



GOESSMANN gazette

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UPCOMING EVENTS

Five College Seminar April 12, 2007 Professor Frances H. Arnold
Senior Awards Dinner May 15, 2007
Alumni Reunion 2007 June 9, 2007 ENERGY: Problems and Solutions
ResearchFest 2007 August 28, 2007

ENERGY AND OUR FUTURE

You cannot go a day without reading or hearing about energy and climate change. With all the conflicting reports and opinions, it's hard to keep it all straight. Are we really running out of oil? Will coal, solar energy or corn ethanol save the day? Can nuclear power become safe? UMass Amherst Chemists are leading the charge to answer many of these questions, especially with the recent establishment of the Massachusetts Center for Renewable Energy Science and Technology (MassCREST). To shed light on these developments, the Goessmann Gazette interviewed two leading lights in the area of renewable energy: our own **Prof. D. Venkataraman** and **Prof. S. Thayumanavan** (co-director of MassCREST). Professor Venkataraman discussed the energy problems we face today, and Prof. Thayumanavan described how MassCREST may help to solve these problems. Here's what we found ...

INTERVIEW WITH PROFESSOR DHANDAPANI VENKATARAMAN (DV)

Goessmann Gazette (GG):
*Can you tell us why
there is so much focus on
energy now?*

DV: About twenty years ago, concurrent with the fall of Soviet Union and the end of the cold war, many nations including the two most populous ones initiated economic reforms and opened up their market for foreign investments. The reforms had the intended consequences in that it brought more competition and jobs to the local markets. As wages increased and



Dhandapani Venkataraman and Sankaran Thayumanavan

INTERVIEW WITH PROFESSOR SANKARAN THAYUMANAVAN (ST)

Goessmann Gazette (GG):
*Why did you
spearhead the formation
of MassCREST?*

ST: The late Nobel laureate Rick Smalley, in his testimony to the U.S. Senate, proclaimed "energy is the single most important challenge facing humanity today." Looking around, it is obvious that we in the USA. need to develop new domestic sources of clean, renewable energy. Since my move to UMass Amherst from Tulane in 2003, I've been struck by the critical mass of excellent scientists

Dear Alumni and Friends of the Department of Chemistry,

I hope you enjoy this latest issue of the Goessmann Gazette, with its dual focus on *Energy Challenges and Energy Research* in Chemistry at UMass Amherst. The recent establishment of the Massachusetts Center for Renewable Energy Science and Technology (Mass CREST), which is co-directed by Prof. Thayumanavan in Chemistry, provides evidence of our commitment and strength in this area. Several Chemistry faculty members are playing key roles in Mass CREST research projects. Overall, the Department of Chemistry has had another outstanding year. Our research prominence continues to grow as we rebuild our department to a critical mass. Over the past year our excellence in both teaching and research has been recognized by several awards to members of our faculty, such as the College Teaching Award to Scott Auerbach, the Distinguished Faculty Lectureship to Vince Rotello, and the Beckman New Faculty Award to Jeanne Hardy.

The topic of Renewable Energy will feature prominently in our 2007 Reunion (page 24). We hope to see you back in Amherst at our Reunion, meeting up with your professors and old friends.

We are deeply grateful to all of you who have contributed so generously to our department over the years. In addition to improving our teaching and research facilities and providing scholarships to students, your gifts help us to provide startup packages for new faculty. I thank you all again for your generous support.

Sincerely,



Bret Jackson, Department Head



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PROFESSOR DONALD F. HUNT HONORED



Professor Donald
Hunt

Professor Don Hunt (BS '62, PhD '67) was fascinated by mass spectrometry from the time he was an undergraduate in Amherst. There was no research in mass spectrometry at UMass when Don did his PhD work here but following his PhD, he took up a National Institutes of Health traineeship in mass spectrometry in the laboratory of Prof. Klaus Biemann, a leading mass spectroscopist, at MIT. A glance at Don's publications reveals that, immediately after he took a faculty position at the University of Virginia in 1968, he began research in his PhD field of organotransition metal chemistry. But in 1971, the first of his independent publications on mass spectrometry appeared; and it has been at the center of his pioneering research ever since. His interest in mass spectrometry has been matched by a commitment to proteins analysis, to protein biochemistry, and to immunology. Not the least of Don's scientific contributions is the education (to date) of 91 graduate students and postdoctoral associates, many of who have become leaders in mass spectrometry.

Don's achievements have been recognized by major international and American Chemical Society awards. The latest is the 2006 award for Distinguished Achievement Award in Proteomics from the Human Proteome Organization. In addition, the State of Virginia named Don as outstanding scientist for 1992. Now, on the occasion of his 65th birthday, the Don Hunt Honor Issue of the International Journal of Mass spectrometry, Vol 259, 1-208, 2007, celebrates Don's work.

The issue begins with a summary of and tribute to Don's career by three former students and a list of Don's many publications. These are followed by 22 articles by leaders in the mass spectrometry field and by many former students. Respect for Don's science and affection for Don as an individual are evident throughout.

The Gazette and Chemistry Department offer their congratulations to Prof. Hunt on this singular occasion.

alumniREUNION 2006



Professor Uden, Dean Langford,
Prof. Lillya

The Alumni reunion, held on June 9-10, followed the tradition of recent such events in honoring contributions of emeritus and former chemistry faculty members to the life and development of Chemistry at UMass Amherst. The late Prof. Sidney Siggia and emeritus Prof. Peter Uden were so celebrated this year. The two-day event comprised, as has become the custom, an honor symposium on Friday followed by an alumni hosted evening banquet. Festivities continued on Saturday afternoon with a reception, informal ‘mini-posterfest’ and a session of ‘roasts and toasts’ by alumni, colleagues and friends.

On Friday, following welcoming greetings by College of Natural Science and Mathematics Dean George Langford and Associate Dean and former Department Head Paul Lahti, Prof. Julian Tyson chaired the afternoon session which comprised talks by honorees’ alumni from different eras. David Mazzo (CEO Chugai Pharmaceuticals, PhD ’84), Lawrence Murphy



Seminar audience in rapt attention.

(Cabot Chemical Corp., PhD ’82), Mary Kate (Behlke) Donais (St Anselm’s College, PhD ’96) and David Henderson (Trinity College, PhD ’75) spoke of their journeys from class to boardroom or to their academic or research careers. It was especially rewarding to welcome Sid Siggia’s widow Ann and son Alan who were able to reconnect with a number of Sid’s undergraduate and graduate students from the 70s and 80s. Speakers and many others made mention of the close relationship between Peter’s and Sid’s groups and of the number of students that they advised jointly. While some of the attending alumni have been frequent visitors to UMass Amherst since graduation, it had been a considerable time since others had been back to UMass

Amherst and it was a great pleasure to catch up with their lives families and careers. Many old contacts were renewed and others found it fascinating to supply ‘faces’ to names of illustrious grad school predecessors.

The Saturday reception was equally well attended with perhaps 50% who were able to attend for both days. The posterfest featured across-the-board presentations from all areas of chemistry research with some emphasis on current analytical research. The ‘roasts and toasts’ session by colleagues and former students was as ever highly enjoyable with balanced emphasis on both aspects. A number of serious and ‘less serious’ presentations were made to Peter and to Ann Siggia, including bound copies of both Peter’s and Sid’s scientific publications. Additional copies were added to the developing collection of such memorabilia in the William McEwen Room in the Lederle Tower.



David Uden and Professor Uden, Ann and Alan Siggia, Janet and Andrew Uden

This issue of the Goessmann Gazette is brought to you by the Department of Chemistry Development Committee:

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Bryant Nelson, Stuart Chalk,
Lisa Lavoie

Don't miss this year's alumni reunion on June 9, 2007, entitled "ENERGY: Problems and Solutions." See page 24 for full details.

POINTS *of* PRIDE *in Chemistry*

- Prof. Auerbach received the College of Natural Sciences and Mathematics Outstanding Teaching Award.
- A paper on "Coverage-Mediated Suppression of Blinking in Solid State Quantum Dot Conjugated Organic Composite Nanostructures" from Prof. Barnes' group was featured on the cover of the Journal of Physical Chemistry B of the American Chemical Society.
- Profs. Barnes' and Venkataraman's research on chiroptical response of single helical molecules was published in the December 1, 2006 issue of the journal 'Science.'
- Prof. Bianconi received a patent for her work on "Methods of Preparing Polysilynes."
- Prof. Carpino was given a 'Lifetime Award', 'Landmark Award' and 'Milestone Award' by the Office of the Vice Provost for Research for receiving more than 20 patents for his work on protecting groups for peptide synthesis.
- Mr. William Mahoney (BS '55) received the Distinguished Alumni Achievement Award.
- Graduate student Dan Montville (Voigtman group) was a finalist for the prestigious UMass Amherst Distinguished Teaching Award.
- Prof. Rotello was elected to the Editorial Board of Journal of Materials Chemistry.
- Prof. Rotello received the College of Natural Sciences and Mathematics Outstanding Research Award.
- Prof. Rotello was also the UMass Distinguished Faculty Lecturer.
- Jocelyn Scheintaub (BS '06) received the prestigious Fulbright fellowship from the Department of State.
- A recent paper on "Simultaneous and Reversible Functionalization of Copolymers for Biological Applications" from Prof. Thayumanavan's group in the journal, 'Macromolecules' was one of the most accessed papers in 2006.
- Prof. Uden was selected by the Eastern Analytical Symposium to receive the 2007 Award for Outstanding Achievements in Separation Science.
- Prof. Vachet received a patent for his "Parallel Tandem Mass Spectrometry" technology.
- Prof. Venkataraman's paper on "Scission of Diblock Copolymers into Their Constituent Blocks" in the journal, 'Macromolecules' was one of the most accessed papers in 2006.
- Prof. Venkataraman received a patent for his synthetic methods for "Formation of Aryl-Sulfur Bonds and Aryl-Selenium Compounds Using Copper(I) Catalysts."
- Prof. Weis and graduate alums Anthony Shrout and Edward Esposito co-founded the company Protein Attachment Technologies LLC (patechllc.com).
- Prof. Whelan was a finalist for the prestigious UMass Amherst Distinguished Teaching Award.

labNOTES

In the Auerbach lab ...

Scott Auerbach received the 2006 College of Natural Sciences and Mathematics Outstanding Teaching

Award, for novel approaches to the teaching of undergraduate Physical Chemistry. Professor Auerbach also received a grant of \$276,000 from the National Science Foundation to study catalysts for biofuel production. The impact of this work will be felt on campus: Chemical Engineering Profs. **Curt Conner** and **George Huber** will test the new catalysts (functionalized zeolites) suggested by Prof. Auerbach's theoretical calculations. This team is part of the new UMass Amherst energy initiative: MassCREST (see page 1).



Professor Auerbach receiving teaching award from Chancellor Lombardi, (left) and Dean Langford (right).

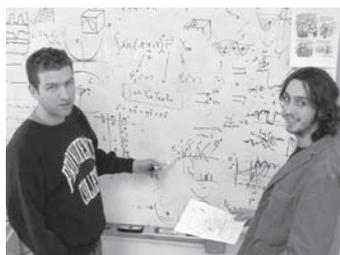
Professor Auerbach gave an invited lecture in Grenoble, France at the "3rd International Workshop on Dynamics in Confinement," and gave seminars at UC Santa Barbara, USC and Brooklyn College (Prof. Auerbach's father's alma mater). The lecture in Santa Barbara celebrated the 60th birthday of Prof. **Tony Cheetham**, one of Prof. Auerbach's postdoctoral advisors. During this event Prof. Auerbach reminisced with **Ethan Sullivan** (BS Chem, 2005), now a graduate student at UCSB working with Prof. **Cheetham**.

Carlos Benitez, **David Medeiros** and **Leanna Toy**, undergraduates in the Auerbach group, graduated in May 2006. **David** works for Rohm and Hass, and **Leanna** is pursuing her Masters in Education at UMass Amherst to teach high school chemistry. **Aldo Combariza** earned his MS in 2006, and is pursuing a PhD in Valencia, Spain. **Eugenio Jaramillo** (PhD '01) left a research position at Los Alamos National Lab, to begin an academic appointment at Texas A&M International University in Laredo, TX. **Eugenio** continues his computational studies of inorganic and polymeric materials. Former postdoc **Roope Astala** has taken a job at "Interactive Supercomputing" in Waltham, MA, a startup company that develops software for supercomputers.

In the Barnes lab ...

Professor Mike Barnes received \$25,000 in 2006 from the NSF Center for Hierarchical Manufacturing (CHM) at UMass Amherst. As part of the Targeted Research Group 2 – Molecular Electronics, the Barnes group will explore electronic and photonic properties of nanoscale materials and assemblies. Professor Barnes gave three departmental seminars this year at Yale University, Brandeis University, and the Chemistry Department Seminar at UMass Amherst.

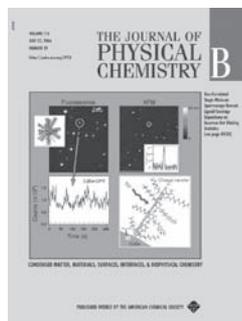
Two new people joined the Barnes group in 2006: **Kevin Early** (right) is now a second-year graduate student who arrived at UMass Amherst after finishing his undergraduate degree at San Diego, and



Kevin McCarthy and Kevin Early

Kevin McCarthy (left) who is a new postdoctoral fellow who recently finished his PhD in Physics from UMass Amherst last fall. Both **Kevin**'s are working together on a combined experimental and theoretical effort to understand the interesting photophysics of surface-derivatized quantum dot systems.

We also had a number of undergraduate researchers working with us this past year: **Anthony Spizuoco** (ChE '07), **Emily Richards** (BS '06), **Daniella Pizzurro** (BS '07), **Kristin Su** (ChE '07), **Brendan Keene** (BS '07), and **Ellen Swain** (BS '08). **Emily Richards** is now working at Pacific Northwest National Laboratory in the Chemical Sciences Division.



The Barnes group achieved several research successes this past year. In collaboration with **Prof. Todd Emrick** and members of his group, we made breakthroughs in the understanding of photophysical properties of quantum-dot systems using single-molecule spectroscopy techniques. One of our papers on this research was selected as the cover feature of the July 15th issue of the Journal of Physical Chemistry B.

In addition, the Barnes group succeeded for the first time in observing chirality at the single-molecule level. Our paper, "Probing the Chiroptical Response of a Single Molecule," in collaboration with the **Venkataraman** group, was published in *Science* (Dec. 1, 2006), and selected for advanced publication in *Science Express* (Nov. 2, 2006). **Ruthanne Hassey** (photo right), the first author on the paper, was also recognized with an outstanding poster award at the 2006 ResearchFest at UMass Amherst. Also noteworthy is the fact that the second author on this paper was **Ellen Swain**, an undergraduate working in our



Ruthanne Hassey

group. **Ellen** made a significant contribution to the research effort under the support of the **Bates Summer Research Fellowship** at UMass Amherst.

In the Bianconi lab ...

This year Prof. Bianconi received a Massachusetts Technology Transfer Center "Technology Investigator Award" of \$25,000. She was also appointed as a visiting professor at The Johns Hopkins University Applied Physics Laboratory, where she gave an invited seminar on her "polymer precursor to diamond carbon" research. She presented her work at the 9th International Applied Diamond and Nanocarbon conference, and at two DARPA conferences by invitation.

This year Prof. Bianconi's laboratory is involved with collaboration with Hexcel Corporation in research on producing next-generation super carbon fibers with an award of \$278,000. The lab is also collaborating with Johns Hopkins Applied Physics Laboratory on diamondizing plastic substrates.

In the Dubin lab ...

A year that starts with Prof. Dubin suffering a broken neck in an auto accident, and ends with Prof. Dubin beating **Prof. Tyson** on the squash court, is a good year. Research in the Dubin group also showed progress. **Dr. Yajuan Li** joined the group this year from the Chinese Academy of Sciences in Beijing. She continues her tremendous productivity (nine papers in ACS journals in 2005), mastering dynamic light scattering and rheology at UMass Amherst after two months. Her research is a continuation of the work of **Dr. Anil Kumar**, who returned to his faculty position in India in June. **Anil** worked with **Mike Herson**, now a senior; their paper will be published in the special issue of *J. Phys. Chem.* based on the Polyelectrolytes 2006 meeting organized by Prof. Dubin and colleagues in Dresden. Also joining the group this year are Commonwealth College undergraduates **Erin Sutherland**, **Brendan Murphy** and **Keith Landry** (new), and **Margarita Antonov**, and **Yelena Vaydman** (continuing). Supervising **Margarita** and **Keith** is **Basak Kayitmazer**, a finalist in last year's graduate research competition. **Basak**'s 5th paper was recently accepted and she is busy writing at least two more, as well as being the key link with collaborators in Israel, China and India, and helping to nucleate a group interested in cystic fibrosis research, including **Prof. Vachet** and others. Additional new collaborations involve **Prof. Kaltashov** in Mass Spectrometry of glycosaminoglycan-protein interactions, **Prof. McClements** (FD SCI) on polysaccharide-protein interactions, and **Dr. Paul Butler** at NIST on small angle neutron scattering of coacervates. Alumni of the 2005

Dubin group from Indiana accepting academic positions in 2006 are **X. Guo** (Shanghai), **Y. Mishael** (Rehovot) and **G. Kirton** (Bowling Green, OH).

In the Gierasch lab ...

A number of exciting events occurred in the Gierasch lab the past year. At the ACS National Meeting in Atlanta in March, Lila was awarded the 2006 Francis P. Garvan-John M. Olin Medal which recognizes



Professor Gierasch receiving the 2006 Francis P. Garvan-John M. Olin Medal.

outstanding contributions of women chemists.

Shortly after that, Lila was named a Distinguished Professor here at UMass Amherst. And, she was selected by UMass Amherst to receive an award for Outstanding Accomplishment in Research and Creative Activity, which was presented at the University Convocation in the fall.

Most exciting for the research group was the news that Lila would receive a prestigious NIH Director's Pioneer award which provides generous support for five years to enable high-risk and high-impact studies related to current biomedical issues. The Gierasch lab will use the Pioneer Award in order to study protein folding and misfolding in the cell.

The lab now has two new postdocs, **Qinghua Wang** (from the Walters Lab in Univ. of Minnesota) and **Jiang Hong** (from the Record Lab in Univ. of Wisconsin-Madison) who are contributing to understanding the relationship of proteins (in their different states) and the cellular environment.

Chemistry graduate student **Gizem Dinler** received her PhD and is now working as a postdoctoral fellow in Sabanci University in Turkey. Senior graduate student **Annie Marcelino** was selected to give a presentation and was awarded the McEwen Fellowship during the Chemistry ResearchFest. Research Assistant **Prof. Joanna Swain** won the best poster award for the North Eastern Structure Symposium.

Among a number of papers appearing this year, one authored by visiting research fellow **Zoya Ignatova** and published in the Proceedings of the National Academy of Sciences USA has received a great deal of attention. This paper reported that the amino acid proline inhibits protein aggregation both in vitro and in vivo. This may have consequences for treatment of diseases such

as Alzheimer's and Parkinson's, which involve the formation of harmful protein clusters.

In the Hardy lab ...

Last spring Prof. Jeanne Hardy was selected to receive the Arnold and Mabel Beckman Young Investigator Award. In August Hardy attended the symposium for the 2006 Beckman Young Investigators at the Beckman Institute in Irvine, California where she was recognized for her three-year \$264,000 award. Hardy also presented the work of the lab at the 2nd Annual Meeting of the Institute for Nanomedicine at the National Academy of Science in Washington, DC, and presented lectures at Amherst College, Mount Holyoke College, the College of the Holy Cross, the University at Albany, and Clark University.

Under the direction of graduate student, **Witold Witkowski**, the Hardy lab launched their lab website <http://people.chem.umass.edu/jhardy> where the lab now keeps the public apprised of their work.



Over the summer Hardy lab Research Fellow **Kristin Paczkowski** won the CBI logo contest with her design for the Chemistry-Biology Interface website. The summer was also a lively time as SPUR student, **Elih Velazquez**, an undergraduate from Puerto Rico worked with graduate student, **Nivas Ramaswamy**, on a previously uncharacterized protein called a caspase. **Nivas, Elih** and graduate student **Kristen Huber** lead the Hardy group to a victory in the Chemistry-Biology Interface volleyball tournament.

The Hardy lab attended the Northeast Structural Symposium at the University of Connecticut (pictured from left to right are **Allison Craney** (MCB grad), **Kristin Paczkowski**, **Cassidy Dobson** (MCB grad), **Jeanne Hardy**, **Kristen Huber**, **Witold Witkowski**, **Sravanti Vaidya**, **Nivas Ramaswamy**, and **Megan Sweeney**.)



The Hardy group.

The Hardy group is working to crystallize new proteins involved in regulating cell death. The Hardy group participated the **Garman** and **Theis** labs in the Biochemistry & Molecular Biology department, to offer an intensive macromolecular crystallization course.

In the Holmes lab ...

Robert Holmes, who is a member of the International Scientific Committee, was invited to present a lecture at the 17th International Conference on Phosphorus Chemistry to take place in Xiamen, China, April 15-20, 2007. The conference is attended by about 500 scientists. His talk is entitled, “Biologically Relevant Phosphoranes: Hypervalent Phosphorus as Applied to Phosphoryl Transfer Enzymes.”

As Editor-in-Chief of the journal, Phosphorus, Sulfur and Silicon and the Related Elements, he has contracted to publish the proceedings of this conference.

Dr. Holmes has continued research with Dr. Chandrasekaran and Natalya Timosheva as an emeritus for the past 9 years. He will write no further research proposals ending more than 50 years of continuous research support. At age 78, he has decided to continue his work with the journal he edits and expand his work as an artist. Last June, he and his wife Joan celebrated their 50th anniversary on a cruise to Norway where they went kayaking on the Geranger Fjord and swam across the arctic circle.

Dr. Holmes had communicated many times over the years with his thesis professor, Nobel Laureate Herbert C. Brown, and was saddened by his death December 20, 2004. He was 92.

In the Jackson lab ...

Despite being head of department for a fourth year, Prof. Jackson continues to oversee a funded and productive research program. In addition to giving several invited lectures last year, including at the Sanibel Symposium and the fall National Meeting of the ACS, Prof. Jackson will give a plenary lecture at the US-China Partnership Workshop for Heterogeneous Catalysis and Surface Science in Dalian, China this summer. Professor Jackson is also serving as Chair for this summer’s Dynamics at Surfaces Gordon Research Conference.

In the Kaltashov lab ...

2006 was a very busy year in the Kaltashov laboratory, which included publication of five papers in peer-review journals, organizing an international meeting in Sanibel, FL on mass spectrometry of proteins and presentations at numerous other scientific meetings and conferences. PhD dissertations were successfully defended by **Joshua K. Hoerner** (who now works at GE Healthcare in Albany, NY) and **Mingxuan Zhang** (now at Schering-Plough Research Institute in Cambridge, MA). **Wendell P. Griffith** (PhD ’05) is completing his work as a post-doctoral fellow at the Johns Hopkins Medical School in Baltimore and is just about to start a faculty career of

his own (as an Assistant Professor of Chemistry in the University of Toledo, OH).

In the Knapp lab ...

The Knapp lab is concerned with enzymatic oxidation chemistry. The principal thrusts are (1) enzymes of the human hypoxia response (2) engineering enzyme-inorganic hybrids for oxidation catalysis and (3) fluorescent detection of plastic explosives.

Shannon Flagg and **Evren Saban** joined the lab to work on the hypoxia project. **Meaghan Germain** won the **Peter C. Uden** award at the 2006 Research Festival for her poster on fluorescent zinc molecules. **Halil Bayrakatar** published a paper on his work in enzyme-nanoparticle recognition, and submitted two others. Two undergraduate researchers left the group to move on to graduate programs: **Tom Vargo** to the University of Pittsburg, and **Todd Ratajczak** to UNC-Chapel Hill.

In the Lahti lab ...

After more than 20 years of productivity in the Lederle Graduate Research Tower, the Lahti group was assigned to Goessmann 201/202. Organic Chemistry in the modern department began in Goessmann, and our group returns the tradition there. See pictures of our move during the last week of February 2006, and our new lab area at <http://www.chem.umass.edu/~lahti/>!



Yilin Qiu, Zeynep Delen, Jitapa Sumranjit (May), Hemali Rathnayake, PML, Safo Aboaku

Susan Pasco (Gardner), former group postdoc (jointly with the **Karasz** group in Polymer Science & Engineering) is happy to announce the (somewhat speedy) birth of baby **Samuel Edward Gardner** in May 2006. **Susan** has been working as a Senior R&D Chemist at Nye Lubricants, Inc.

Martha Baskett defended her PhD dissertation on May 24, 2006. She has returned to her position teaching chemistry at Transylvania University.

Yi Liao has joined the faculty at the University of Central Florida as an assistant professor, after a highly successful postdoctoral stint with NLO materials authority **Prof. Larry Dalton**, University of Washington. **David Modarelli** of the chemistry department, University of Akron visited UMass Amherst during

November 29-30, 2006, and gave a departmental seminary on November 30 (see page 16).

Zeynep Delen defended her PhD dissertation on December 6, 2006. She has returned to Istanbul, Turkey. **Hemali Rathnayake** defended her PhD dissertation on December 13, 2006. She is presently working for a startup company birthed from the UMass Amherst Department of Polymer Science & Engineering. **Jitapa Sumranjit** defended her PhD dissertation on December 22, 2006. Hers was the 25th PhD defense in our group. She has returned to Thailand.

PML visited Japan in November 2006 to give a series of lectures at Nagoya University (thank you to host **Prof. Kunio Awaga**, a world authority in molecule-based magnetism, and to **Prof. Hiro Nishide**, Vice President of the Japan Polymer Society, for arranging a visit to Tokyo), and to make presentations at workshops and other universities. He also took great pleasure visiting some very beautiful places in Nara, Nagoya, and near Mt. Fuji.

Hidenori Murata and his wife, **Miho** have returned to Tokyo after a year with us in Amherst, following a very enjoyable bon voyage party. **Hidenori** accomplished the first discovery by a member of our group of an organic radical that exhibits intermolecular ferromagnetic exchange interactions. They have now settled in Chiba, where **Hidenori** is a faculty member at Tokyo University of Science! They were very kind hosts to PML for a day during his recent trip to Japan. **Hidenori's** work and publications continue to go well. We are all proud of his success.

In the Maroney lab ...

Recent highlights from the Maroney lab include the production of two new PhDs: **Peter Bryngelson**, who did groundbreaking work on nickel superoxide dismutase reaction mechanism and computations leading to new mechanistic insights, and **Sergio Chai** (joint with **Prof. Uden**), who brought structural and functional studies of cysteine dioxygenase, a non-heme dioxygenase, to fruition. Professor Maroney gave the Harvard/MIT inorganic seminar entitled "Cysteine Dioxygenase: A Theme and Variations" on October 11. Professor Maroney has accepted an offer to become the John C. Metzger, Jr. Professor of Chemistry and Head of the Department of Chemistry at Worcester Polytechnic Institute, and will be leaving the department this summer after 22 years at UMass Amherst.

In the Martin lab ...

Following last year's graduation of **Eddie Esposito** (PhD '05) from the laboratory of Prof. Craig Martin, three more students have left with well-earned PhDs.

Peng Gong (PhD '06) has taken postdoctoral position with **Prof. Karsten Theis** (Biochemistry & Molecular Biology), learning crystallography and continuing a collaboration between the two labs. **Peng's** work published in Biochemistry and J. Biol. Chem. has led to new insights of how RNA polymerase transforms itself from a sequence-bound initiating enzyme to a complex that can synthesize thousands of bases of polymeric RNA with no sequence specificity.

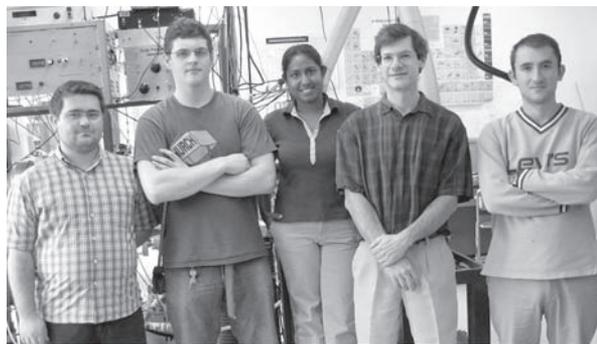
Rosemary Turingan (PhD '06) wrapped up her work on FRET distance measurements within the T7 RNA polymerase complex, with two papers in Biochemistry. **Rosemary** has now taken a position at Network Biosystems, in Woburn, MA, where she is exploiting her skills in fluorescence and nucleic acids.

Yi Zhou (MCB PhD '06) showed in a recent article in J. Biol. Chem. that RNA polymerases, lined up like trains on a track, can collide with each other. More specifically, a polymerase coming up from behind can efficiently displace a polymerase "stalled on the tracks." In another paper soon to appear in Proc. Natl. Acad. Sci., U.S.A., how an RNA polymerase that is topologically "locked" onto the (double) helical train track can fall off the track – it must first slide forward, dethreading the lock, before the RNA can be released. **Yi** is now in Cambridge, MA, doing pharmacokinetics with Altus Pharmaceuticals.

Finally, a collaboration begun by **Eddie Esposito** (PhD '05) and **Catherine Goodman** (PhD '03, Rotello group) is now bearing substantial fruit under the guidance of **Han Gang**, a graduate student jointly advised by Profs. Martin and Rotello. Although formally advised by two faculty, **Gang** has also established collaborations with **Prof. Richard Vachet** from Chemistry and **Prof. Neil Forbes** from Chemical Engineering, resulting (so far) in five first author and six secondary author publications.

In the Metz lab ...

The Metz lab is continuing to look at catalysis by, and solvation of, transition metal ions by studying the



Recent group photo: Murat Citir, Paul Ganssle, Manori Gunawardhana, Ricardo Metz and Gokhan Altinay

vibrational and electronic spectroscopy of ions. Our NSF grant to study C-H, C-C and C-O bond activation by transition metal and metal oxide cations was recently renewed. This renewal will allow us to implement new techniques to obtain vibrational spectra of ions and to extend our vibrational spectroscopy studies down to the 600-2100 cm^{-1} region. **Murat Citir** has been looking at complexes of Fe^+ with methane, using vibrational spectroscopy in the C-H stretching region to get a detailed picture of how binding to the metal weakens the C-H bonds in methane.

Gokhan Altinay leads our studies of the vibrations of intermediates of methane to methanol conversion by FeO^+ . Spectra of the key insertion intermediate $[\text{HO-Fe-CH}_3]^+$ are obtained by “argon tagging.” **Manori Gunawardhana** just finished up a very nice study of $\text{TiO}^+(\text{CO}_2)$. Photoexcitation of the TiO^+ chromophore in the visible leads to loss of CO_2 , which allows her to study the electronic spectroscopy of TiO^+ well below its dissociation limit, and also to study how the CO_2 “solvent” responds to changes in the TiO^+ charge distribution following photoexcitation. **Manori** and **Paul Ganssle** (a Junior undergraduate) are improving the electrospray instrument so they can study solvation of multiply charged ions by aprotic solvents by looking at the spectroscopy of ions such as $\text{Ni}_2^+(\text{CH}_3\text{CN})_n$. **Manori** and **Gokhan** will be presenting posters of their work at the Gordon Conference on Gaseous Ions.

In the Rotello lab ...

It has been a busy year for the Rotello lab. Professor Rotello presented a Distinguished Faculty Lecture in November, and was awarded the NSM Distinguished Research Award in May. He also organized two symposia at the ACS national meeting in San Francisco, and was co-PI (and co-organizer) for the NSF Physical Organic Workshop (2006-2008).

Vince is also co-leader of Bionanotechnology for the recently-awarded \$23 million NSF grant for the Center for Hierarchical Manufacturing, and was appointed to the Editorial Board of the Journal of Materials Chemistry.

In group news, **Rui Hong**, **Ayush Verma**, **Hiroshi Nakade** all received their PhDs and are at their respective postdocs (**Rui** at Harvard Med, **Ayush** at MIT, and **Hiroshi** back in Japan). **Belma Erdogan** (postdoc) is enjoying the warm weather at 3M

in Minneapolis, while recent PhDs **Ray Thibault** (ExxonMobil), **Joe Carroll** (Cabot) and **Ben Frankamp** (Bend Research) are all enjoying their jobs (and paychecks!). PhD students **Gang Han** (Graduate School) and **Rochelle Arviso** (CBI) both received fellowships. Rotello group research was featured on four covers: two for *Soft Matter*, one for *Nano Letters*, and one for *Journal of Materials Chemistry*.



In the Stidham lab ...

Professor Stidham remains active in teaching and research after celebrating the completion of his 50th year as a UMass Amherst Chemistry faculty member. The Physical Chemistry Laboratory now bears a plaque to honor this achievement. Professor Stidham and student **Arthur J. Laplante** continue their spectroscopic and computational studies into the conformations of small halocarbons, focusing now on the properties of 1,4-dichlorobutane. In collaboration with Prof. Stidham's wife, **Andrea M. Femino**, a Raman microscope is being designed for future biomedical imaging applications. Other Raman studies are being carried out in collaboration with **Gamil A. Guirgis** of the College of Charleston in South Carolina.

In the Thayumanavan lab ...

The Thayumanavan group enjoyed another productive year at UMass Amherst, despite the fact that Thai has been spending quite a bit of time as the codirector of the new campus effort, MassCREST (see page 1 for more details). Thai spent the latter part of the fall semester in India. He spent most of his time at the Indian Institute of Science in Bangalore and at the Indian Institute of Technology at Mumbai. In addition to invited lectures at various institutions within India, Thai also presented invited lectures at two International conferences in India.

Dr. Jing Jiang's paper on Amine-Functionalized Polystyrene Nanoparticles in Macromolecules was in top 20 most accessed papers in the whole year. **Dr. Ambade** and **Elamprakash Savariar's** review article on Dendrimers in Drug Delivery in Molecular Pharmaceutics was also among top ten most accessed articles for six months. More recently, the paper in Macromolecules by **Dr. Suhrit Ghosh** and **Subhadeep Basu** was the most accessed article between July-September 2006.



Professor Rotello receiving research award from Chancellor Lombardi, (left) and Dean Langford (right).

People in the group also had recognitions within the university. **Britto S. Sandanaraj** was awarded a graduate school fellowship for the academic year 2006-07 from UMass Amherst. **Jay Stone** also got a scholarship through the Mass Nanotech's IGERT program. Undergraduate **Derek van der Poll** got several honors from the Department of Chemistry as a graduating senior. **Jimmy Tran** got the Shapiro award as a sophomore in Chemistry.

Malar Azhagarsamy, Siriporn Jiwpanich, Tejaswini Kale, Michael Lartey, Jay Stone, and Volkan Yesilyurt joined the group as graduate students in February. **Kate Irvin** from Mount Holyoke College and **Daniella Gonzalez** from University of Puerto Rico spent their summer group as part of the Mass Nanotech's REU and NEAGEP program respectively.

K. 'Velu' Sivanandan has graduated and has joined **Prof. Craig Hawker** as a postdoc at UC-Santa Barbara. **Krys Bronk** took a job at the Pacific Northwest National Lab in Clem Yonker's group in Seattle. Also, **Krys** got married to **James Wallace** recently. Our new graduate student, **Malar** also got married to **Sangeetha** in India in 2006. They are now enjoying their life in Amherst.

Derek van der Poll finished his honors' thesis in the group and joined **Prof. Jean Fréchet** as a PhD student in Berkeley. **Kate Holman** (our Tulane alum) has become a candidate for her MD degree at Columbia University.

Dr. Sivakumar Aathimanikandan finished his postdoc in the group to accept a position at Childhood Foundation in Connecticut; **Dr. Raghunath Reddy** finished his postdoc to move to Georgia Tech; **Dr. Justin Thomas** has accepted a faculty position at Indian Institute of Technology at Roorkee; **Dr. Jayakumar** and **Thenmozhi** have become happy parents in Washington DC with their son, **Arjun**.

Please visit (<http://www.umass.edu/thaigroup>) to see our updated research highlights and other details.

In the Thompson lab ...

The Thompson lab continues to apply solid-state NMR and other approaches to investigate mechanisms of membrane proteins. Professor Thompson presented some of the lab's work on probing the role of conformational changes in transmembrane signaling at several conferences, including an invited talk at the XXII International Conf. on Magnetic Resonance in Biological Systems in Göttingen, Germany in August. Current graduate students **Dan Fowler** and **Fe Consolacion** are continuing work on this project. **Fe**, who was recently awarded a CBI Traineeship, is reconstituting the intact receptor into vesicles for biochemical and NMR studies. **Dan** is also preparing a manuscript describing an ideal small molecule for calibration of $^{13}\text{C}\{^{19}\text{F}\}$ REDOR NMR long-distance measurements. **Dan** was a co-author (with **Frank Kovacs**, postdoc 99-02, and **Greg Gallagher**, PhD '06) on a recently published paper where that outlines strategies for successful solid-state NMR distance measurements in proteins. Based on her sabbatical with **Doug Rees'** lab at Caltech. **Naima Sharaf**, an undergraduate who worked with the group during spring and as a summer REU student, succeeded in purification and preliminary stability studies of the methionine transporter. **Naima** transferred to University of North Carolina for the fall semester: we were sad to see her go but wish her well.

After many years of wonderful service to the UMass Amherst NMR community, **Charlie Dickinson** retired last January. Luckily we hired an able new director who also happens to be a UMass Amherst alumnus: **Weiguo Hu**, who earned his PhD in PSE working with Klaus Schmidt-Rohr, became the new NMR Facility Director in March. Last but not least is wonderful news from Israel, where **Yael Balazs** (PhD '99) works as an NMR Facility Director at Technion University: **Yael** and her husband **Tom** welcomed a baby girl last summer.

Professor Thompson also continues to direct the NIH-funded Chemistry-Biology Interface Training Program, a thriving community of 28 laboratories from 5 different departments, who gather for monthly Chalk Talks and

VINCENT ROTELLO DELIVERED DISTINGUISHED LECTURE



Professor **Vincent Rotello**, the Charles A. Goessmann Professor of Chemistry, gave a Distinguished Faculty Lecture on Wednesday, Dec. 6 at 4 p.m. in the Massachusetts Room of the Mullins Center.

In his talk titled, "Nanoparticles in Biology: Small Packets that Go Places and Do (Big) Things," he discussed how nanoparticles provide unique scaffolds for the binding of such biomolecules as

proteins and DNA. **Rotello** described how his research team combines synthesis, materials science and biology to create nanoparticles that bind to specific targets, providing new systems for chemotherapy and diagnostics. One focus of his research is on gene delivery, with potential for treating many genetic diseases. Another is on "silver bullet" treatments designed to maximize therapeutic efficacy while minimizing side effects.

- excerpt from In the Loop

benefit from many aspects of the CBI curriculum. We received news that the CBI Training grant was renewed for another 5 years! This is a testament to the high quality of our CBI students and faculty.

In the Tyson lab ...

A number of students completed their PhD studies: **Princess Hernandez** (Johnson Matthey), **Richmond Ampiah-Bonney** (Amherst College), **Yustina Rodriguez** (Brock University), **Hans Mentzen** (Alpha Analytical) and **Khalid Alassaf** (SABIC). Undergraduate students, **Patrick Cahill**, **Brendan Keene**, and **Berlinda Luong** worked in the group in the Spring '06 semester, and thanks to some additional funding from the NSF, **Bukola Fatunmbi**, **Michelle Gray**, **Shani Samuel** (all from Lincoln University) and **Theresa Ortiz** (UPR Mayaguez) enjoyed summer research experiences in the group. In the Fall of 2006, **David Mortenson**, **Mattias Frid** (an exchange student from Sweden), **Cathy Wong**, and **Christina Arieta** contributed to our further understanding of arsenic in the environment. Graduate students **Fumin Pan** and **Elena Dodova** have been developing HPLC separations with plasma source emission or mass spectrometric detection. Graduate student **Maura Mahar** has been developing new methods for the measurement of arsenic with a quartz crystal microbalance and she and graduate student **James Kearns**, who is also developing some spectrophotometric procedures, will evaluate the possibilities of anodic stripping voltammetry. Graduate student **Prince Amoako** continues to develop GC-AED procedures for the evaluation of the stability of selenium-enriched yeast material. The undergraduate component of the arsenic project continues to grow: a total of 92 undergraduate researchers were involved over the two semesters in 2006. More details of this work in progress can be seen at <http://courses.umass.edu/chemh01/>.

In the Vachet lab ...

2006 brought some big news for Prof. Vachet. He received tenure and was promoted to Associate Professor. On the personal front, Prof. Vachet and his wife, **Laura**, are proud to announce the birth of their second son, **William Powell**, on February 5, 2007.

Professor Vachet was busy professionally as well. He taught two-day short courses on Quadrupole Ion Trap Mass Spectrometry at both Pittcon in March 2006, and the annual meeting of the American Society for Mass Spectrometry (ASMS) in May 2006. He co-organized the ASMS Fall Workshop on The Present and Future of Quadrupole Ion Trap Mass Spectrometry in November 2006. During the fall semester, Prof. Vachet spent some sabbatical time in **Peter Lansbury's** lab at Brigham & Women's Hospital in Cambridge, MA.

FOND FAREWELL

The department also bids a fond farewell to **Dr. L. Charlie Dickinson**, who retired as the Director of the NMR laboratory last year after many years of excellent service (36 years at UMass and over 15 years as NMR Director!). Scores of students involved in synthesis were trained on the NMR machines under the watchful eyes of Charlie. Charlie continues to live here in Amherst. He keeps a hand in NMR as a consultant supporting the instruments at Mt. Holyoke, and is also happily busy with woodworking projects, kayaking local ponds, recorder music, and travel. We wish him the very best.



Dr. L. Charlie Dickinson

Charlie has left the facility in excellent hands: we are happy to welcome **Dr. Weiguo Hu** as our new NMR Facility Director. Dr. Hu earned his PhD in 1999 working with Prof. Klaus Schmidt-Rohr in the Polymer Science & Engineering Department here at UMass Amherst. Dr. Hu then worked at ExxonMobil before returning to UMass Amherst as the NMR Facility Director in March 2006. His research interests are broad: he has worked on NMR technique development, polymer and catalyst structure and dynamics by solid-state NMR, polymer microstructure by solution NMR, and structure of soil organic matter. Weiguo has embarked on teaching the next generation of UMass Amherst NMR users.

A patent on "Multiplexed Tandem Mass Spectrometry" was filed and accepted at the US Patent Office. This patent is based on work with **Jonathan Wilson**, and UMass' Commercial Ventures and Intellectual Property office is currently negotiating with a mass spectrometry company to license this technology. The group's research is progressing quite well as we focus on two main projects. First, we seek to understand the molecular-level details of the early stages of β -2-microglobulin amyloid fibril formation by developing new tools based on mass spectrometry and associated techniques. Second, in collaboration with **Profs. Rotello** and **Thayumanavan**, we use nanomaterials and mass spectrometry to selectively and sensitively detect compounds of environmental and biological importance. Several papers from both of these projects were published in 2006.

Three students defended their PhD dissertations during 2006, bringing the total number of graduate students who have completed their PhD work in the Vachet lab to eight. **Juma Bridgewater** defended in May 2006 and is now a Research Scientist at Vertex Pharmaceuticals in Cambridge, MA. **Juma** and his wife, **Stacey**, are also expecting their first child in February

2007. **Angela Fahey** defended in September 2006 and is now a Research Scientist at Cytec Industries, Inc. in Stamford, CT. Right around Christmas time **Angela** also became engaged to **Paul Kelly**. **Kwasi Antwi** defended in October 2006 and is now a postdoctoral fellow with **Douglas Lake** at Arizona St. University. **Kwasi** and his wife, **Dorcas**, are also expecting their second child in August 2007. Another piece of exciting personal news to report is the wedding of **Jonathan Wilson** (PhD '05) and **Princess Hernandez** (PhD '06) which occurred on May 6, 2006. Two undergraduate researchers also graduated in May 2006 and have moved on to continue their studies elsewhere. **Emily Carino** moved to Texas where she is pursuing her PhD in Analytical Chemistry at the University of Texas-Austin, and **Kevin Anderson** began an MD/PhD program at Boston University.



Cu(II) binding to beta-2-microglobulin causes it to aggregate into amyloid fibrils.

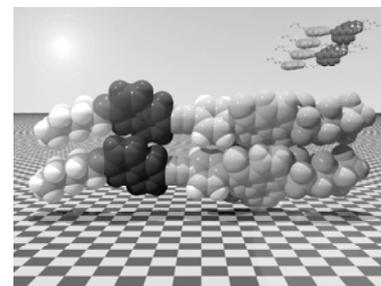
In the Venkataraman lab ...

Professor Venkataraman was on sabbatical leave during the fall semester. He spent a month at the Indian Institute of Science (IISc) in Bangalore, India. During his stay at IISc, he gave a series of lectures on Energy Options for India and about Fundamental Problems in Energy Research.

The copper catalysts developed in the DV group are now a part of Strem's main catalog. A patent was recently issued to DV, **Craig Bates** and **Rattan Gujadhur** for the coupling of chalcogenides with aryl halides using copper catalysts. **Pranorm Saejueng** graduated in November of 2006 and is now back in Thailand as a professor at Ubon Ratchathani University. Her research program at UBU will focus on copper-based catalysts for cross-coupling reactions and their mechanism. **Pranorm's** departure marks the end of the copper project in the DV Group. On the other hand, the helicene project was brought back to life because of a collaboration with **Prof. Mike Barnes**. Chiroptical responses from single helical molecules were probed by the **Barnes** group and the results of this investigation was reported in the Dec. 1, 2006 issue of the journal *Science*. **Travis Benanti's** work on the phase segregation of electron donors and electron acceptors using mutually phobic interactions will be featured on the cover of an upcoming issue of *Journal Chemical Communications*. A paper by **Serkan Yurt** and **Uche Anyanwu** on cleavable diblock polymers in the journal *Macromolecules* was on the most accessed papers in 2006. **Nestor Chevere-Trinidad** is now focusing on the synthesis of oriented semiconductor

nanorods on surfaces using electrochemistry. **Jocelyn Scheintuab** (BS '06) was awarded a Fulbright fellowship by the Department of State and she is spending a year at the Max-Planck Institute at Mainz, Germany. She will return to the US this fall and will join graduate school in the west coast. **Dan Burke** (BS '06) is now a graduate student at the University of California at Santa Barbara and works with **Profs. Jeff Bode** and **Craig Hawker**. The current undergraduates **Andy Kalaydjian** (BS '07), **Gordon Smith** (BS '07) and **Ingrid Swenson** (BS '07) have been very productive and will enter graduate schools this fall. **Amarnath Bheemaraju** joined the group and will be working on the use of side-chains with incompatible packing to assemble organic semiconductors.

From the undergraduate alumni side, **Claire Cohen** (BS '01) is now **Claire Cohen Schmidt**. **Claire** is now a visiting assistant professor in the Department of Chemistry at the University of Toledo. **Claire** received her PhD in 2006 from Cornell University working with **Prof. Geoff Coates**.



The illustration, published on the cover of the journal *Chemical Communications*, shows the packing of naphthyl ether and naphthalimide moieties into segregated stacks due to mutually phobic side-chain interactions.

Jeremy Kintigh (BS'00) is now a graduate student at the University of New Hampshire working with **Prof. Glen Miller**. **Jeremy** met DV in 2006 in a regional ACS conference in Binghamton and was very excited about his research in the **Miller** group. **Karen Osman** (BS '00) is with Shimadzu Scientific Instruments in Santa Clara, CA. **Tom Hill** (BS '02) visited Amherst in October 2006 and gave a talk to the Chemistry Club on this thesis research with **Prof. Larry Scott** of Boston College. After his talk, **Tom** discussed with current UMass Amherst Chem undergraduates about his experiences in graduate school. **Jaclyn Murphy** (BS '04) has moved to the University of Illinois with her advisor **Prof. John Hartwig**. **Noah Tremblay** (BS '04) is at Columbia working with **Prof. Colin Nuckolls**. **Mike Doherty** (BS '05) is working with **Prof. Mike Gagne** at the University of North Carolina at Chapel-Hill. For the past year, **Mike** and DV have been playing phone tags. Hopefully, they can talk to each other this year!

From the graduate alumni side, **Craig Bates** (PhD '05) and **Gemma** are now the proud parents of **Isaac**. **Craig** is now working for Sepracor in MA. **Jay Field** (PhD

'03) and **Lora** are expecting a baby this year. **Rattan Gujadhur** (PhD '03) is still with CV therapeutics in Palo Alto. **Derek Van Allen** (PhD '04) is working at the Naval Research Labs. His thesis was cited in the Ullmann Reaction entry in Wikipedia. **Uche Anyanwu** (PhD '05) is now working for Momentive Performance Materials; it was formerly GE Advanced Materials.

In the Voigtman lab ...

Ed Voigtman's year was the usual mix of highs and lows, but mostly the former. He taught CHEM 112 for the first time, following **John Chandler's** sudden January re-retirement, so CHEM 519 was not offered. Last March, Ed gave an invited lecture at the University of Florida, in honor of the impending retirement of his post-doc mentor **James D. Winefordner**. Ed's wife, Janiece, accompanied him and they greatly enjoyed reuniting with long-time friends and colleagues. The weather and southern hospitality were perfect. Ed's LightStone software continued to evolve and was crucial to the comprehensive detection limit research Ed did during the summer, but a big low was when **Al Wynne**, Ed's longtime colleague, mentor and friend, passed away in June.

Last fall, Ed taught CHEM 121H and enjoyed it immensely, even the grading of the term papers and special projects and the Help sessions, but CHEM 515

was not offered. **Dan Montville** defended his PhD on January 18, 2007, and is currently putting the finishing touches on his dissertation. Congratulations to **Dan!**



Professor Ed Voigtman and Dan Montville

Dan will still be around for the spring semester, teaching labs at UMass Amherst and Smith, before moving on to "the real world." We will get another paper based on **Dan's** work on the statistical behavior of quotients of detection limits and, since Ed is on sabbatical leave now, there is also time to write up his summer work. Ed will be spending a month at the University of Florida in late spring, working one last time with **Jim Winefordner's** group. Thanks to Center For Teaching and PMYR funding, Ed will also be using his sabbatical leave to re-invent CHEM 515, 519 and his gen chem courses.

degrees AWARDED

BA/BS DEGREES

Kevin Anderson	05/2006
Daniel Burke	05/2006
Emily Butterfield	05/2006
Patrick Cahill	05/2006
Lindsay Coutu	05/2006
Fei Huang	05/2006
Sai Archana Krovi	05/2006
Lisa Lee	05/2006
Todd Ratajczak	05/2006
Emily Richards	05/2006
Jocelyn Scheintaub	05/2006
Richard Senatore	05/2006
Tatyana Shalapyonok	05/2006
Katelyn Spillane	05/2006
Leanna Toy	05/2006
Erik Turnberg	05/2006
Derek van der Poll	05/2006
Thomas Vargo	05/2006
On Yi Wong	02/2006

MS DEGREES

Ali Bayir	09/2006
Basar Gider	09/2006
Jay Kerwin	02/2006
Karolina Rachtan	02/2006
Ilyas Unlu	09/2006
Joseph Worrall	02/2006
Zhixia Yan	05/2006

PHD DEGREES

Richmond Ampiah-Bonney	09/2006
Martha Baskett	09/2006
Tatiana Besschetnova	02/2006
Juma Bridgewater	09/2006
Krys Bronk	02/2006
Peter Bryngelson	09/2006
John Danku	02/2006
Gizem Dinler	02/2006
Edward Esposito	02/2006
Gregory Gallagher	02/2006
Peng Gong	05/2006
Princess Hernandez	05/2006
Rui Hong	05/2006
Sonoko Kanai	09/2006
Matthew Miller	05/2006
Yustina Rodriguez	09/2006
Calin (Dan) Sferdean	09/2006
Anthony Shrout	02/2006
Patrick Taylor	05/2006
Oktay Uzun	02/2006
Ayush Verma	09/2006

inMEMORIAM

Professor Emeritus Al Wynne 1925-2006

Professor Al Wynne, a member of faculty in our department for 38 years, passed away last June. Al was a man of deep and abiding character, possessed, as his son **Dennis** said at his funeral service, of integrity, honesty, generosity and caring. He was an Analytical chemist and proud of it and he had the ideal temperament for it: he was every bit as logical as Star Trek's Mr. Spock and unfailingly accurate and precise in his speech and writing, even when he was writing tiny longhand in that mysterious little book he always carried in his shirt pocket. His exquisite printing and mirror image cursive (which he sometimes used to inform students of their cumulative examination progress) were as tightly crafted as Mayan stonework. Al had a truly outstanding memory for facts and details of all sorts, whether in weekly Sunday New York Times crossword puzzle competition (in ink) with long-time friend and fellow railway buff **Everett Turner**, or the specifics of an insanely complicated buffer system or some incident involving student misbehavior. He knew all the Analytical division history and made a great deal of it personally. He could be a bit pedantic on occasion, but it was nothing more than a side-effect of his analytical mind. He was uncommonly and refreshingly forthright, but never pretentious or arrogant. He was an active member of this "Brotherhood of Hermits."



NEAACC January, 1988: Al Wynne, Terry Tougas, Ed Voigtman & K. P. Lee

Al taught in the general chemistry program early in his career at UMass Amherst, but when I met him in 1986, he was one of the senior faculty in the Analytical division, where

he taught until his retirement in 1995. His son **Dennis** took Al's Quantitative Analysis (CHEM 315) course the year before Al retired and noted that Al cut him and the other students "absolutely no slack and I never worked harder at any course than I did for CHEM 312, but it was a great course and a great experience. As a teacher Dad had higher expectations of juniors, he communicated those expectations right up front and held his students accountable. Dad said what he did and did what he said." It is inconceivable that Al would have done otherwise, as all those who had the privilege to know him would agree. He wasn't just well grounded: he was bedrock, utterly dependable and unflappable.

As **Dennis Wynne** said at Al's service: "it is Dad's sense of humor and his antics as the 'mischievous intellectual' that I, and I expect many of you, will remember most fondly." This is a staggering understatement! Al had a fantastic sense of humor and his exuberant laughter, which could

be quite loud, is very sorely missed. Al was a master story teller, spinning out the yarn just so, and then evoking gales of laughter from all in earshot, including himself, no matter if the story was at his own expense (i.e., his John Roberts prank attempts). I still remember the time he got up to speak at a NEAACC (New England Academic Analytical Chemistry Conference) and opened his talk by noting that his surname had been misspelled as "Wynn." He dryly commented that the "e" on the end of "Wynne" was like a pig's tail: it was not much to look at, but the pig needed it for balance! We all burst out laughing, especially Al, who was enormously fond of what he called his "spontaneous unrehearsed" comments.

Al Wynne's life was a sterling example of integrity, balance, humanity and professionalism. He loved his family immensely, speaking of them so often we almost felt we knew them all closely, including his daughter **Janet**, her son **Danny** and his father. Al deeply loved learning and teaching, and his explanations were always clear and concise, cutting right to the heart concept. And he was a deeply religious scientist, which, for those of us who knew Al, was not the slightest contradiction.

At Al's service, **Dennis Wynne** said "Dad always undervalued his importance to those with whom he came in contact, but Dad was important to so many. We see evidence of this by the number of cards and letters Dad received over the past several months, by the number of former students who have stayed in contact with Dad and who made extra efforts to contact Dad while he was sick, and by the number of people who are here today – honoring my father and celebrating his life with us." On a personal note, I would like to express my thanks to all those who sent cards and letters and who visited Al last spring. He and his lovely wife **Mary** appreciated these kindnesses greatly and, as bravely as Al persevered, I'm sure these efforts considerably eased his journey.

I have lots of Al stories, and I'm sure I'm not at all unique in this regard, so I would like to suggest that if anyone wants to share one or more of their Al stories with all of us, please send them to me at voigtman@chem.umass.edu. I will edit them as sparingly as possible and post them at our departmental web site. I'm sure **Mary**, **Dennis**, **Janet**, and **Danny** would enjoy these as well and I will see to it that they receive hard copies. –*Ed Voigtman*

Professor Emeritus John Chandler 1933-2007

Just prior to going to press with this issue of the Goessmann Gazette we learned of the passing of our colleague and friend, Prof. John A. Chandler. His smiling face, positive attitude, and important contributions to the Chemistry Department will be sorely missed. We will place a more suitable and lengthy remembrance in the next issue of the Gazette.



Professor John Chandler

newADDITIONS

Safo Aboaku (Lahti group) and his wife, **Kate**, became the proud parents of **Kofi Aboaku** (Kofi because he was born on Friday) on February 24, 2006. The birth weight was 7.7 lbs and the height was 21.8 inches. He is currently on holidays in Ghana whilst the mum is in school there.



Luke Alexander Hammer born to **Nathan Hammer** (Barnes group) and his wife, **Larissa**, on February 24, 2006 at 12:34 am weighing 6 lbs, 5.8 oz and 19.5 inches long.

Professor Peter Khalifah and his wife, **Surita Bhatia** (ChemE), welcome **Julian Krishan Khalifah** born on December 19, 2006. He weighed in at 9 lbs, and stretched out to 22 inches.



Hemali Rathnayake (Lahti group) gave birth to **Bhanuka Pavan Ariyawansa** on October 14, 2006. Weight at time of birth 8 lbs 2.7 oz and height 21.75 inches. This picture was taken after four days he was born—his very first smile.

Nibedita Sanyal (Lahti group) gave birth to **Soham Sanyal** on August 6, 2005 weighing at birth 6 lbs 9 oz, 20 inches long. This picture was taken on his first birthday.



Professor Dick Stein shares the birth of his GREAT grandchild, **Jenson Taylor** born Thursday, December 16, 2004 at 11:24 am by C-section weighing 7 lbs, 3 oz.



Professor Richard Vachet and his wife, **Laura**, would like to announce the birth of their second son, **William Powell Vachet**, born February 5, 2007. He was 8 lbs, 2 oz and 21 inches long.

staffCHANGES

Kay Fenlason joined our Chemistry team last spring as an Assistant to the Undergraduate and Graduate Programs. Although new to the university, Kay acclimated quickly to academic life, making valuable contributions to both programs including streamlining the process for graduate appointments. Kay has also been working closely the Graduate Program Director, **Craig Martin**, in creating a new database system containing graduate information to better track their history and progress. We are lucky to have attained another talented person into our ranks.

staffNEWS

Illustrating the Chemistry staff's diverse talents, our own **Suzanne Palmer**, IT Manager for the Chemistry and Biochemistry and Molecular Biology departments, was nominated for Best Short Story of 2006 by the British Science Fiction Association. Her nominated story, "Spheres," was published in *Interzone*, Britain's No. 1 Science Fiction Magazine, in the November/December 2006 issue.



Suzanne is a UMass Amherst alumnus. While earning her BFA in sculpture, she also served as president of the UMass Science Fiction Society. Although she has been a lifelong reader of SF, she only began writing it a few years ago. So far she has published four short stories, two poems, and has completed a novel which is on submission to a publisher in New York.

FORMER PRESIDENT JOHN W. LEDERLE 1912-2007



John W. Lederle

The University of Massachusetts Amherst, as we see it today, is primarily the creation of former President John W. Lederle. President Lederle died February 13, 2007. Dr. Lederle was appointed president in 1960 and transformed a small rural campus of approximately 6,000 students to the major research university that he handed back to the trustees in 1970. With unparalleled background knowledge and foresight, he established

and fostered the university's strengths as an international educational and research institution. At home in the world of politics, medicine, science, engineering, social studies, athletics, and the arts, President Lederle provided a balance in the development of all areas. We in the sciences and engineering are proud to have his name connected with the Lederle Graduate Research Center. President Lederle's many other contributions to the realm of national, state and local government politics, and to the civic life, were legendary. He is much missed.

2006 SEMINAR SERIES

The 2006 Seminar Series was notable for its dazzling speakers and the opportunity for members of the chemistry department to host two Nobel Prize winners. The series started with an amazing presentation by **Prof. Patrick Vaccaro** from Yale University whose seminar was “Lifting the Veil of Solvation: The Chiro-Optical Response of Isolated Organic Molecules.” Emphasizing progress in signal-to-noise, Prof. Vaccaro provided a historical anecdote about previous researchers who set up their spectrometer in the largest indoor venue available—the local cathedral—which they succeeded in burning to the ground!

The Annual *Five College Seminar*, which has featured over a dozen Nobel Laureates, this year presented **Prof. F. Sherwood Rowland** from the University of California at Irvine. Professor Rowland won the 1995 Nobel Prize for his revolutionary work on the damaging effects of emitted pollutants on the ozone layer. His work culminated in the ban of chlorofluorocarbons (CFC’s) in aerosols. He delivered a standing-room-only lecture at UMass Amherst entitled, “Pollution, Both Urban and Long-range.”

In the Fall of 2006, we were honored to have one of our alumni give a seminar. **Professor David Modarelli** is currently Associate Professor and Associate Director, Center for Laser & Optical Spectroscopy at University of Akron. Professor Modarelli earned his PhD with **Prof. Paul Lahti**. Professor Modarelli’s seminar was entitled, “Photophysical Properties of N-Confused Porphyrins and Their Use in Photonic Arrays.” The term N-confused porphyrins was a bit confusing at first, but by the end it became crystal clear.



William Mahoney and Dr. Ioannis Miaoulis

On September 22, 2006 our *William E. Mahoney Annual Lecture* was given by **Dr. Ioannis Miaoulis**, President and Director, Museum of Science, Boston. His talk was an inspiring overview of his efforts to add engineering into the curriculum across the United States. Dr. Miaoulis’ message is that to be an educated society, the population needs to know how natural and also man-made objects work—like a TV or a car. Dr. Miaoulis has developed a series of courses such as Gourmet Engineering, which teaches students the principles of heat transfer, convection, conduction and radiation while students learn to cook a variety of delicious dishes.

Our *Procter & Gamble Honorary Seminar in Chemistry*, held on October 26, 2006 was given by **Prof. Jean-Marie Lehn**, Nobel Prize Winner from the University of Strasbourg, France. Professor Lehn gave a fascinating speech entitled, “Perspectives in Supramolecular Chemistry: Towards Self-Organization from Matter to Life.” Professor Lehn’s main focus was what he described as “The Basic Question: from the elementary particle to the thinking organism, how does matter become complex? Professor Lehn offered his unique perspective on the answer, taking from his work on self-assembly of supramolecular systems.



Professor Jean-Marie Lehn awaits introduction.



Professors Julia Kornfield and Richard Stein

This year marked the 10th annual *Richard Stein-Bayer Corporation Honorary Seminar in Polymer Chemistry*, which was presented by **Prof. Julia Kornfield** from the California Institute of Technology. Professor Kornfield gave an energetic talk on polymer-crystallization entitled “Making them Faster and Better: Flow-Induced Crystallization of Polymers” in which she described how throughout her career she had often changed her research focus to follow “new” scientific insights, but at each turn was surprised to learn that Prof. Stein had made the important fundamental insights into the same problems, usually several decades before!

Our 2006 seminar series was a wonderful success; we are looking forward to the 2007 series, expecting it to be as exciting as always, bringing us many new scientific insights. We thank all our alumni whose gifts make this seminar series possible.

researchFEST 2006

The annual research symposium was held on September 9, 2006. Four students were selected by a committee to give oral presentations and were given the following awards:



Annie Marcelino



Gang Han



A. Basak Kayitmazer



Serkan Yurt

William E. McEwen Fellowship: Annie Marcelino (Gierasch Lab) for “Local and Global Sequence Information in a Beta-Clam Protein”

William E. McEwen Outstanding Chemistry Graduate Student: Gang Han (Rotello/Martin Labs) for “DNA/Drug Delivery by Means of Multifunctional Gold Nanoparticle”

Procter & Gamble Outstanding Chemistry Graduate Student: A. Basak Kayitmazer (Dubin Lab) for “Polyelectrolyte-Protein Coacervates: Mesophase Separation in Biomimetic Electrostatic Self-assembly Systems”

Rohm & Haas Outstanding Chemistry Graduate Student: Serkan Yurt (DV Lab) for “Well-Defined Heterojunctions for Photovoltaic Applications.”

There was a wonderful turnout for the two poster sessions, which contained over 40 posters. The judges had a hard time choosing just four outstanding posters because every student did a great job. In the end though, there were four awards given out as well as two honorable mentions, and they were as follows:

Peter C. Uden Outstanding Poster Award Sponsored by Procter & Gamble: Meghan Germain (Knapp Group) for “A Marcus Theory Analysis of the Photoinduced Electron Transfer Properties of the Zn(salophen) Family”

C. Peter Lillya Outstanding Poster Award Sponsored by Rohm & Haas: Kelly Ryan (Maroney Lab) for “Nickel Superoxide Dismutase: Effects on Structure and Function in First-Sphere Mutations”

George R. Richason Outstanding Poster Award Sponsored by Rohm & Haas: Ruthanne Hassey (Barnes Lab) for “Fluorescence Detected Circular Dichroism and Circularly-Polarized Luminescence of a Single Molecule”

Marvin Rausch Outstanding Poster Award Sponsored by Fisher Scientific: Mrinmoy De (Rotello Lab) for “Biomimetic Interaction of Alpha-Chymotrypsin with Amino Acid-Functionalized Gold Nanoparticles”

Honorable Mentions: Priyanka Dobriyal (Russell Lab) for “Wetting Transition in Cylindrical Alumina Nanopores with Polymer Melts” and Michael Odoi (Barnes Lab) for “Time-Tagged Time-Resolved (TTTR) Single Photon Counting and Size Correlated Studies of Single Quantum Dot/Conjugated Organic Composite Nanostructures”

We executing this event would like to extend a thank you to the many people and organizations involved in making this event possible. We thank Prof. Venkataraman, whose endless efforts and support drove the event’s success; the oral presentation judges: Prof. Ed Voigtman, Prof. Lynmarie Thompson, Prof. Mike Knapp, Prof. Jeanne Hardy, Prof. Peter Lillya, and Prof. Scott Auerbach, and the Poster Judges: Dr. Marianny Combariza (Vachet Lab), Dr. David Kennedy (Maroney Lab), Dr. Suhrit Ghosh (Thai Lab), Dr. Nate Hammer (Barnes Lab) and Dr. Crisjo Joseph (Maroney Lab), who were charged with choosing winners among a very worthy group. The sponsors: UMass Amherst Department of Chemistry, Rohm & Haas, Procter & Gamble, Fisher Scientific, Bruker Biospin, Cambridge Isotopes, and the William E. McEwen Endowment Fund deserves a thank you for their financial contributions. Lastly, the ResearchFest Committee thanks Lisa Korpiewski, jms, and Susan Pixley for their help with planning, organizing and printing.

The BBQ at the end of the day gave everyone an opportunity to relax and enjoy the beautiful weather. It was nice to see members of the chemistry community bring their families to socialize and concluded a great day of science. We look forward to seeing everyone next year for ResearchFest 2007.

undergraduate SENIOR & AWARDS DINNER



Professor David Adams and the 2006 Senior Class.

At its eighth annual Senior and Awards Dinner, held in the Lincoln Campus Center on the UMass Amherst campus on Wednesday, May 17, 2006, the chemistry department recognized those undergraduates who have distinguished themselves in the pursuit of academic excellence. More than a hundred students, parents, faculty and staff attended the event that included a buffet dinner followed by the presentation of 35 awards to 26 deserving undergraduates. The students and guests were welcomed by Acting Department Head **Julian F. Tyson**, and the 27 graduating seniors were introduced by Prof. David L. Adams, who also acted as master of ceremonies. **Marie Whalen**, Undergraduate Program Manager, organized the evening's activities, and **Lisa Korpiewski**, departmental Graphics Designer, providing the creative talents, designed the program and made the certificates and favors given to individual students. Additional information about the undergraduate awards is available at the departmental web site at www.chem.umass.edu/Undergraduate/scholarshipAwards.htm.

The following students received awards:

Daniel J. Burke

– Outstanding Senior Undergraduate Award

Derek G. van der Poll

– Connecticut Valley Section of the American Chemical Society (CVS/ACS) Student Award

Fei Huang

– American Institute of Chemists Award

Jocelyn R. Scheintaub and Todd R. Ratajczak

– Richard W. Fessenden Award

Richard D. Senatore and Katelyn M. Spillane

– Senior Class Award

Thomas R. Vargo, Katelyn M. Spillane, and On Yi Wong

– Merck Index Award

Derek G. van der Poll

– HyperCube Scholar Award

Kevin R. Anderson

– Departmental Recognition Award

Daniel J. Burke, Jocelyn R. Scheintaub, and Derek G. van der Poll

– Outstanding Undergraduate Researchers 2006

Richard D. Senatore

– Alumni Association Senior Leadership Award

Jocelyn R. Scheintaub

– Fulbright Fellowship

Michael J. Hernon

– ACS Analytical Chemistry Award

Christine M. Oslowski

– Jay A. Pirog Scholarship

Ellen J. Swain

– Bates Research Fellowship

Antranig Kalaydjian

– Bradspies Research Fellowship

Brad A. Beaudoin, Tyler J. Caron, and Zoltan Mester

– Robert Maxwell Williams Memorial Scholarships

Nathan T. Akey, Benjamin R. Ditrollo,

Arionela Jashari, Daniella M. Pizzurro, and Jimmy C. Tran

– Edward Shapiro Scholarship

Brett M. Babin, Matthew M. Coggon, and Sarah J. Morgan

– CRC Freshman Chemistry Award

DV ... continued from page 1

the prices lowered, the quality of living dramatically improved. The Human Development Index (HDI), which is a combined measure of the standard of living, literacy, education and life expectancy, increased for many countries especially for India and China. The new economies have joined the G7 in their demand for energy to fuel their growth. The result is an increased global demand for energy, estimated to be around 14 terawatts (14×10^{12} watts) in 2004. Substantial parts of this demand are met by carbon-based energy sources such as oil (47%), natural gas (20%) and coal (21%). It is anticipated that the demand is going to grow in the coming years and the current sources of energy may not be able to meet the demands. In addition, the current geopolitical and environmental concerns are providing the impetus to look at new sources of energy.

GG: *How much petroleum do we have now?*

DV: According to the US Department of Energy, the total world petroleum or oil reserves is estimated to be 1292.5 billion barrels of oil. With the current global demand of about 90 million barrels per day, oil will last for about 39.3 years, i.e until the year 2046. However, according to the official energy statistics from the US Government, the global oil demand is expected reach 98 million barrels/day in 2015 and 118 million barrels/day in 2030. Even if oil reserves equivalent to that of Saudi Arabian reserves (~264 billion barrels) are discovered, it would extend the availability of oil only by another eight years. Also, since 16% of oil is used to generate petrochemicals, oil shortage will not only affect the energy sector but also the chemical and pharmaceutical industries. In order to extend the availability of oil, either large reserves need to be discovered or the demand for oil needs to dramatically decrease.

GG: *How about coal?*

DV: Yeah, coal is a good source of energy. In fact, India, China and the United States are among the countries that are rapidly expanding the use of coal and nuclear energy to meet their energy demands. According to the US Energy information administration (<http://www.eia.doe.gov/emeu/iea/res.html>), the total recoverable global coal reserves are equivalent to 4800 billion barrels of oil. Also, coal can be converted to petrochemicals. Therefore, there is a renewed interest in using coal. Last year, China's second largest coal firm, China National Coal acquired Harbin coal-to-petroleum plant for the conversion of coal to olefins – a clear indication of the important role that coal will play in the near future. However, one of the major concerns in using coal for energy generation is the environmental

impact of carbon dioxide and other gaseous by-products.

Instead of burning coal directly to generate energy, the current focus is on

converting coal to a mixture of CO and H₂ (Syngas). Conversion of coal to Syngas separates coal from sulfur and nitrogen impurities and therefore provides 'clean' coal. Nonetheless, carbon dioxide that is generated by burning syngas still needs to be sequestered. One approach that has emerged as a front runner is the injection of carbon dioxide in to deep oceans or deep into the earth. Yet, the environmental impact of this approach remains unknown. In my opinion, we have to find a way to sequester carbon dioxide if coal becomes the major source of energy.

GG: *OK. What is your opinion on nuclear energy?*

DV: Nuclear Energy has also emerged as front runner to meet global energy demands. For example, India is expected to build several new reactors in the near future to meet its energy demands and has entered into an agreement with the United States for procurement of nuclear fuel. International Atomic Energy Agency (IAEA, http://www.iaea.org/NewsCenter/News/2006/uranium_resources.html) estimates that at the present rate of demand, global uranium resources will last for another 85 years. On the other hand, if Breeder Reactor technology is adopted, then IAEA estimates that there will be enough nuclear fuel for more than 2500 years. At the present time, since uranium fuel is cheap, countries like India prefer the construction of uranium-based reactor over the expensive Breeder reactors. The two major concerns associated with nuclear energy are nuclear proliferation and nuclear waste. Nuclear proliferation would be a big problem if breeder technology was adopted. However, given the geopolitics of oil, increased energy demands, and inefficient large scale generation of primary power from renewable energy sources, nuclear energy seems to be a practical short term solution to meet the energy demands.

GG: *Let us go back and talk about the environmental impact of burning petroleum and coal. Can you tell us*



Mount Hope Bay (mouth of Taunton River), Braga Bridge and Brayton Point Power Plant, Fall River, Massachusetts, January 15, 2004—Professor Alexey Sergeev, Texas A&M University.

DV ... continued from page 19

more on this?

DV: Well, there is a lot of talk now on global warming or climate change. I think there is a general agreement at least among scientists that there is global warming. In 1998, Hoffert and co-workers published a paper in the Journal Nature on the 'Energy implications of future stabilization of atmospheric CO₂ content'. In this paper, they argued that in order to stabilize the CO₂ levels in the atmosphere, more than 10 TW of power needs to be generated from non-carbon sources at least by 2050, much earlier than envisaged by the United Nations Forum on Climate Change. The current situation is that petroleum is being consumed at a fast rate and coal is being burnt without a viable way of sequestering carbon dioxide. If the current global warming is a result of the industrialization of 200 million people, one has to wonder the effect on the climate if carbon-based energy sources fuel the industrialization of 2 billion people!

GG: *What do you think should be done to solve the energy demand problem?*

DV: In my opinion, the world's response to the global energy demand has largely been reactive and we are a long way from replacing carbon-based energy sources. The need of the hour is thoughtful, proactive, long term planning to meet the projected energy needs using non-carbon sources.

I think that the next decade will have to see a paradigm shift in the production of primary energy. Energy production portfolio in the United States and in rest of the world has to diversify. Direct solar energy, wind energy and biomass, in conjunction with energy carriers such as hydrogen, alcohols, bio-diesel or other synthetic fuels will have to dominate the energy landscape instead of petroleum and coal. In this diverse energy landscape, our ability to lead and compete in a global economy will not only depend on our ability to transform basic research on energy to efficient, cost-effective energy production but also on how we deploy and utilize the diverse energy resources for maximum benefit.

UMass as a community is doing its part to address this energy issue. There are many research groups at UMass Amherst particularly in Chemistry who are focusing on the fundamental problems in alternate energy. The Massachusetts Center for Renewable Energy Science and Technology at UMass Amherst brings together researchers with complementary expertise to focus on energy-related problems. The need of the hour is more financial support for this research.

GG: *Thank you DV. It was wonderful talking to you.*

Thai ... continued from page 1



doing energy research, both in the Chemistry Department and in neighboring departments. I felt like the time was right to unite these strengths on campus into a

single entity – MassCREST – to maximize our chances of solving renewable energy problems.

GG: *The “energy problem” seems so broad. Does MassCREST have a particular focus?*

ST: Yes, absolutely. We in MassCREST focus on “chemical energy;” this is obviously of great significance to our department. Chemical energy, in contrast to wind, hydro and nuclear, is energy stored in chemical bonds. For example, in solar power, energy is stored as excited electrons in photo-voltaic materials. In the case of fuels, energy comes from reorganizing chemical bonds during combustion. There are many other examples. Overall, the mission of MassCREST is to provide the technological know-how to improve the performance of chemical energy devices by ten-fold over the next ten years. I am really excited by the central role that faculty and students in the Chemistry Department are playing in achieving this goal.

GG: *In addition to Chemistry, what other disciplines are represented in MassCREST?*

ST: Renewable energy research is an inherently multi-disciplinary area, where Chemistry has a central role to play, but many other disciplines are crucial as well. To really make an impact, we need expertise in synthesis of new energy-harvesting materials, characterization of these materials, theory to explain and optimize their performance, and device fabrication to pull all of this together into deliverable products. Experts in each of these areas working together as a MassCREST team definitely makes the whole greater than the sum of its parts; that's just the synergy I was looking for. We have identified experts from Chemistry and from departments such as Biochemistry, Biology, Chemical Engineering, Electrical Engineering, Mechanical Engineering, Microbiology, Physics, Plant and Soil Science, Polymer Science, and the Isenberg School of Management.

GG: *Why the School of Management?*

ST: To make a real impact, we hope and expect to generate spin-off companies from MassCREST

research. We figured that it's better to have input from the School of Management on product development, marketing, etc. sooner rather than later.

GG: *Even with your focus on Chemical Energy, that still seems quite broad. How have you structured MassCREST to develop different sources of chemical energy?*

ST: Good question; we need a structure that supports our work without imposing artificial and harmful boundaries. MassCREST has three primary Energy Research Groups or ERGs. [At this point in the interview, Prof. Thayumanavan just smiles, waiting for me to remember that an “erg” is a unit of energy!] The ERGs are (i) Solar Energy, (ii) Fuel Cells and Batteries, and (iii) Fuels for the Future (e.g., hydrogen and ethanol). Examples of projects include studying new bio-inspired materials for efficient light harvesting, new proton exchange membranes for high-temperature fuel cells, and new nanoporous catalysts for biodiesel production. In addition to projects that fall within these ERGs, several projects overlap two or three ERGs. For example, hydrogen is a fuel of the future (ERG 3) that could be produced using solar energy to split water (ERG 1), and could be utilized in a next-generation fuel cell (ERG 2). The great utility of MassCREST is the ease with which these kinds of research connections can and do flow.

GG: *What are some of MassCREST's early accomplishments?*

ST: In the early days of such an endeavor, we count our successes in grant dollars. MassCREST's first grant was provided by the University of Massachusetts President's Science and Technology Initiative Fund. This is a \$200,000 grant with a \$40,000 match from the Vice Provost for Research at UMass Amherst. Also, Prof. Auerbach in Chemistry received a grant from the National Science Foundation (NSF) to model new

catalysts for biofuel production (see the Auerbach lab notes on page 4). Very recently, we won an NSF grant to establish UMass Amherst as an REU (Research Experiences for Undergraduates) site. This program supports summer research projects with MassCREST investigators for undergraduates from UMass Amherst and from other universities across the country. In addition to supporting our present research, this is a terrific way to recruit the star graduate students of the future. We have many other “irons in the fire,” so to speak. More than a dozen million-dollar proposals have been submitted to the US Department of Energy over the last year. We are very optimistic that these will bear significant fruit.

GG: *Okay, you've provided a great glimpse into MassCREST. How can our alums help?*

ST: Speaking now directly to our Chemistry alums, you can help in many ways. First is your ideas. We believe we have many excellent ideas, but we don't pretend to have all the ideas. We would like to hear your input and advice about MassCREST. Second is corporate connections. We are building an industrial consortium to facilitate translation of MassCREST research into the marketplace. Your help in building bridges between your company and MassCREST is tremendously valuable. Please email me at thai@chem.umass.edu to share your ideas for building MassCREST and its connections with industry. Third is your financial support. You can sponsor an endowed chair in chemical energy; you might support named research facilities or student fellowships; there are a great many ways to support MassCREST activities. Please contact Laurie Benoit (lbenoit@nsm.umass.edu), Director of Development, to discuss giving to MassCREST.

GG: *Well, thank you Prof. Thayumanavan for sharing these exciting developments.*

ST: Visit our website at <http://www.chem.umass.edu/masscrest/>.



MassCREST to Host NSF REU Program



This summer the Chemistry Department will host 10–12 undergraduate researchers from colleges and universities in New England and across the country. The three-year REU program, focused in the emerging area of chemically based renewable energy, will be run under the auspices of MassCREST and directed by Professor Thayumanavan. In this 10-week research program MassCREST faculty mentors and their students will form collaborative teams to tackle problems in photovoltaics, fuel cells, and biomass conversion. We expect the collaborative aspect of the projects coupled with the focus on renewable energy science and technology to attract some of the area's most promising students. More information is available on the program's web site, www.chem.umass.edu/masscrest/reu.



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ALL ALUMNI ARE CORDIALLY INVITED TO CHEMISTRY ALUMNI REUNION 2007

*Featuring Professors D. Venkataraman and S. Thayumanavan talking about
“ENERGY: Problems and Solutions”*

*Y*OU are cordially invited to the next Chemistry Reunion on Saturday, June 9, 2007. The Department of Chemistry will feature lectures on issues related to ENERGY, by two of our distinguished faculty members: Prof. D. Venkataraman (“DV”) and Prof. S. Thayumanavan (“Thai”). Please mark this date on your calendar. We hope to see you for Reunion 2007, an occasion to learn about energy issues that impact us all, and about research here in Chemistry at UMass Amherst that we hope will address these issues.

We plan the following schedule of events, open to all students, faculty, staff, alumni and friends:

Saturday, June 9, 2007

2:00-3:00 p.m. Reception

3:00-3:30 p.m. Energy and the Future,
by Prof. Venkataraman

3:30-4:00 p.m. Energy Research and MassCREST,
by Prof. Thayumanavan

4:00-5:00 p.m. Social Hour

Please RSVP to Ms. Susan Pixley by phone at 413-545-2585, by email at spixley@chem.umass.edu. For more information about the reunion weekend including lodging information, call Ms. Susan Pixley or visit our reunion 2007 website.

The Reunion will take place in Lederle Tower room 1634. Lederle Tower is just north of Goessmann Laboratory; room 1634 is on the 16th floor. We hope to see you all there in June 2007!

*Have you been wondering
how your next car might
be powered, or when solar
energy will finally light
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