (PhD '86) became executive director of the North Carolina State University's Institute for Computational Science and Engineering, as well as a professor in its Department of Chemical and Biomolecular Engineering. His research focuses on reaction kinetics and engineering, obtained from molecular-beam mass-spectrometry experiments, computational chemistry, and reactive-flow modeling. The main technology driver is clean energy from fossil and biofuels, but he has also been involved with developing fire-safe polymers, hypergolic rocket fuels, and plasma processing of microelectronics.

From 1986 until 2009, Phil was on the faculty of the Chemical Engineering Department at the University of Massachusetts Amherst, and in 2006-2009, he served as a Program Director at the National Science Foundation. He is an AIChE Fellow and serves on the Boards of Directors and the Combustion Institute. He is a past president of the educational nonprofit CACHE Corporation; and was the founding chair of AIChE's Computational Molecular Science and Engineering Forum. His teaching, research, and service have been recognized in recent years by Lawrence Berkeley National Lab's David Shirley Award, AIChE's Gary Leach Award and George Lappin Award, ASEE's Corcoran Award, NSF Director's Award for Collaborative Integration, and the UMass College of Engineering's Outstanding Senior Faculty Award.

What work are you doing now at NCState? What is the NCSU Institute for Computational Science and Engineering (ICSE)?

My group and I do research on elementary reaction kinetics for clean energy uses, both experimental (molecular-beam mass spectrometry) and computational (quantum chemistry and Reactive Molecular Dynamics). Our recent work has emphasized biomass and bio-oils, examining elementary reactions for making bio-oils and for burning them cleanly.

The Institute for Computational Science and Engineering (www.icse.ncsu.edu) lives at the interface of computer science and domain science and engineering, advancing CSE through education, use, research, and new collaboration methods. Created in 2008, it engages students and approximately 60 faculty at NCSU.

Do you have any fond memories from MIT you'd like to share?

I worked on flame chemistry with the late Jack Howard and Jack Longwell in a lab on the top floor of Bldg. 31, the old Sloan Automotive Lab. The excitement and stimulation of research and other technical interactions with the faculty, post-docs, and my fellow students were great. So were the December holiday party skits, our Mardi Gras and Halloween costume parties, and Columbus Day 1979 weekend at Talbot House in Woodstock, Vermont, with the families of the Howards, Longwells, Sarofims, postdocs Brian Haynes, Gilles Prado, Federico Baretta, and the three students who came: John and Gina Nenniger and me.

Practice School News

Hello to all our Practice School alumni! Summer and fall 2009 continued the David H. Koch School of Chemical Engineering Practice tradition of providing unique and challenging opportunities for generations of chemical engineers to hone their technical leadership skills. As many of you have experienced yourselves, this is an exciting and enriching program for both the students and host companies alike.

Last year we branched out geographically with our first station in India; this term we moved into a new facet of chemical engineering work with an inaugural station at Morgan Stanley. I extend a tremendous thank you to our hosts who have helped provide the kind of education that only these hands-on, real-world challenges can offer!

The Stations

Summer 2009

BP Naperville, Naperville, IL
Director Bob Fisher

Working with BP's Global Fuels Technology (GFT) division, students focused on physical property characteristics associated with engine performance. This included modeling process concepts and separation schemes and the development of user friendly interfaces. A project with the Chemicals (A&A) division focused on process intensification and technology assessment. Refining Technology was the third division that supported this session. The students evaluated an Uncertainty Analysis tool developed at MIT through BP's partnership with our Energy Initiative. The group developed a user friendly interface along with model refinements based on data from the pilot plant operation that was being assessed for commercial implementation.

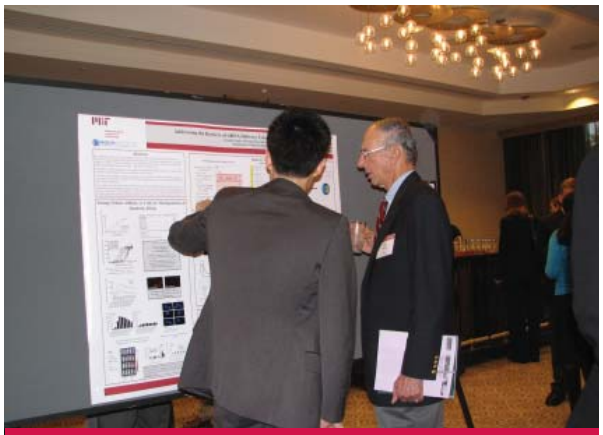
As always, BP was the consummate host and made special efforts to acknowledge its appreciation for a job well done both during and after each session hosting many social events.

Cabot, Billerica, MA
Director Bill Dalzell '58, SM '60, ScD '65

Our major contact at Cabot, Angelica Sanchez, does a great job rounding up projects and encouraging the full participation of the scientists, engineers, and managers within the company. Many of these people attended MIT and some, the Practice School. The daily encouragement, guidance, and enthusiastic support of the Cabot staff are keys to the success of the projects.

The students worked on a total of six projects and made full use of their training in chemical kinetics, mixing, fluid mechanics, modeling and transport processes. Projects included the visualization and modeling of flow in a reactor, filtration of solid particles from liquids, modeling of kinetics in a reactor, entrapment of liquids in solid particles, diazonium kinetics, and mixing viscous fluids with solid particles.

As in past years, the highlight of each week was the arrival of the ice cream truck on Friday afternoons. The students and staff gathered in the parking lot for free ice cream and informal discussions. The students also found the local home-made ice cream store to which they made occasional visits. Two of the students had birthdays, which were celebrated with cake and ice cream and ice-cream cake. If you have noticed an ice-cream theme here, you are correct.



Bob Gurnitz '60 learns about current student research during the poster session preceding the Awards Dinner.

Novartis, Hanover, NJ
Director Claude Lupis

Our summer station in East Hanover was prepared well in advance of its start, thanks to the formidable organizational skills of our Novartis coordinator, Thomas Blacklock. More than a dozen projects were proposed, from which six were finally chosen for our two sessions of four weeks and the nine students attending the station. The work of the students encompassed a wide and interesting range of topics, from enzyme chemistry to roller compaction, and from prototype development of a newly designed chemical reactor to its validation at the pilot plant scale.

The team resided in the Morristown area, a beautifully bucolic part of the state and they enjoyed seeing daily the herd of deer roaming the Novartis campus. New York City is also within easy commuting distance and thus offered a host of interesting extra-curricular activities. However, they did not have to travel that far to attend a masterful performance of Moliere's play, "The School for Wives", at the Shakespeare Theater of New Jersey in nearby Madison.

NREL, Golden, CO
Director Alan Hatton

Our second PS operation at the National Renewable Energy Laboratory (NREL), focused on a series of problems associated with both acid hydrolysis and enzymatic breakdown in the pretreatment of biomass. One group continued the work begun in Spring 2009 on the development of protocols for the automatic analytical evaluation of biomass feedstock, with an emphasis on quantifying the sugar content of corn stover using a two-step acid hydrolysis procedure. A second group conducted a detailed techno-economic analysis of different proposed acid pretreatment scenarios. The third group worked on a theoretical project to develop population balance models for the enzymatic degradation of cellulose taking into consideration the ac-

tion of both endo- and exo-glucanases.

Extracurricular activities included a short hiking trip in the foothills of the Rockies and a day in the Colorado Springs vicinity, with visits to the Garden of the Gods, a cog railway ride the top of the 14,000 ft Pike's Peak, and ancient Cave Dwellings. The team celebrated Indian Independence Day with a fine meal at a local Indian restaurant and attended a concert at the famous Red Rocks Auditorium to celebrate the 45th anniversary of the Beatles' visit to the area.

Fall 2009

NREL, Golden, CO

Directors Kristin Vicari and Gregg Beckham

At NREL's Fall Station, the students worked closely with NREL scientists and engineers to complete six projects on lignocellulosic biofuels production within the National Bioenergy Center (NBC). The scope and breadth of the projects reflected developments in the area of alternative/sustainable energy, especially since the NBC "supports and coordinates the nation's biomass research activities." In two months, the students produced value-added work on high-impact projects in this area that led to substantial changes to the NREL research and development program in biomass conversion as well as three peer-reviewed publications (in preparation at the time of this writing) and three posters to be presented at the 32nd Symposium on Biotechnology for Fuels and Chemicals (April 2009).

Everyone was eager to take advantage of Colorado's "giant playground" of expansive mountains and scenery as well as the cities of Denver and Boulder. The team explored Breckenridge, Pike's Peak, the Garden of the Gods, and Denver nightlife. We also enjoyed the magnificent scenery by hiking and jogging on the mesa adjacent to NREL.

Morgan Stanley & Co., Purchase, NY

Director Bill Dalzell

For its inaugural experience as a Practice School station, Morgan Stanley hosted nine students at its Westchester Campus. Their host was Jay Dweck, a Course X and Practice School alumnus, and Professor Gregory McRae, who was on leave from MIT and working for Morgan Stanley. The students and station director lived in White Plains, located a few miles from Purchase, New York, and about 25 miles from New York City, where Morgan Stanley's headquarters is located. The students worked on six projects that were centered on the evaluation of available technologies for power generation and cooling systems for large computer systems. These technologies included fuel cells, batteries, solar and renewable energy sources, and various heat exchanger and server cooling options. The students occasionally enjoyed the multitude of dining and entertainment options offered by New York City.

The ChemE group from the Novartis (Siena, Italy) Station take a tour of Siena Music Academy.

Novartis Corp., Siena, Italy

Director Claude Lupis

This was our first station with the Vaccines and Diagnostics (VD) division of the Novartis Pharmaceutical Corporation and it was held in the old city of Siena, in Tuscany. Nine students attended the station and worked on a variety of projects ranging from the optimization of several critical steps in the production of vaccines (such as fermentation, lyophilization, polysaccharide-protein coupling reaction) to the development of new tools for the quantitative analysis of certain proteins in complex media.

On arrival, the students were partnered with "peer mentors", i.e., young people of the Technology Development division who assisted them in the laboratories and provided them with an instant social network, ensuring the students had a great time. Siena is a magnificent medieval city, famous for its large fan-shaped Piazza del Campo, heart of the city and scene of the famous horse-race known as "il Paglio". Siena lies at the heart of Tuscany and the proximity to Florence, San Geminiano, Montepulciano, Castellina in Chianti, and countless other touristic sites, provided great opportunities for excursions. The students' technical achievements, the warm hospitality of our Novartis colleagues, the wonderful local food, and the beauty of Tuscany all combined to make this station a particularly successful and memorable one.

General Mills, Minneapolis, MN

Director Bob Fisher

Transport mechanisms and temperature profiles within the multiple components of a food matrix comprised one project, while the other involved coating operations with subsequent drying and crystallization. The objectives were to obtain operational conditions that establish desired ranges of product appearance. This required an understanding of material property characteristics such as development of nucleation sites and crystal growth kinetics versus amorphous phase generation. The other four projects involved technology assessment of competitive continuous aeration systems and the rheological behavior of nano-emulsions for use in existing product lines.

Right now our Spring semester Practice School groups are in Switzerland and India, and I look forward to sharing their work and endeavors with you.

Best regards,

T. Alan Hatton
Director
David H. Koch School for
Chemical Engineering Practice

My Practice School Experience

by Jeffrey Mo
Practice School Fall '09

When I came to MIT, I knew I wanted to go to Practice School – I had absolutely no prior industrial experience, so this opportunity would be invaluable. It was on July 1, the day that I was sharing my country's birthday with the rest of the (at the time) first-year class, that I found out we'd be the first Practice School group ever to go to Morgan Stanley in New York City.

Morgan Stanley, you ask? But … isn't that a bank? Why would they need chemical engineers? Those were our first thoughts too, and even the knowledge that Jay Dweck '77, a Course X and Practice School graduate, was the sponsor and Dr. Greg McRae, one of the department's faculty members, was on sabbatical leave there and had helped to arrange the new station was not helpful. On our first day, both Dr. McRae and our Station Director, Dr. Bill Dalzell, briefed us for just over two hours on what the next two months would be about – rules and guidelines associated with Practice School, the schedule of meetings and presentations, and what we could expect to get out of the experience. Dinner was then served at an Italian eatery located in what was formerly – of all things – a bank building. There, we were joined by Jay Dweck, the head of Morgan Stanley's modeling and analytics group and a member of the Morgan Stanley Management Committee. It seems like Practice School alums really do go far in life!

We started work the next morning with the usual ID procedures; they even took our fingerprints to make sure we didn't have criminal records. Due to the large-scale financial implications of our work, the confidentiality agreements that we signed were very stringent. In fact, all I can say is that our work involved "the modeling of heat and mass transfer," along with lots of analysis of cutting edge technology. The perks that Morgan Stanley offered were top-notch. The facilities were spotless. Two soccer games, at 7 AM and 7 PM, were organized on the front lawn every day, and access to their well-equipped gym was available for only $15/month, so that you could stay at work 24/7. Finally, eighteen varieties of hot chocolate, coffee, and tea were provided for free and the large cafeteria was stocked with an enormous variety of stations – grill, sandwich, salad, sushi, pizza, paella, pad thai, moo shu pork, "other international cuisine of the day" … the list goes on.

Except for our lunch, coffee, and gym breaks, a typical day would have the nine of us at our stations, each of which had two monitors and plenty of desk space. We had essentially a cluster of stations to ourselves, and there were no cubicle-type walls that prevented us from seeing one another.

The Fall '09 GM group with Station Director Bill Dalzell. Author Jeffrey Mo center.

Dr. Dalzell had an office a short distance away and teams often met with him there to discuss reports and presentations, of which there were two (proposal and final) and three (proposal, progress, and final), respectively. The three presentations were each given by different members of the team, with the team leader giving the final presentation. Generally, we all left for work between 7 and 8 AM, arriving before 8:30, and almost always left by 6 or 6:30 PM (usually even earlier!) to do some more work at home. While Dr. McRae and the other project mentors were located in New York City, they interacted with us via numerous personal visits, teleconferences, emails and phone calls. In addition we had many on-site presentations from different equipment vendors, visits to off-site facilities and training in financial evaluation of projects. Plus we were able to enjoy the delights of New York City. Our reports and findings were judged to be of real value to the company.

At General Mills (GM), we were located at one of their technical research centres, which housed both scientists and engineers as well as many pilot plant technicians who do the brunt of the physical manufacturing work. Much more structure was provided at GM, as it was a 'returning' station. This made our schedule much more uniform and less stressful – we would arrive at work between 8 and 9 AM on weekdays and stay until between 6 and 8 PM, depending on whether we had meetings with the entire group. These 'whole-group' meetings, according to our station director Dr. Bob Fisher, were meant to keep us informed about everyone else's efforts; unlike at Morgan Stanley, where all subprojects of an overall task, GM projects were much more diverse. We also had to prepare three presentations, but only one final report.

We worked on four product lines while at GM: Häagen-Dazs ice cream, several types of chewy granola bars, Progresso® soup, and Kix® cereal. The latter three projects made heavy use of the pilot plant. In fact, during my time on the Kix® project, we once came into work at six in the morning – remember that we wouldn't normally even be awake at that time, – prepared for a pilot plant run that started at eight, made over ten batches of cereal by one in the afternoon, and sugar-coated them for delivery to the next day's tasting panel by four-thirty. That day was absolutely exhausting – and then we had to drive home on icy Minnesota roads after sunset! It would have been impossible for us to do this without significant help from the technicians, who were also very gracious with the cleanup procedure (meaning that they essentially performed all of the cleanup work on our behalf). As another example, the chewy granola bar group had to manually haul over 1000 pounds of raw ingredients from the storeroom to the machinery on their first morning at the job. The benefits from the exercise we got on the job were, however, negated by our constant eating of the food that we made! Freshly-prepared ice cream from the Häagen-Dazs pilot plant is quite possibly the best I've ever tasted, so much so that I 'tasted' a full cup of vanilla ice cream on at least three separate occasions.

Our sponsors worked with us side-by-side, often in the same lab space. We could meet with them several times every day, run our plans by them or vice-versa, and receive spontaneous, hands-on help and feedback. Our sponsors also took

us to lunch at the corporate headquarters (which, incidentally, looked just like the Morgan Stanley campus) and invited us to the Christmas party. Our last days were spent on presentations, attended by Dr. Hatton himself, lunch with the company, and finally a group dinner where we said our farewells to both Dr. Fisher and each other before heading home for the holidays.

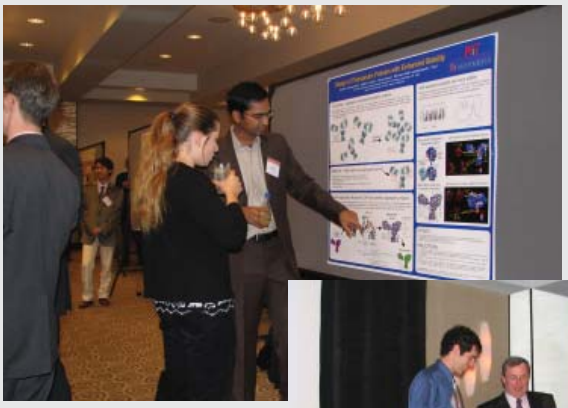
That brings me to today – literally. During a break at this IAP event in building 56 – do you all remember IAP and building 56? – I was trying to convince a first-year Course X Ph.D. student to go to Practice School. A man who had to have been older than sixty suddenly turns to us and says: "Are you talking about the chemical engineering Practice School program? I did that 55 years ago, at Oak Ridge!"

A lot of things have changed over 55 years. None of the station directors from that time are affiliated with Practice School any more, while Dr. Hatton has just reached his 20th year of directing the Practice School. None of the stations from back then – stations like Bethlehem Steel in Pennsylvania and American Cyanamid in New Jersey – are stations today. Foreign companies have hosted Practice School students since the 1990s, and an all-male group is no longer the norm. However, the core of what Practice School is remains the same. We work hard, add value to the companies, represent MIT, and learn technical, communication, and interpersonal skills to last us the rest of our careers.

I'm pretty sure I brought back memories for the stranger I met today, and I hope you all thought about your own Practice School experiences too. Maybe, like Bill Dalzell, you and your Practice School teammates can have your own fifty-year reunions!

2009 Practice School Awards Banquet

In October 2009, we held our annual Awards Banquet for the Practice School, attended by industrial sponsors, MIT administration officials, and students, faculty and staff from our Department. Our speaker was Dr. Thomas Blacklock, Vice President and Head of Early Portfolio Acceleration, Technical R&D, at Novartis Pharmaceuticals Corp. in Hanover, NJ. Dr. Blacklock presented an extremely engaging discussion on "The Pursuit of Public Safety in the Pharmaceutical Industry," which included an historical perspective of issues in the past century and what today's industry does during each phase of the creation to market process to make sure medication is safe for the public. This was also a great reunion for students who had worked with Dr. Blacklock during the summer 2009 Novartis Station.



2009 Practice School Award Winners

William Rousseau Award: Emily Chang, Edison, NJ (photo center right)
Rosemary Wojtowicz Award: Jaisree Iyer, Mumbai, Maharashtra, India
Jefferson W. Tester Award: Kristin Vicari, Glenview, IL
J. Edward Vivian Award: Patrick Heider, Greenfield, MA
Jefferson W. Tester Award: Spencer Schaber, North Oaks, MN (photo center left)

Professor Gregory McRae

In the fall of 2009, Professor Gregory J. McRae retired to become the Hoyt C. Hottel Professor Emeritus of Chemical Engineering. He leaves the Department to continue his work as an executive director at Morgan Stanley, where he had been on leave for the previous two years. Greg's teaching, research and professional activities are related to process systems engineering, high performance computing, new energy technologies and finance/project risk management. His work in process systems engineering and new energy technologies is world-renowned; he is the recipient of numerous awards for his work in computational science and process engineering including the prestigious NSF Presidential Young Investigator Award, the National Computer Graphics Prize and an AAAS US EPA Environmental Science Fellowship.

Greg is an advisor to many industrial, academic and government organizations including the National Academy of Sciences, the National Research Council and the U.S. Department of Energy. He is the founder of four companies that provide services to the chemical, microelectronics and financial communities. Greg also taught popular finance and project risk management courses at the Sloan School of Management. He has written numerous papers and reports and was a co-author of the recent MIT Future of Coal study.

Greg's work spans several chemical engineering areas, but focuses on one theme: the environment, which has emerged as one of the critical challenges facing the chemical engineering profession. Greg's research to reduce adverse impacts comprises three areas: to enhance our understanding of the physical and chemical processes occurring in the environment; to develop process design and operating procedures that can incorporate multiple objectives including economic, environmental, safety, control and product quality; and to develop chemistries and molecular systems that avoid the occurrence of environmental problems in the first place.

Examples of research in the areas includes work to develop the first regional-scale photochemical air quality model that incorporates scale adaptive solution procedures, aerosol dynamics, and data assimilation. The model would help develop cost effective emissions control strategies. For chemical process simulation, design and operation work on very fast process simulation procedures exploit emerging parallel computing architectures, with particular attention on the direct treatment of uncertainties in the solution and optimization algorithms. Also, advances in computational chemistry and the capability to manipulate structures at atomic scales offer the opportunity to design, from first principles, molecules that have the desired physical and chemical properties.

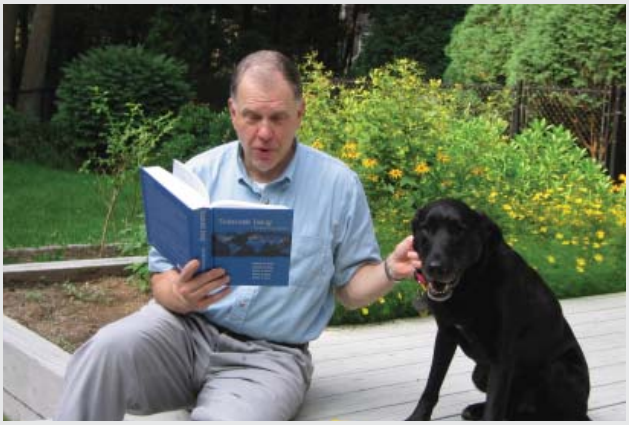
Greg's work contributes to bettering the world around us and we look forward to witnessing future successes from his new endeavor at Morgan Stanley.

sors Retire

Professor Jefferson Tester (PhD '71)

After almost thirty years at MIT, Professor Jefferson W. Tester (PhD '71) has returned to his undergraduate alma mater, Cornell University, to become its first Croll Professor of Sustainable Energy Systems, Director of the Energy Initiative in the Cornell College of Engineering and Associate Director of the Cornell Center for a Sustainable Future (CCSF). For more than three decades, Jeff has been involved in chemical engineering process research as it relates to renewable and conventional energy extraction and conversion and environmental control technologies. He is an expert in supercritical fluids for green chemical synthesis and geothermal energy, as evidenced in his co-authorship of MIT's 2006 Report on the Future of Geothermal Energy. His research interests include renewable and geothermal energy systems, advanced drilling, hydrothermal reforming, upgrading of biomass and fossil fuels, clean chemical processing in supercritical fluids, and environmental remediation and control technology.

Jeff has been the H.P. Meissner Professor of Chemical Engineering at MIT (1980-2008), director of MIT's Energy Laboratory (1989-2001), director of MIT's School of Chemical Engineering Practice (1980-1989) and a group leader in the Geothermal Engineering Group at Los Alamos National Laboratory (1974-1980). He has co-authored more than 200 research papers and 10 books. Jeff received his undergraduate and master's degrees in chemical engineering at Cornell before heading to MIT for his PhD.



Jeff is currently a member of the advisory boards of the National Renewable Energy Laboratory (chair), the Midwest Research Institute, the American Council of Renewable Energy, Idaho National Laboratory, and Los Alamos National Laboratory. He has served as a member of the Massachusetts Renewable Energy Trust (chair) and the Paul Scherrer Institute in Switzerland. He was a member of the 1997 Energy R&D Panel of the President's Committee of Advisors on Science and Technology (PCAST), and has served as an advisor to the USDOE and the National Research Council in areas related to concentrating solar power, geothermal and biomass energy, and other renewable technologies and waste minimization and pollution reduction.

Jeff was passionate and esteemed teacher and advisor; his cross-country biking exploits were well known throughout the Department. We'll miss his insight and enthusiasm for a good debate and wish him good luck in his new role as the Croll Professor of Sustainable Energy Systems.

Faculty News

The ChemE Department Welcomes New Assistant Prof. Bradley Olsen '03

The Chemical Engineering Department is pleased to welcome newly appointed Assistant Professor Bradley Olsen '03 who started his appointment January 1, 2010. After earning his PhD from Berkeley in 2007, Bradley conducted his postdoctoral work at Caltech, studying the physics of protein polymer hydrogels. At MIT, he is applying his expertise in polymer physics to develop a fundamental understanding of protein-based nanostructured materials for applications in solar energy and sustainable materials.

Polymeric materials provide integral structures in advanced technologies such as fuel cells, organic photovoltaics, nanopatterned hard drives, and biomedical devices. Nature also uses polymers to produce ultra-strong spider silk fibers, tough organic/inorganic composites, and some of the most efficient catalysts (enzymes). The unique physical properties of these materials arise from the large size of the polymer molecules and its effect on molecular strucutre and dynamics.

Bradley's research in polymer physics attempts to understand the statistical mechanics, thermodynamics, and transport properties of these large molecules and to apply this understanding to the intelligent design of polymeric materials with new and interesting properties for applications in biotechnology, energy, and sustainability.

For more information on Bradley's research, go to http://web.mit.edu/bdolsen/www/research.html.

Michael Strano Named One of Popular Science's "Brilliant 10"

In October 2010, Professor Michael Strano was deemed a member of Popular Science's "Brilliant 10 Young Geniuses Shaking up Science Today."

According to the article, Michael was chosen because "he's tapping the strange powers of nanotechnology to detect cancer… he is one of the world's leading researchers of quantum-confined materials, a field of nanotechnology that has the potential to transform cancer medicine, solar power, electronics and more.

Quantum-confined materials derive their power from their small size. For example, a single layer of carbon atoms, known as graphene, behaves nothing like normal carbon. In a conductor such as a copper wire, electrons simply inch along. In graphene, however, electrons move at nearly the speed of light. 'It's like a little particle accelerator,' Strano says. Graphene could make the ultimate solar-panel conductor; it's highly conductive, highly affordable, and so thin that it's transparent to light. 'It's the thinnest conductor we can ever imagine,' he says.

He is particularly fascinated by the medical potential of carbon nanotubes. The tiny structures emit near-infrared light that passes harmlessly through human tissue. Injected into cells, they could be used as biological sensors so sensitive they could detect a single molecule of a potentially harmful chemical."

For more information on Michael's research, go to http://web.mit.edu/stranogroup/.

Alan Hatton One of the 25 Most Prolific Authors Published in *Langmiur*

In 2009, the journal Langmuir celebrated its 25th year of publication. In celebration of this important milestone, it published lists of the 25 most-cited articles and its 25 most-prolific authors. Professor T. Alan Hatton came in at number 23 on the distinguished list.

Langmuir is an interdisciplinary journal focusing on colloids, interfaces, materials and electrochemistry.

Paula Hammond (SB '84 PhD '93) Named AIMBE Fellow

In December 2009, the American Institute for Medical and Biological Engineering (AIMBE) announced the election of Professor Paula Hammond to its College of Fellows. She was cited for her "outstanding contributions to the design of novel biomaterials and carriers for drug delivery."

Recipients of this honor are recognized for their outstanding achievements in medical and biological engineering. AIMBE (www.aimbe.org) was founded in 1991 to establish a clear and comprehensive identity for the field of medical and biological engineering. Representing over 75,000 bioengineers, AIMBE serves and coordinates a broad constituency of medical and biological scientists and practitioners, scientific and engineering societies, academic departments and industries.

In October 2009, Professor Hammond also had the honor of giving Berkeley's Melvin Calvin Lecture, speaking on "2D and 3D Macromolecular Assembly for Delivery: from Patchy Micelles to Multi-

Agent Delivery (MAD) Nanolayers." The Melvin Calvin Lectureship is named after Melvin Calvin, former Professor of Chemistry and Nobel Laureate. The lectureship was established to bring distinguished and internationally renowned scientists to Berkeley for the purpose of developing broad interests in the chemical sciences.

Ed Merrill (ScD '47) Receives AIMBE's 2010 Galletti Award

Congratulations to Professor Emeritus Ed Merrill for receiving the 2010 Pierre Galletti Award from AIMBE. He was presented with the award at AIMBE's annual event in Washington, DC on February 22, 2010.

The Pierre Galletti Award was established in 1999 by the AIMBE Board of Directors to honor its Founding Member and Past President. The award is presented to an individual in recognition of contributions to public awareness of medical and biological engineering, and to the promotion of the national interest in science, engineering and education. The Galletti Award is the highest honor that AIMBE bestows on an individual.

Bill Green Becomes Hoyt C. Hottel Professor of Chemical Engineering

Announced (appropriately) at the 2009 Hoyt C. Hottel Lecture on December 4, 2009, Professor Bill Green has been named the current Hoyt C. Hottel Professor.

The Hottel Professorship historically recognizes a faculty member's commitment to energy research. Bill's work in high temperature chemistry and predictive kinetics, as well as his leadership in MIT's Energy Initiative, have proven him a leader in energy research. In 2009, Bill also became the Editor in Chief of the *International Journal of Chemical Kinetics.* He also won the American Chemical Society's top prize in fuel chemistry for his work in creating alternate fuel and engine systems.

Bob Cohen Named Director of MIT Program in Polymer Science and Technology (PPST)

In October 2009, Bob Cohen was appointed the new director of MIT's PPST program. He takes over for Professor Greg Rutledge, the previous PPST leader.

PPST at MIT is an interdisciplinary program offering graduate education in the interdisciplinary field of polymer science and engineering. Its goals are to provide educational opportunities for students seeking advanced interdisciplinary training and to foster a spirit of community and collaboration among the large group of students, faculty and visitors involved in polymer-related activities at MIT. It provides a core curriculum in polymer studies for students working towards the PhD or ScD degree, and continuing education opportunities through seminars, contact with visitors from industry and academia and research competitions.

Other Chemical Engineering faculty involved in PPST include Professors Daniel Blankschtein, Pat Doyle, Karen Gleason, Paula Hammond, and Bradley Olsen.

Bob was also elected to the National Academy of Engineering in February 2010.

Professors Armstrong and Jensen Make AIChE News

In the fall of 2009, Professor Klavs Jensen was elected a Fellow of AIChE. According to the bylaws of AIChE, the grade of Fellow in AIChE is a special category of membership that identifies and honors Senior Member chemical engineers who have made meaningful impacts on our profession. They must have been in chemical engineering practice for a minimum of 25 years and have demonstrated significant accomplishments and professional attainment, as well as significant service to the field and to AIChE, and significant accomplishment in engineering.

Professor Bob Armstrong was also elected as a director of AIChE for three year term.

AIChE is a professional association of more than 40,000 chemical engineers in 92 countries. Its members work in corporations, universities and government, using their knowledge of chemical processes to develop safe and useful products for the benefit of society. For more information visit www.aiche.org.

Greg Stephanopoulos Receives Murphree Award

Congratulations to Professor Greg Stephanopoulos, who has received the 2010 American Chemical Society's E. V. Murphree Award in Industrial and Engineering Chemistry.

The Murphree Award was established to stimulate fundamental research in industrial and engineering chemistry, the development of chemical engineering principles and their application to industrial processes. The Exxon Mobil Research and Engineering Co. established the award in 1955.

Research News

Focus

In 2006, President Susan Hockfield announced MIT's commitment to "address the challenges of energy and the environment....bringing scientists, engineers and social scientists together to envision the best energy policies for the future."

Today, that commitment is embodied in the MIT Energy Initiative (MITEI), which has partnered with research and industrial organizations all over the world to address the planet's energy issues. MIT's efforts on this front were recognized by an October 2009 visit from the President of the United States, where Professor Paula Hammond had a chance, alongside her colleague Angela Belcher from Mechanical Engineering, to show development of viruses that create batteries.

Chemical Engineering's Professor Bob Armstrong is deputy director of MITEI, representative of the Department's strong participation in MITEI's work. Our faculty, students and staff are developing technology and systems to address the world's energy and its environmental impact. Below are highlights of work in the department; for more information, go out our new Energy and Environmental Engineering webpage http://web.mit.edu/cheme/research/areas/energy.html.

Professor Paul Barton and associate Tom Adams propose a zero-emissions power plant

A new type of natural-gas electric power plant proposed by MIT researchers could provide electricity with zero carbon dioxide emissions to the atmosphere, at costs comparable to or less than conventional natural-gas plants, and even to coal-burning plants.

In findings recently published online in the Journal of Power Sources, postdoctoral associate Thomas Adams and Paul Barton, the Lammot du Pont Professor of Chemical Engineering, propose a system that uses solid-oxide fuel cells, which can produce power from fuel without burning it. The system would not require any new technology, but would rather combine existing components, or ones that are already well under development, in a novel configuration. The system would also have the advantage of running on natural gas, a relatively plentiful fuel source considered more environmentally friendly than coal or oil.

The system proposed by Adams and Barton would not emit into the air any carbon dioxide or other gases believed responsible for global warming, but would instead produce a stream of mostly pure carbon dioxide. This stream could be harnessed and stored underground relatively easily, a process known as carbon capture and sequestration (CCS). One additional advantage of the proposed system is that, unlike a conventional natural gas plant with CCS that would consume significant amounts of water, the fuel-cell based system actually produces clean water that could easily be treated to provide potable water as a side benefit, Adams says.

Although no full-scale plants using such systems have yet been built, the basic principles have been demonstrated in a number of smaller units including a 250-kilowatt plant, and prototype megawatt-scale plants are planned for completion around 2012. Actual utility-scale power plants would likely be on the order of 500 megawatts, Adams says. And because fuel cells, unlike conventional turbine-based generators, are inherently modular, once the system has been proved at small size it can easily be scaled up. "You don't need one large unit," Adams explains. "You can do hundreds or thousands of small ones, run in parallel."

Adams says practical application of such systems is "not very far away at all," and could probably be ready for commercialization within a few years. "This is near-horizon technology," he says.

For more information on this research, go to http://web.mit.edu/newsoffice/2009/natural-gas.html.

on ENERGY and the ENVIRONMENT

Professor Paula Hammond discusses research with President Obama

During his October 27, 2009, visit to MIT, President Obama saw demonstrations of several clean-energy technologies being developed at MIT. Among them, Professor Paula Hammond, along with research collaborator Angela Belcher, demonstrated work on using genetically engineered viruses to produce self-assembling solar cells and batteries.

The tour marked the first time a sitting president has visited MIT's laboratories to see demonstrations of ongoing research work and meet with faculty members who are conducting that research.

"He was very responsive, and an incredibly warm person," Paula said of the President. "When we described the self-assembly process, he asked several very intelligent questions, about the scalability of the process and so on."

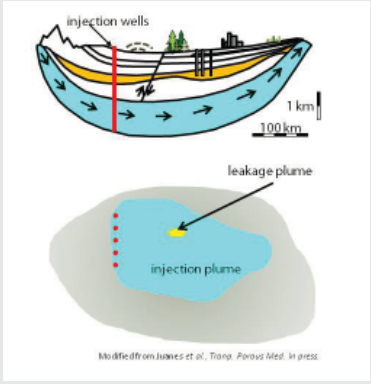
In fact, after he heard part of the description of plans to develop the system so that batteries or solar cells could be made by spraying alternating layers of different organisms onto a glass surface, Paula said, Obama turned to reporters who accompanied him on the tour and said "did you understand that?" - and then proceeded to explain the information in his own words.

"He was exactly correct," Angelar said. "I asked him if he wanted to teach my class." When she explained that her biologically based system made it possible to conduct a billion experiments at a time, he interrupted to say, "Really?" Belcher said "Yes we can," to which he quipped, "That was my slogan, you know." Overall, he was "serious, but kind of joking at the same time," Belcher said.

During his lab visit Belcher handed him a wallet-size card displaying the periodic table of the elements - something she routinely gives to students and visitors. As soon as he was given the card, he placed it in his pocket and deadpanned: "I'll glance at it periodically."

For more information on Paula's virus battery work, go to http://web.mit.edu/newsoffice/2006/virus-battery.html.

Chemical Engineering researchers' predictive simulations can monitor carbon sequestration



To meet our immediate energy needs without exacerbating climate change, most experts agree, we'll need to find a way to store the carbon dioxide given off by the combustion of coal, oil and natural gas. But no full-scale storage systems exist, and the plans to create them have many unknowns.

Addressing this is a project led by Carolyn Seto, the Clare Boothe Luce Postdoctoral Fellow, working with chemical engineering graduate student Arman Haidari and Professor Greg McRae, which uses predictive simulations to develop a monitoring system for a sequestration site, integrating information from networks of sensors to infer the amounts and locations of the injected CO_2 as it moves through underground formations. To monitor the sites adequately but without undue costs, the team looked into the minimum number and type of monitoring stations that would be needed. To do this, they would measure tiny deformations in the surface topography, monitor gases escaping from the soil, test geochemical samples from observation wells, and monitor seismic activity.

Because of the potential risks from sequestered CO_2 being released to the surface, as well as other risks such as groundwater contamination or geomechanical effects (including possible increased earthquake risks in some locations), constant monitoring of the site "serves as an early warning mechanism if there are anomalies in the project, allowing us to locate the CO_2 and intervene, should it be necessary," Carolyn says.

For more information on this project, go to http://web.mit.edu/newsoffice/2010/carbon-sequestration-0111.html.

Focus on ENERGY continued

Professor Kristala Prather '94 Reprograms Microbes to Create Biofuels

(with excerpts from MIT Spectrum Winter 2008, photo by Len Rubenstein)

In the summer of 2008, Kristala Jones Prather was invited to testify before a Senate committee on the topic of biofuels and her words, "[she] was a nervous wreck."

Prather's message to the group was that biofuels have a lot to offer but aren't a quick fix. Indeed, she said that making high quality and affordable biofuels would require "a systems-based solution." That solution will include finding safe, cost-effective ways to turn certain crops or crop residues — poplar trees, the prairie weed called switch grass, and agricultural wastes, among others — into biofuels.

Kristala's work involves genetically engineering organisms to fulfill roles nature hasn't chosen them for. One such role is "microbial chemical factory." For example, it's in yeast's nature to do the fermenting work that yields the alcohol in beer. Her approach is to get the organisms to make something useful — biofuels, drugs, or other products. To do this, she must genetically reprogram the microbes.

Her "little helper" is E. coli. If she can turn E. coli into a productive maker of glucaric acid, it could open the way, among other possibilities, for creating biofuel-specific microbes. But that first step won't be easy — as comparing re-engineering a microbe to the task of retrofitting a chemical plant makes clear.

Say the idea is to convert a plant from making chemical A to making chemical B through the installation of a few, but critical, new parts. Executing the same job with E. coli is like working with a factory whose machinery is invisible, and whose response to the installation of any one new piece of gear is highly unpredictable. It also may take you many months of work to find the new parts — in this case, genes — you want to install.

Kristala sees biological methods as being critical to a secure energy future — one, moreover, that may take us beyond ethanol, the type of biofuel most in the limelight right now. Ethanol has many advantages but also some downsides. An example: it mixes easily with water, which means water intrusion could be a problem in terms of piping the fuel over significant distances.

One of Prather's long-term aims is to create microbial chemical-makers that can generate products that no one has even thought of yet. Then biorefineries could be configured to produce a range of both biofuels and other chemicals. "It could take a good part of my academic lifetime for all of this to come to fruition," she said, "but it's very exciting to be in on the early stages."

For more information on the Prather Group's work, go to http://web.mit.edu/prathergroup/.

From paper-thin solar panels, to bacteria-made biofuels, to a math model to optimize natural gas production, our students and faculty use cutting edge resources to address the world's energy and its environmental impact. Below are more examples of current work in the Department.

- Professor T. Alan Hatton: Development of nanoparticle-laden molten salts for heat transfer in high-temperature solar and nuclear applications
- Professor Karen Gleason: Paper thin solar cells
- Professor Bob Cohen: Nanoengineered surfaces for subsea separation of fluid-fluid (oil-water) mixtures
- Professor Paula Hammond: Self –assembly of nanomaterials for low-cost, flexible, large-area solar cells
- Professor Bill Green Group: Making hydrogen from coal separations

For updated news and information, go to **http://web.mit.edu/cheme/research/areas/energy.html**.

The Hoyt C. Hottel Legacy

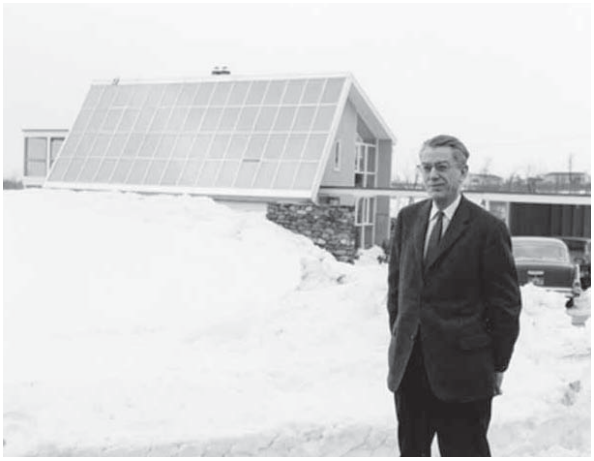
Long before the creation of MITEI, Chemical Engineering Professor Hoyt C. Hottel was a pioneer in the expansion of energy technology.

(excerpted from his National Academy of Engineering Memorial Tribute)

One of Hoyt C. Hottel's contributions was the development of the gas emissivity charts for quantifying heat transfer in furnaces. He designed and constructed the first infrared spectrometer at MIT and developed such a sensitive radiometer for measuring energy fluxes that the galvanometer would go off scale from the adiabatic temperature rise resulting from the pressure increase when the laboratory door was closed. Measurements could only be made in the still of the early morning on days so calm that the wind would not raise the Institute flag. The data that he generated in the 1930s yielded results that provided standards up to presen day. In addition to measuring gas emissivity, he established the mathematical framework for the quantitative treatment of furnaces and the zone method for furnace heat transfer. He was working on a paper on his one-zone method of analysis of furnaces at the time of his death in 1998.

Professor Hottel's other achievements include an early series of studies (1932 to 1936) of heterogeneous combustion, which first identified quantitatively the roles of diffusion and chemical reaction in the combustion of solid carbon. One paper was reprinted fifty years later by *International Communications in Heat and Mass Transfer* as a classic contribution to the field. His research on gaseous diffusion flames (1939 to 1949) provided a first quantitative treatment of the impact of transition from laminar to turbulent flows on the length of gaseous diffusion flames. These findings have become cornerstones to the understanding of turbulent flame structure.

With funding from Godfrey L. Cabot in 1938, Professor Hottel organized the world's first research center on the use of solar energy. The studies led to the choice of the flat-plate collector as the most promising device for solar heating, development of the performance-predicting equations in use today for assessing such collectors and for testing new concepts, construction of the first solar-heated house (pictured below) and of three others that provided data for economic assessment of solar space-heating and hot water supply. Simultaneously, Professor Hottel maintained a balanced view of the significance of solar energy in national or world energy use, advocating the separation of emotional from logical inputs to the assessment of the prospects for economic use of the sun as an energy source.



On the principles of teaching, he said: "Beware that a student's spirit be not done to death by a formula, by teaching with answers cast in concrete. Be less concerned with technical content and timeliness of what you teach and less concerned with the completeness of coverage of your subject than with stretching the student's mind and stimulating him to self-teaching, hopefully stretched throughout life. " As one of his students recollected, he would look suddenly at his watch and exclaim, "My heavens, it's half-past six and Nellie will be wondering where I am; you'd better come home with me." Later in the evening, "My heavens, it's half past eleven. You'd better stay here tonight. "

Hoyt Hottel was a giant of twentieth century chemical engineering and leaves a rich legacy in his research output and the large number of students and colleagues, whom he inspired. In a letter to alumni who had helped establish the Hoyt C. Hottel Professorship, Hottel Professor Emeritus Gregory McRae explained, "Hoyt was a giant in our field; he had an absolute insistence on technical excellence coupled with a passion for working on energy-related problems. He saw well into the future the need for a sustained search for new ways to provide energy and his vision is now being realized on many fronts."

Associate Advisor Program Helps New Sophs

In fall of 2009, Chemical Engineering introduced its Associate Advising program, a volunteer group of upper-level undergraduate chemical engineering students who help incoming students navigate the Department. They impart general information about MIT and Departmental requirements, student organizations, careers, and graduate study, as well as simply help these new students become part of the Chemical Engineering Community.

The establishment of an Associate Advisor program was lead by our student AIChE chapter. They felt having the counsel of a fellow student who had gone through what new chemical engineering students were experiencing, would be a benefit for them.

"Entering the chemical engineering department is an exciting and challenging time. As students enter separate majors, the social networks and academic support they built up over freshmen year can become less useful," Bob Chen, one of the current associate advisors, explains, "Incoming chemical engineering students have to adjust to new social networks and academic settlings. They no longer have the unifying experience of taking GIRs with their friends. At this junction, associate advisors help ease the transition and make life much easier. I applied to be an associate advisor to guide sophomores and lend them sympathetic advice."

Associate advisors go through a formal application process and are chosen based on their academic standing and ability to be a counselor and leader for their advisees. The ten inaugural associate advisors for the 2009-2010 school year attended a training session in August, which included a photo scavenger hunt of Boston. They then jumped into their unique roles.

Bob continues, "Though the sophomores are new to the Chemical Engineering Department, they are well-established as a MIT student. So the role of a ChemE associate advisor is different from freshman associate advisors. Freshman associate advisors play a much more aggressive role making sure freshmen integrate into MIT. As a ChemE associate advisor, I play a more passive role, acting as an academic resource. I try to communicate with my advisees often, addressing any questions they have. My communications range from basic emails to planned trips to Toscanini's.

"My favorite part of the program is just answering my advisees' questions. I enjoy offering advice and guidance. Not only is giving guidance on ChemE fulfilling, but I also feel much more involved in the Department as a result."

Alumnus Highlight

Bobby Satcher (PhD '86)

On November 27, 2009, the shuttle Atlantis brought seven astronauts, including Robert Satcher (SB '86 PhD '93), who tweeted the mission, back to Earth after a 11-day mission to stock the International Space Station (ISS) with 15 tons of spare parts.

Satcher was the "tweeter-on-board" for the mission. You can read his posts and see updates with video and other resources from the mission on two Twitter accounts: Astro_Bones focuses on the overall mission and ZeroG_MD recounts medical updates.

Satcher joined NASA as it explores the viability of extended travel far beyond present day levels. A hurdle to this is the loss of bone mass; a backbone may not be vital in the microgravity of space, but it sure comes in handy on the return trip home.

Before NASA, Satcher worked at the forefront of orthopedic oncology, and his present job offers the prospect of advanced research from a somewhat broader perspective...some travel required.

ACCESS Introduces Grad Studies in ChemE

In the fall of 2009, the Chemical Engineering Department introduced its ACCESS Program; ACCESS stands for A Community in Chemical Engineering Select Symposium. ACCESS is a weekend of engaging events intended to introduce talented under-represented minority undergraduate students to the benefits of a graduate chemical engineering education and related career opportunities. Through workshops, hands-on activities and tours, participants are introduced to the chemical engineering graduate student community and its network of support, as well as life outside the lab through the rich environment and culture of the Boston area.

Members of the Chemical Engineering Student Office pose with ACCESS attendees during the Friday luncheon.

Twelve juniors and seniors from around the country attended the first ACCESS weekend, experiencing first hand the opportunities of graduate studies in chemical engineering. Over the two-day period, the attendees met with current students, faculty and alumni and got a look at life as a chemical engineering student on campus as well as in Boston.

"We did a ton of interesting and fun things, including ice breaker/communication sessions, research presentations that were critiqued in a non-threatening environment, duck-toured Boston, toured laboratories, and had outstanding dinners with faculty and graduate students," attendee Timothy Sitka from Madison-Wisconsin explains, "Amongst many amazing faculty, staff, alumni, and graduate students, one particularly interesting person that we met was Professor Robert Langer, who described his innovative, progressive research and was willing to take photos with us afterwards!"

Nayla Saker from the University of Puerto Rico also enjoyed the weekend. "I enjoyed both dinners and the opportunity to interact with faculty in a more intimate environment. The Communication Skills Workshop with Sheree Galpert was amazing; I learned new techniques and had a great time."

One of the sessions during the weekend was "Research 101", an interactive introduction to graduate research in chemical engineering. The organizer of that activity, graduate student and Wittrup Group member Jordi Mata-Fink, explains "we presented the students with a real research problem from the lab - in my case, how to engineer an antibody drug to better target solid tumors. The students then split into small groups to discuss the problem and brainstorm possible solutions. The objective of the session was both to pique student interest in cutting-edge research topics, and to introduce them to the type of open-ended, multidisciplinary problem solving required in graduate research.

ACCESS attendees get enthusiastic about their communications workshop.

"One student assigned to my group was reticent at the start of the session because he didn't have much of a background in biology. By the end of the hour, however, he was describing to his group members some nanoparticles he had worked with, and how they might be a useful tool in targeting tumors. He overcame his initial apprehension when he realized he could apply his creativity and classroom knowledge to a problem in a new setting. Witnessing this transition, and interacting with the dozen other sharp and eager students, was my highlight of the weekend."

More information on the ACCESS Program can be found at http://web.mit.edu/cheme/academics/access/.

Spring 2010 Lectureships and Events

in the Chemical Engineering Department

We hope to see you at our upcoming Spring 2010 Lectures:

The 2010 Alan S. Michaels Distinguished Lectureship in Medical and Biological Engineering

http://web.mit.edu/cheme/news/michaels.html

"Starting & Building Biotech Companies: From Sepracor to Selecta"

Robert L. Bratzler '75

Executive Chairman, Selecta Biosciences

Friday, April 2, 2010

3:00 pm, Building 66-110

Dr. Bratzler is Executive Chairman of Selecta Biosciences, a Watertown-based biotech company pioneering the development of targeted nanoparticle vaccines for treatment and prevention of diseases. Previously, Dr. Bratzler was President and Chief Executive Officer of Coley Pharmaceutical Group from 1998 to the time of its sale to Pfizer in January 2008. A co-founder of Sepracor Inc., a research-based pharmaceutical company, in 1984, Dr. Bratzler also co-founded and helped build and finance several Sepracor group companies, including ChiRex, a pharmaceutical outsourcing company, where Dr. Bratzler served as president and chief executive officer. A former faculty member in the department of chemical engineering at Princeton University and with industrial experience at Procter and Gamble and Polaroid Corporation, Dr. Bratzler received his BS degree from the University of Michigan (1968) and his PhD in chemical engineering from the Massachusetts Institute of Technology (1975). Dr. Bratzler lives in Concord, Massachusetts and is married to Lori (Shingleton) Bratzler.

The 2010 Warren K. Lewis Lectureship in Chemical Engineering

http://web.mit.edu/cheme/news/lewis.html

"The Untold Story of Gluten: Viscoelastic Wonder, Rat Poison, or Autoimmunity's Rosetta Stone?"

Chaitan Khosla

Professor, Departments of Chemistry, Chemical Engineering and (by courtesy) Biochemistry, Stanford University

Friday, April 30, 2010

3:00 p.m., Building 66-110

also

The Warren K. Lewis Research Lecture
"Assembly Line Antibiotic Biosynthesis"

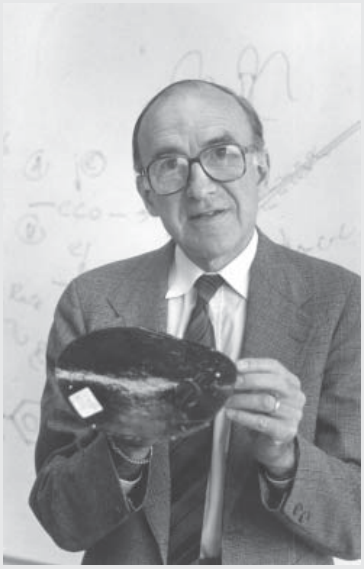
Wednesday, April 28, 2010

3:30 p.m., Building 66-110

Chaitan Khosla is the Wells H. Rauser and Harold M. Petiprin Professor at Stanford University in the Departments of Chemistry, Chemical Engineering, and, by courtesy, Biochemistry. He received his PhD in 1990 at Caltech. After completing postdoctoral studies at the John Innes Centre in the UK, he joined Stanford in 1992. Over the past two decades he has studied polyketide synthases as paradigms for modular catalysis, and has exploited their properties for engineering novel antibiotics. More recently, he has investigated celiac sprue pathogenesis with the goal of developing therapies for this widespread but overlooked disease. In 1995 he co-founded Kosan Biosciences, a public biotechnology company that developed new polyketide antibiotics and was acquired by Bristol Myers Squibb in 2008. He is also a founder and director of Alvine Pharmaceuticals, a company that is developing an oral enzyme drug discovered in his laboratory for the treatment of celiac disease, and Flamentera AG, focused on the development of novel biomarkers for gastrointestinal diseases.

You are invited to a very special event:

Symposium to Honor Professor Emeritus Edward W. Merrill '47:



A Celebration of 60 years as a member of the MIT faculty

Friday, May 14, 2010

10am to 4pm

Building 66-110

For more information and a full schedule as it comes available, go to

http://web.mit.edu/cheme/news/merrill.html

Professor Emeritus Edward W. Merrill is a pioneer in the field of biomedical engineering. received his PhD in chemical engineering from MIT in 1947. Join the Chemical Engineering Department as we celebrate his six decades of research and teaching excellence. Speakers include former students, colleagues and current researchers who today continue to build upon his legacy of work in polymer synthesis, biomaterials and biomedical engineering.

Fall 2009 Recap:

December 4, 2009 Hoyt C. Hottel Lecture

Membranes: The Vanguard of Large Scale Low Energy Intensity Separations"

William J. Koros,
Roberto C. Goizueta Chair for Excellence in Chemical Engineering and GRA Eminent Scholar in Membranes, Georgia Tech

Professor Koros began his lecture with an acknowledgment to Professor Hottel, including a wise quote from him: "Plan early for death, then keep planning as long as you possibly can."

Professor Koros discussed the motivation for membranes: energy, environmental and separation issues. He gave a "crash course" in membranes, going into detail about the evolution of large scale membrane processes and giving a nod to MIT Professors Colton, Deen, Brenner, and Michaels for their work in this area. Membranes are in their fourth generation of evolution, which offers the most opportunities and challenges. Finally, he went over realistic steps to revolutionize the separation landscape.

William J. Koros is an advocate for technology-assisted strategies to reduce the energy intensity and carbon dioxide footprints of chemical processes. He is leader in the development of advanced separation membranes and sorbents and an expert in the formation of advanced hollow fiber membranes and sorbents with composite structures.

The Hottel Lectureship was established in early 1985 to recognize Professor Hottel's contributions to the intellectual climate of the Chemical Engineering Department, to the encouragement of students over six decades, and to the foundation and direction of the Fuels Research Laboratory. The lectureship is intended to draw eminent scholars to MIT - preferably in the fields of combustion and energy technology - for short periods of residency in order to stimulate future generations of students. The inaugural Hottel Lecture was presented in April 1985 by Professor Hottel himself.

For more information and the full webcast, go to web.mit.edu/cheme/news/hottel.html.

Alumni News

We want to hear from alumni like you!
Please direct news to: ***Melanie Miller, Editor***
Email: ***melmils@mit.edu***, Phone: ***617-253-6500***, Fax: ***617-258-8992***

Special note: The alumni donor honor roll for the period of July 1, 2009, through June 30, 2010, will be in the Fall 2010 edition of the alumni news. *We sincerely appreciate everyone who has supported us throughout the year!*

CORRECTION from Fall 2009: Clyde Smith '35 worked 35 years at Bechtel Corp. based in San Francisco, not Berkeley, as reported in the Fall 2009 edition of X-Currents.

Bedrich V. Hettich '43 is proud to introduce "The Reality of God in the Universe," a collection of 15 essays offering a modern "testament" about "who God is." The objective of the book is to provide humankind an understanding of the reality of God in the Universe vis-a-vis the reality of human life on God's Earth that connects us to God. It includes the foundation for humankind's diversity to come together to live in a unity for peace and harmony.Based on his life experiences and observations, Hettich's perceptions about God are also rooted in his education in chemical engineering. Hettich studied how humans could adapt and control chemical processes in different environments.

Void of fantasy, mysticism, myth, miracle or superstition, "The Reality of God in the Universe" is not necessarily unique - but it is different in that Hettich does not make judgment about past perceptions of God as right or wrong, but states that they "were just cast within the perspectives of people in environments in which they lived within their own times - which were significantly different from our perspective of today's world."

Bill Peter (MS '58) relays, "At age 74, I still remember my exciting days at Oak Ridge, TN Practice School in 1958. We had special government clearances and worked at three Oak Ridge locations doing research studies. One study was on the storage of nuclear waste, and it is incredible that Yucca Mountain has been stopped 51 years later!!!! Science moves a lot faster than politics. I am currently teaching MBA students and consulting with several companies. I have written six books and the last two are on my Futurist website: www.2020and2035.com. ("Unleashing Wisdom: An optimistic view of the 21st Century" and "Unleashing Wisdom II:The path to a successful life"). Each of these books contains six chapters which are 30 minute TV Shows that I produced in Arizona. I was invited to assist Minnesota in preparing a grant request for $250 million to the U.S. Department of Education for studies to develop "World-Class K-12 Schools" in ten Minnesota cities.

Peter Silverberg (SB '60, SM '61) (at left) unveils a plaque honoring Benjamin Franklin in Philadelphia.

Peter Silverberg (SB '60, SM '61)'s 15-month effort to commemorate Benjamin Franklin's pioneering research on electricity was realized on August 7, 2009, when, before a standing-room-only crowd of engineers and friends, as well as the ghosts of Ben Franklin and his intellectual companions in his Junto discussion group, a bronze plaque was unveiled that will forever hang in the Library of the American Philosophical Society (APS). The brass plaque, which will hang in the APS Library in Philadelphia, just a block from Independence Hall, commemorates the publication of Franklin's Book, "Experiments and Observations on Electricity," in 1751.

The American Philosophical Society was founded by Franklin and friends in 1743. Early members included George Washington, John Adams, Thomas Jefferson, Alexander Hamilton, Thomas Paine, Benjamin Rush, James Madison, and John Marshall. Later members include Albert Einstein, Warren Buffett, and Supreme Court Justice Sonia Sotomayor.

The wording on the bronze plaque reads: "In April 1751 the Royal Society published Benjamin Franklin's book, 'Experiments and Observations on Electricity: Made in Philadelphia in America.' A collection of letters to London's Peter Collinson, the book described Franklin's ideas about the nature of electricity and how electrical devices worked, and new experiments to investigate lightning. This important book led to a better understanding of charges, stimulated Franklin's work on lightning rods, and made him an internationally known figure."

Bernard Horn '65's first book of poems, *Our Daily Words*, won the Old Seventy Creek Press 2009 Poetry Prize. He is also the author of *Facing the Fires: Conversations with A. B. Yehoshua*, the only book in English about Israel's greatest living novelist. He has been awarded a Fulbright and five National Endowment for the Humanities Fellowships and has lectured at MIT's Hillel on Yehoshua and the Israeli poet Yehuda

Amichai. Since 1984 he has been Professor of English at Framingham State College.

Paul Eich (SB '65, SM '67) placed fourth in the race for mayor of Mount Airy, NC. Since coming to Mount Airy from Charlotte two years earlier, Eich had regularly attended city council meetings and said he's worked hard to educate himself about local affairs. He frequently commented on issues during public-comment periods at the meetings, especially spending-related matters. At age 65, Eich was the oldest of the mayoral candidates, "but [he did] not hold their inexperience against them." He may still become involved in town administration.

Jeffrey B. Sakaguchi '82, a community volunteer with more than 30 years in business and executive management, has been elected Chairman of the Board of Directors of the American Red Cross of Greater Los Angeles. Most recently, Sakaguchi was President and Chief Operating Officer of Evolution Robotics Retail, Inc., an early-stage technology company developing robotic vision and object recognition software for the retail industry. Prior to that, Sakaguchi was a senior partner with Accenture, a leading global management and information technology consulting firm, and a senior engagement manager with McKinsey & Company, a renowned strategy consulting firm.

"Since joining the Board of Directors four years ago, I have been amazed by, and proud of, the comfort, care and compassion the Red Cross provides on a daily basis to a wide spectrum of people in our community," Sakaguchi said. "In addition to sheltering and feeding thousands of people during major disasters, like last year's wildfires, the Red Cross assists people every day who are displaced by house fires."

Sakaguchi said the Red Cross will continue to focus much of its attention on preparing the people of Los Angeles for a catastrophic event, such as a major earthquake.

Jim Olivo '82 has been named Director of Alan Gray, Inc.'s newly-formed Strategic Advisory Group. Jim will be in charge of providing strategic consulting services, including business evaluation, capital strategies, and the design of specialty insurance and reinsurance products, to Alan Gray clients. Alan Gray is a provider of a variety of critical services to the insurance industry, including Claims Management, Auditing, Legal Bill Review, Inspection, Collection, Accounting & Financial, Consulting, and Actuarial Services.

Company founder and Executive Vice President Al Gray added, "Jim brings a new dimension to our firm and we are very excited about the new business opportunities this represents for the firm and for our clients."

Julia Greer '97 (third from the left) poses with her current research group at CalTech.

Julia Greer '97 was named to participate in the Defense Advanced Research Projects Agency (DARPA)'s Young Faculty Award (YFA) program. Greer's YFA project is aimed at understanding and subsequently mimicking the superior mechanical robustness and strength of naturally occurring protective layers—such as nacre, or mother of pearl, a composite produced by some mollusks to line their inner shell—to create strong, ductile, damage-tolerant materials that maintain a relatively low density.

She also was named a "Rising Star" by the journal Advanced Functional Materials. Julia joined Caltech's Materials Science department in 2007, where she is developing innovative experimental techniques to assess mechanical properties of nanometer-sized materials.

Greer is a recipient of TR-35, Technology Review's Top Young Innovator award (2008) and an NSF CAREER Award (2007). She is also a concert pianist, with her most recent performances being a violin–piano recital in the Lagerstrom Chamber Series (2009) and Brahms Concerto No. 2 with the Redwood Symphony (2006).

Anish Goel (SM '99, PhD '02) has formally become the US National Security Council's Senior Director for South Asia, after having served in the acting capacity for several months. Anish joined the State Department in 2003, after serving as an AAAS fellow in the office of Sen. John Jay Rockefeller. Before joining the NSC last year, he had worked in the State Department South Asia bureau, focused in particular on regional proliferation issues and the India civil nuclear cooperation agreement.

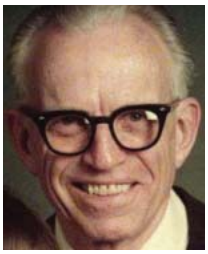
Matt Vokoun (MS '05) recently joined Google in their Strategy and Business Operations team as a Project Manager. In this role, Matt will be leading company-wide strategic and operational initiatives important to the ongoing growth of the company, and he will be based in Mountain View, CA. Prior to Google, Matt was a Manager with Bain & Company in their Palo Alto, CA, office. Matt continues to live in Mountain View, CA, with his wife Reena and son Shaan.

Let us know what you're up to!

Email your news to melmils@mit.edu

and we'll post it in the next XCurrents!

In Memoriam



Lowell L. Fellinger (ScD ’41)

1916-2009

Lowell Lee Fellinger, a retired chemical engineer at Monsanto who loved mountain climbing and playing the clarinet, died of pneumonia and heart problems on July 24, 2009, at his home in Creve Coeur, MO. He was 93.

Mr. Fellinger traveled to Australia and the United Kingdom helping Monsanto build small chemical plants to test industrial processes. He retired in 1981 after 39 years with the company.

“His work led to more effective ways of making chemicals and plastics, which helped to raise the standard of living for all Americans,” said a friend, retired Monsanto engineer William B. Hooper, now of Austin, Texas.

On a trip to England during the 1950s, Mr. Fellinger saw a three-speed bicycle years before they became popular in this country. He bought one for himself and another for his son, the start of a lifetime of cycling for both. He was an avid hiker, climbing the 14,259-foot Longs Peak in the Rocky Mountains of Colorado “3.8 times,” his wife Erika Fellinger said, recalling how a snowstorm once forced him to stop short of the summit.

Mr. Fellinger was born in Norris City, Ill., earned a degree in chemical engineering from the University of Illinois at Champaign-Urbana and a doctor of science degree at MIT.

James Barnes, Jr. ’44

1922-2009

James H. Barnes Jr. (Jim) received a scholarship to MIT, where he graduated with a degree in chemical engineering in 1944. His first job out of college was at the central headquarters of the Manhattan Project in New York City. Since he was a good writer, he was responsible for writing the specifications of many parts of the atomic bomb made by several companies around the US. After a while he figured out that he was working on the atom bomb!

After the war, he worked for 16 years for Ford Motor Company and then several smaller companies, two of which he was president. Oury Engineering/Beltcrete, Jimmy Barnes Motor Company, CRS/Cosatron Killian Associates/K-Line Corporation, ServiceMaster, Gray Communication and Youth for Christ are among the companies or organizations he worked with. Upon retiring from the business world, he worked for John Brown University as director of development, raising scholarship money for needy students. Jim and Priscilla were the host family for Japanese students and others. Together they shared a passion for missions and sacrificially supported the work of individual missionaries and mission organizations. They also enjoyed travel and had the opportunity to do so throughout Europe, the Near East, the Far East, and the US.

Donald Keamy ’53

1930-2009

Dr. Donald G.Keamy, 78, of Andover, MA, died at his home on Tuesday April 21, 2009. He was the husband of the late Yvonne (Hajjar) Keamy. Dr. Keamy was born in Lawrence on September 23, 1930 to Mitchell and Wadie Keamy. He graduated from Lawrence High School as the valedictorian of his class. He graduated from MIT, and Tufts Medical School, going on to do his residency in Otolaryngology at Massachusetts Eye & Ear Infirmary. Don worked tirelessly in his own practice of Otolaryngology in Lawrence and Chelmsford. He was on staff at Massachusetts Eye & Ear Infirmary and a clinical instructor at Harvard Medical School, and served on the staff of the Lowell General Hospital and Lawrence General Hospital for decades. He worked at the Veterans VA Hospital in Bedford until March 23, 2009. The doctor was always willing to share his professional knowledge with anyone who sought his advice.

Don’s brother Mitchell ’47 (pictured with Don at left) writes, “my brother would have been pleased to know that MIT was granted the ABET accreditation of the chemical-biology engineering undergraduate degree XB program. Don planned to take the chemical engineering course together with biology courses at MIT and graduated as planned in 1953. He said his degree was “hybrid” – a blend of classes in chemical engineering, biology and food technology classes. But there was no official degree including the requirements of biology and engineering. We often talked thinking that there should have been a course degree recognizing the amalgamated subjects at that time. He foresaw that eventually such a degree could be granted.”

Martin E. Weber (ScD '64)

1937-2008

Marty Weber died of prostate cancer Nov. 24, 2008, at the age of 71, just months after attending his Princeton 50th reunion with his wife, Nora. Marty was Phi Beta Kappa at Princeton and played rugby at MIT. After earning his degree, he spent four decades teaching chemical engineering at McGill University in Montreal, where he won several teaching awards before retiring as professor emeritus. Marty will be fondly remembered by his many students, colleagues and friends for his love of teaching, sense of humor, and passion for skiing.

He is survived by his wife; his sons, Mark, Lawrence, Gerry, and David; and seven grandchildren, Julie, Russell, Colin, Natalie, Andrew, Jane, and Michael. His four sons are two sets of twins and all became engineers, though in different faculties.

Alumnus Highlight

Alfredo "Al" Armendariz '93

On November 5, 2009, U.S. Environmental Protection Agency Administrator Lisa P. Jackson announced President Barack Obama's selection of Dr. Alfredo "Al" Armendariz to be the Agency's Regional Administrator for EPA's region 6. This region encompasses Louisiana, Arkansas, New Mexico, Texas, Oklahoma and 66 Tribal Nations.

"I look forward to working closely with Al Armendariz on the range of urgent environmental issues we face, in region 6 and across the nation," said EPA Administrator Lisa P. Jackson. "At this moment of great challenge and even greater opportunity, I'm thrilled that Al will be part of our leadership team at EPA. He will certainly play an instrumental role in our Agency's mission to protect our health and the environment."

Regional Administrators are responsible for managing the Agency's regional activities under the direction of the EPA Administrator. They promote state and local environmental protection efforts and serve as a liaison to state and local government officials. Regional Administrators are tasked with ensuring EPA's efforts to address the environmental crises of today are rooted in three fundamental values: science-based policies and programs, adherence to the rule of law, and transparency.

Dr. Alfredo "Al" Armendariz is an Associate Professor at Southern Methodist University in Dallas, Texas, where he has taught environmental and civil engineering. For the past 15 years, Armendariz has worked in a variety of research and academic positions and has published several research papers. After college, he worked as a research assistant at the MIT Center for Global Change Science at their Atmospheric Chemistry Laboratory in Massachusetts. He later joined Radian Corporation in North Carolina as a chemical engineer and in 2002 he joined the faculty at Southern Methodist University and also spent a summer on special assignment to EPA's Dallas office as an Environmental Scientist. At Southern Methodist University he's received several outstanding faculty awards and was selected as a Royster Society Fellow at the University of North Carolina. Armendariz received his ME in Environmental Engineering from the University of Florida, and a PhD in Environmental Engineering from the University of North Carolina at Chapel Hill.

Student News

2009 Holiday Party and Skits

On Friday, December 11, 2009, the Chemical Engineering Department celebrated the end of classes and commencement of the holiday season with its annual Baking Contest, Holiday Skits and Dinner. The undergraduates and graduates continued the time-honored tradition of throwing good-natured jabs at the professors, while the faculty held their own with a skit showing what really goes on during qualifying exams.

Photos courtesy of Kangy Mao

Blast from the Past

A special thank you to **Janet Fischer, former Academic Advisor to the Department, now in EECS**, whose recollection of the photos below was uncanny. She recognized Brett Bader, Brian Goodlin, Tom Wang, Pat Walton, Maria Klapa, Ann Dewitt, Peter Moore and Bo Chen.

Anish Goel ‘02 also recognized the right photo as his doctoral graduating class. He mentions knowing Bo Chen,Tom Wang, Zhitao Cao and Pat Walton, as well as himself (of course!).

In reviewing the photos shown in the previous newsletter, Joe Polack (MS ’43, ScD ‘48) recognized his thesis advisor and shared a photo of his own: his Practice School group XA-42 taken at his Parlin, NJ, station. From left to right are Keith Rumbel (MS ‘43, ScD ‘70), Joe Polack, Art Porter ‘42, Art Power, Bob Campbell ‘42, and Donald Mains ‘47.

Below are new photos culled from the MIT Chemical Engineering archives. Are you or anyone you know in them? Email *melmils@mit.edu* if something is familiar!

Massachusetts Institute of Technology
Chemical Engineering Department
77 Massachusetts Avenue, Room 66-371
Cambridge, MA 02139-4307 USA
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SPRING 2010 Chemical Engineering Dept. Seminar Schedule
All Seminars are Fridays at 3pm in 66-110. Reception at 2:45pm.

March 5, 2010
Design of materials for energy conversion from first principles: metallic nanoparticles of targeted shapes as highly selective catalysts and photo-catalysts
Suljo Linic, Chemical Engineering, University of Michigan

March 12, 2010
Defining unit operations for integrated dynamic single-cell analyses
J. Christopher Love, Chemical Engineering Department, MIT

March 19, 2010
Microsystems for chemical and biological discovery and development
Klavs F. Jensen, Chemical Engineering Department, MIT

April 2, 2010
MICHAELS LECTURE: Starting and Building Biotech Companies: From Sepracor to Selecta
Robert Bratzler (PhD '75), Executive Chairman, Selecta Biosciences

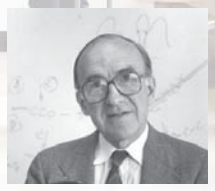
April 9, 2010
Microbial synthesis of drugs and fuels via synthetic biology
Huimin Zhao, Centennial Chair of Chemical and Biomolecular Engineering, University of Illinois at Urbana-Champaign

April 23, 2010
Control of small things: From steering cells and quantum dots on chip to magnetically manipulating nanoparticles to in-vivo targets
Benjamin Shapiro, Institute for Systems Research, Affiliated: Bio-Engineering, Applied Math & Scientific Computation, Univ. of Maryland

April 28, 2010
LEWIS RESEARCH LECTURE: Modular Biocatalysts
Chaitan Khosla, Depts. Of Chemistry, Chemical Engineering, & Biochemistry, Stanford University

April 30, 2010
LEWIS LECTURE: Untold Story of Gluten: Viscoelastic Wonder, Rat Poison, or Autoimmunity's Rosetta Stone?
Chaitan Khosla, Depts. Of Chemistry, Chemical Engineering, & Biochemistry, Stanford University

You are invited to a very special event:
Symposium to Honor
Professor Edward W. Merrill:
A Celebration of 60 years as a member of the MIT faculty



Friday, May 14, 2010

for more info, go to page 21