



GOESSMANN gazette

A Publication of the Chemistry Department
University of Massachusetts Amherst
www.chem.umass.edu

Volume 38

WINTER/SPRING 2009

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UPCOMING EVENTS

Chemistry Analytical Day
April 4, 2009

Senior Awards Dinner
May 12, 2009

Alumni Reunion 2009
June 6, 2009
Industrial Connections

UMass Amherst Chemistry— A World of Industry

Dr. Brian Jordan, the Department's most recent PhD graduate to enter industry, happily makes his way to work as an industrial chemist at US Genomics; a start-up company specializing in single-molecule detection of DNA, RNA, and proteins. Although the economy is slow in every business including the chemical sector, Dr. Jordan's training has positioned him to remain nimble and provide tremendous value to his new organization. He is one of a great many UMass Amherst Chemistry alums employed in the chemical industry. In fact, the UMass Amherst Chemistry Department has a long record of preparing its students for careers in the industry sector. About 70% of the Department's graduates pursue industrial careers. Our graduates have joined companies of all sizes from major global companies to small venture-backed start-ups. However, preparing students to work in industry is just one aspect of the Department's involvement with the world of industrial chemistry. Our many connections with the chemical industry provide a clear testament to the importance of our work in chemistry research and education at UMass Amherst.

The Department's partnerships with industry include sponsored seminar programs, targeted recruiting, sponsored research, and the sponsoring of ResearchFest, our annual Departmental research symposium. The Procter & Gamble Company and Bayer Material Science both sponsor seminars that feature prominent research chemists on an annual basis, while Rohm and Haas sponsors

Getting to Know Our Newest Faculty Members

INTERVIEW WITH PROFESSOR NATHAN SCHNARR (NS)



GG: *Where did you grow up?*

NS: I grew up in Haslett, Michigan, a small town just outside of East Lansing, home of the Michigan State Spartans.

GG: *When did you realize you love chemistry?*

NS: Although I have always been intrigued by the natural sciences, I would say that my high school chemistry experience really solidified my fascination for all things molecular. I owe most of this to an amazing instructor, Mr. Tom

Dear Alumni and Friends of the Department of Chemistry,

I hope you enjoy this latest issue of the Goessmann Gazette. The Department of Chemistry has had another outstanding year. I am pleased to welcome a new Assistant Professor, Matt Holden, to our department. Matt is a bioanalytical chemist interested in membrane transport, bionetworks and single ion channels. Over the past year our faculty have been recognized with various awards, including the 2008 NSM Outstanding Teacher Award (DV), a Cottrell Scholar Award (Jeanne Hardy), and a Human Frontier Science Program Young Investigator Award (Jim Chambers). In addition, our Online Web-based Learning (OWL) systems in organic and general chemistry are now used by over 100,000 students each year, at over 100 universities in the US, Canada and Australia.

We continue to be 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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NEW STATE-OF-THE-ART TEACHING LABORATORIES AND LECTURE SPACE ARRIVE AT UMASS AMHERST!

Ever wonder what the future of chemistry instruction will look like? Well, the future has arrived! We are delighted to report that the Integrated Sciences Building, which began back in 1995 with a discussion between Bob Mahoney (BS '70) and then department Head Lila Gierasch, is now open for 2009 Spring semester classes. At the time of this writing, the freshman teaching labs and the upper level physical and analytical labs have mostly completed the move to their new facilities. Organic and inorganic labs will follow at the end of the semester. A grand staircase, flanking a wall of glass, rises through the floors of the lecture wing, with balconies and break out rooms offering great views both inward and outward. A large student socializing area lies just outside the ground floor of the large lecture theater and is designed for a future coffee center. Labs are in a separate wing, with the overall building shaped roughly as an "L" having the socializing area and main three-floor foyer at the "elbow."



ISB entrance.




New ISB labs

We are delighted to report that the labs are fantastic! Designed with the student experience in mind, the freshman labs are centered around 16 student clusters. We have a well-equipped core lab in the center, to provide shared instruments and supplies. The labs are of course fully networked and have great facilities and (finally!) excellent hood support. They are truly poised for the 21st Century! The five 16 student organic/inorganic labs are each set up to have student bench and hood space surrounding a central instrument area. More sophisticated instrumentation resides in a core facility toward the center of the building, which also houses lab prep and storage space. On the other side of the central core reside upper level biology and biochemistry labs, reflecting the "integrated" nature of the building.

... continued on page 15

alumni REUNION 2008

The featured theme for the 2008 Reunion was **HEALTH & DISEASES: Discoveries and Treatments**, featuring Chemistry Department research on the “Chemical Basis of Disease.” **Professor Jeanne Hardy** focused on her caspases research which aids in treating cancer, stroke, heart attack, arthritis and Alzheimer’s disease. **Professor Richard Vachet** gave insight into protein misfolding and aggregation which is important for understanding of a variety of diseases. These lectures were enjoyed by many Chemistry Department alumni, faculty, students and staff. Don’t miss this year’s alumni reunion on June 6, 2009, entitled “*Industrial Connections*.” See page 28 for more details. 



Professors Vachet and Hardy



Juanita Bradspies, Profs. Dave Adams and Nathan Schnarr



Nigel Metcalfe (PhD, Uden), Ben Mohimen (PhD, Kaltashov), Prof. Richard Vachet, Juma Bridgewater (PhD, Vachet), and Josh Hoerner (PhD, Kaltashov).

analytical DAY

Undergraduate Chemistry Majors are cordially invited to explore:

Bioanalytical and Analytical Chemistry at UMass Amherst and Beyond

at

University of Massachusetts Amherst, Department of Chemistry

Saturday, April 4, 2009

9 a.m. to 4 p.m.–Integrated Sciences Building

The Program will feature:

Interaction with Chemistry Faculty • Chemistry Graduate Student Poster Session •
The Procter & Gamble Professional Analytical Chemists in Industry Course

For more information: http://www.pg.com/science/prof_chemists.shtml

Register online: <http://www.chem.umass.edu/analyticalday.html>

POINTS *of* PRIDE in Chemistry

- Prof. Fermann demonstrated the working of a hydrogen fuel cell during the Opportunity Fair and Clean Energy Conference at the MassMutual Center in Springfield.
- Prof. Gierasch and group have found a way to slip a fluorescent marker into one of a cell's molecular machines so it lights up when it has formed the proper shape to carry out the cell's "work orders." This new technique should help study the origins of protein-misfolding diseases such as cystic fibrosis, Alzheimer's and Parkinson's.
- Prof. Hardy named a Cottrell Scholar by the Research Corporation; the honor will support Hardy's research proposal, "Controlling Protein Function with Designed Allosteric Switches."
- Prof. Rotello and Bappaditya Samanta are co-authors on a paper in *Nature*, "Magnetic Assembly of Colloidal Superstructures with Multipole Symmetry," and the research features the use of nanoparticles to assemble micro and nanoparticles into structures.
- Prof. Rotello's paper in *Advanced Materials*, "Applications of Nanoparticles in Biology," was the most downloaded paper of 2008.
- Prof. Rotello appointed Associate Editor for North America for the *Journal of Materials Chemistry*.
- Prof. Rotello and group uses gold nanoparticles to restore structure and function to misfolded proteins which are responsible for many diseases, including Mad Cow disease and Alzheimer's disease.
- "TechCast" joins OWL, created in the Chemistry and Computer Science Departments and used by over 100,000 chemistry students each year, as a UMass online education system.
- Then Massachusetts House Speaker Salvatore F. DiMasi visited the Fueling the Future Center for Chemical Innovation lab, where he met with Prof. "Thai" Thayumanvan and his Chemistry Department team, who are researching the development of hydrogen fuel cells and the creation of more efficient solar cells.
- Prof. "DV" Venkataraman awarded a College Outstanding Teacher Award at the Fall 2008 NSM Convocation.
- Prof. "DV" Venkataraman has made one of the top 20 Most Cited papers of all time, "Formation of Aryl-Nitrogen, Aryl-Oxygen, and Aryl-Carbon Bonds Using Well-Defined Copper(I)-Based Catalysts," published in the *ACS Journal Organic Letters*. 

labNOTES

In the Adams lab ...

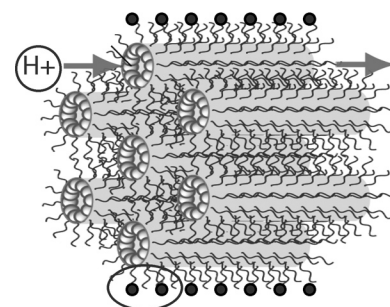
The year 2008 saw the completion of a major project that has been going on for 2-3 years. In May the book "Massachusetts Memories – UMass Amherst History," authored by David L. Adams and Lynne E. Adams, both UMass '67, was published locally by Collective Copies, Inc. The 169 page book contains 21 documented chapters about people, places and events in the 146 year history of UMass Amherst, originally Massachusetts Agricultural College. Several readings and signings were held on and off campus and the book is available through Collective Copies (www.collectivecopies.com) and the University Store.

I continued writing papers highlighting New England Chemists for the NEACT Journal. This past year these included Yannis Miaoulis, Director and President of the Museum of Science in Boston and his efforts surrounding technological literacy, and our own Thai, Professor S. Thayumanavan, regarding his research and leadership into sources of renewable energy. I also continued to serve on the National Advisory Board of the ALSOS project, documenting sources available dealing with the Manhattan Project. My role in this is to review and approve source annotations for the ALSOS website.

In the Auerbach lab ...

The Auerbach group enjoyed another exciting year of theoretical chemistry research in the interface between nanotechnology, fuel cells and biofuels. We continue to be supported by two grants from the National Science Foundation (biofuels, fuel cells) and two grants from the Department of Energy (biofuels, self assembly). Auerbach group research was featured during a seminar visit to U. Washington, Seattle (February 2008); at the

national American Chemical Society meeting in Philadelphia (August 2008); and at the national Canadian Chemical Engineering Society meeting in Ottawa (October 2008). Graduate student **Karl Hammond** gave a lecture at the national American Institute of Chemical Engineers meeting in Philadelphia



New proton wires studied by Auerbach.

(November 2008) on the “Spectroscopic Signature of Nitrogen-Containing Zeolites,” which was published as a rapid communication in the *Journal of the American Chemical Society*.

Regarding Auerbach alumni, Dr. **Chandra Saravanan** (1st PhD student, PhD '99) has moved back to India to be a technology manager for Reliance, the “GE” of India. Dr. **Cristian Blanco** (PhD '03) is now the chairman of the Chemistry Department at the Universidad Industrial Santander in Bucaramanga, Colombia. **Dan Stapleton** (Chem Eng BS '06) now works for UOP, traveling around the world putting together pilot plants for new chemical installations. **Julia Kumpf** (BS '08) is now a high school chemistry teacher in Massachusetts, sharing her enthusiasm with new generations of chemists. **Oliver Kiowski** (MS '02) is trying to be the first Auerbach alum in space, having applied to the European Space Agency to become an astronaut. Good luck **Oliver** and all Auerbach alums – the sky's the limit!

In the Barnes lab ...

In the past year, Prof. Mike Barnes renewed his grant from the US Department of Energy on “Chemical Microscopy of Conjugated Nanomaterials” for \$390,000 (through 2011), and continued to serve as co-investigator in the newly funded NSF-Center for Chemical Innovation (CCI: Fueling the Future), as well as continued participation in the NSF-Center for Hierarchical Manufacturing, and the Polymer-based MRSEC here at UMass Amherst. Within the grand mission of the CCI to develop new materials for hydrogen fuel-cell applications, our group is developing experimental methodologies for probing proton transport within nanostructured assemblies at a single molecule level. As part of the Targeted Research Group 2 – Molecular Electronics, our research group is exploring electronic and photonic properties of nanoscale materials and assemblies. In the past year, Prof. Barnes gave seven invited seminars including a plenary lecture at the US-DOE Conference on Chemical Imaging. He was also selected to serve as Co-Chair for the Optical Society of America's Frontiers in Optics/Laser Science National Meeting in Fall 2009, and received a nomination for the Distinguished Teaching Award.

Kevin Early, now a fourth-year graduate student is in the second year of his IGERT Fellowship, and as part of this fellowship, began recently a two-month research stay at ETH Zurich under the supervision of **Prof. Vahid Sandoghdar**. **Kevin** has discovered a novel polarization-driven directionality in surface-derivatized quantum

dot systems—an effect that is potentially important for next-generation nanostructured optoelectronic devices. A paper on this work is under revision at ACS Nano, and should be published early in 2009. **Michael Odoi**, a 5th year graduate student from Ghana has had some spectacular success investigating the photon-pair correlation statistics from individual quantum dot systems which may be important for single-photon applications such as quantum cryptography. **Michael** received the prestigious **William McEwen Fellowship** for Best Talk at UMass Amherst Chemistry's annual ResearchFest in September 2008. **Ruthanne Hassey**, also a 5th year student, has made great progress in exploring chiroptical properties of single molecules in collaboration with the **Venkataraman** group. A full paper on the experimental observations as well as computational modeling was published this year in a special issue of *Chirality*. **Jinhong Kim** is a new addition to the group, and has been investigating single-molecule spectroscopy of proton-sensing fluorophores in connection with our efforts in CCI program.

A number of undergraduates have made significant contributions to our group's research efforts: **BJ Odusami** (ChemE BS '08) who is now at Cabot Chemical, **Tim Mortsolf** (BMB/Chem BS '09), **Joe Polak** (BS '09) and **Samuel Bearg** (BS '09).

In the Chambers lab ...

Since arriving in western Massachusetts from California during a snowstorm in January 2008, things have improved greatly. Life has been very busy on all fronts. The Chambers lab is now officially open for business with renovated space on the sixth floor of the tower and almost all of the necessary equipment now in operation. In addition to the physical lab being ready, the Chambers group has developed tremendously and continues to grow. Graduate student **Nate Akey**, a native of western Massachusetts, has joined the group as well as **Vytla Devaiah**, a post-doctoral scholar originally from India, but came to UMass Amherst by way of Germany. There have also been a number of undergraduate students directly involved with research, getting the lab set-up, and starting to work on some of the ideas floating around the lab. These undergraduate researchers include **Jessica Lewis** (Columbia Univ.), **Chris Talbot** (Western New England College), **Randy Gilbreath** (UMass Amherst Chem), **Yu Zhao** (UMass Amherst Biochem), **Nick Druar** (Neuroscience), **Matt Stevens** (UMass Amherst Chem), and **Jade Balicki** (UMass Amherst Chem). During the fall semester, the Chambers lab has been lucky enough to attract a number of talented graduate rotation students including

Rosie Combs-Bachman (Neuroscience), **Dave Solfield** (Chem), **Jamie LaFrance** (Chem), and **Mariel Feliciano** (Chem). Additionally, we have been lucky enough to have **Prof. Min Chen**, a new faculty member, help us with our sensitive electrophysiology setup.

Chambers and collaborator **Ismail Hafez** (Univ. British Columbia) received a \$750,000 three-year grant from the Human Frontier Science Program to design, develop, and deploy a novel method for labeling native proteins with a molecular beacon. Additionally, **Prof. Knapp** and Chambers received a Mellon Mutual Mentoring faculty development grant to initiate an inter-College group of pre-tenure faculty meetings to discuss issues of tenure, work/life balance, and chemical biology.

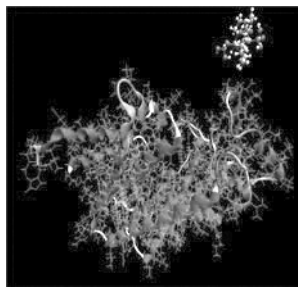
Enough about campus. At home Chambers and family have bought a house near campus and is keeping plenty busy with renovations and repairs. He is loving every minute of it.

In the D'Alonzo lab ...

Professor D'Alonzo retired from Procter & Gamble last year after more than 31 years of service, to begin his second career as a faculty member in Chemistry at UMass Amherst.

Activities in the D'Alonzo office this year have focused on four major aspects pertaining to interfacing with the chemical sciences industry. The first aspect involves educating and preparing students for pursuing industrial careers. This includes assistance to all chemistry students and post doctoral associates in developing resumes and preparing for interviews and presentations. Also, students electing to take Chemistry 515 (Theory of Analytical Processes) or Chemistry 726 (Applied Analytical Chemistry) receive instruction with an emphasis on the industrial environment, its practices and needs.

The second aspect involves participation in and consultation to centers or programs funded by government sources requiring an industrial outreach component. Professor D'Alonzo is currently serving on the Department's Fuel Cell Research Center committee and working with **Prof. Thayumanavan** to invite and engage industry members as advisors and participants.



Inhibiting bone osteoclasts: docking of risedronate in Farnesyl Diphosphate Synthase

The third aspect pertains to identifying industrial research collaboration opportunities/grants and assisting research faculty with preparing and submitting industrial research proposals as well as with providing guidance to research contract terms and conditions. Projects identified for potential funding by industry currently moving forward include drug delivery for individualized medicine using novel biomarker/protein sensing polymer micelles developed in **Prof. Thayumanavan's** lab, novel small lactones for commercial flavors and fragrances prepared by manipulating intracellular enzyme synthetic machinery developed in **Prof. Schnarr's** lab, and alternative energy through hydrogen generation using integrated biological catalysts and nanoscale materials developed in **Prof. Maroney's** lab.

The fourth and last aspect consists of providing consultation to faculty who have founded spin-off companies or desire to do so based upon intellectual property discovered or developed in their laboratories. Such consultation focuses on business strategy, development planning, and strategies for identifying, soliciting, and negotiating with external partners. Prof. D'Alonzo has accepted a management team position at PA Technologies, LLC, as Business and IP Strategy Officer at the invitation of **Prof. Weis**.

In the Dubin lab ...

2008 seemed to be year of collaborations and travel for current and recent students of the Dubin group. **Basak Kayitmazer** (PhD '07) interviewed for five faculty positions in Turkey including her Alma Mater, Bogazici University. **Yajuan Li** (PostDoc, '07) returned to China (J&J, Shanghai). **Margarita Antonov** (U4), and **Malek Mazzawi** (U3) are headed overseas, she to Latvia and Italy, he to study abroad in Senegal, having just submitting their paper to Biomacromolecules. Undergraduates involved in extramural collaborations were **Elaine Foun** (U3) who worked on polyelectrolyte-micelle coacervates, a project with **Matt Liberatore** (Colorado School of Mines); and **Kevin Chan** (U4) who worked on the interactions of platelet factor 4 with heparin, a project joint with Momenta pharmaceuticals.

For Paul Dubin this was also a year of travel, with invited lectures in Portugal (Coimbra), China (Fudan University) and Japan (Kyushu University); and, more locally, at Laval University, Clemson University, and CUNY. Scheduled in the months ahead are lectures in Geneva, Montpellier and Grenoble. He is also organizing symposia on "clustering" (IACIS/ACS meeting, NYC) and "coacervation" (ACS meeting, Washington, D.C.). Collaborations underway involve **D. Petri**

(Universidade São Paulo), and **H. Cottet** (University of Montpellier) – with publications in preparation; and **S. Vasenkov** (University of Florida) - published. His local collaborations at UMass Amherst in 2008 included research proposals with **Prof. Vachet** of Chemistry (pending), **Prof. Kaltashov** of Chemistry and **Prof. Bermudez** of Polymer Science (pending), and **Prof. Dinsmore** of Physics (funded).

In the Gierasch lab ...

The Gierasch lab had a terrific 2008. We successfully renewed the NIH grant that supports our research on Hsp70 molecular chaperones, and the other main research project of the lab (protein folding in the cell) continues to be funded by an NIH Director's Pioneer Award. Two review articles, three editorials, and four papers were produced in the lab this year. The work of postdoctoral fellow **Beena Krishnan** was chosen for the cover of the October issue of *Chemistry and Biology* and received lots of press. It represents an exciting new fluorescence labeling strategy to detect the formation of correctly folded β -sheets in proteins and promises to help visualize folding events in the cell.



The lab was as always full and busy. Currently, seven postdoctoral fellows, four graduate students, and four undergraduate students are carrying out research in the Gierasch lab. During the summer, many undergraduate students were working with us. **Dimitri Steblovsky** and **David Paquette** were awarded highly competitive Howard Hughes Medical Institute Summer Research Internships to support their projects on the folding of cellular retinoic acid-binding protein. We were very pleased to have **Dr. Anne Gershenson** as a visiting researcher in the lab while she was on sabbatical from Brandeis, and we recently had our collaborator **Dr. Sigurd Wilbanks** from the University of Otago, New Zealand spending some time in the lab to share exciting results. Next semester, **Dr. Pat O'Hara** from Amherst College will join us for her sabbatical.

Gierasch group members traveled widely this year presenting their results at major conferences, including the Protein Society Meeting held in San Diego, CA, the FASEB Summer Research Conference on 'Protein Folding in the Cell' in Saxtons River, VT, the NIH

Director's Pioneer Symposium in Bethesda, MD, the ACS National Meeting in Philadelphia, PA, and more. Lila was invited to many scientific meetings to present the lab's work and traveled all over the country. She attended almost 20 conferences (and went to California six times!!) during this past prolific 2008.

Many former lab members joined current members and many other friends to help Lila enter a new decade (we won't say which) in a lively birthday party at hers and **John's** new home in Ashfield. The photo shows a picture of the gathered lab members and alumni.



Prof. Gierasch's birthday party.

Last, but certainly not least, we celebrated chemistry graduate student **Annie Marcelino's** successful defense of her thesis 'A tale of two turns: active and passive roles in folding of a β -clam protein' last spring. We miss **Annie** greatly, but know she is doing well in her postdoctoral fellowship position at RPI with **Peter Tessier**.

In the Hardy lab ...

It has been a great year for the Hardy Lab. We celebrated our third birthday in September and added our first postdoctoral fellow, **Dr. Sumana Ghosh**. **Sumana** has designed a number of helical peptides with the support and advice of **Dr. Lou Carpino** and the members of his lab. **Kristen Huber** was awarded the **Peter C. Uden** Outstanding Poster Presentation Award Sponsored by the **William E. McEwen** Fellowship at Posterfest last fall. **Samantha Bernard** joined the lab in Spring 2008 and was awarded an Integrative Graduate Education and Research Traineeship (IGERT) from the Institute for Cellular Engineering. Jeanne Hardy was awarded the Cottrell Scholar Award from Research Corporation and honored in the June 20, 2008 issue of *Science Magazine*.

Research highlights include **Sam Bernard** expressing protein that was finally green, **Sravanti Vaidya** obtaining diffraction quality crystals of her cell death protease, and **Kristen Huber** and **Witold Witkowski** submitting first-author manuscripts for publication. In addition to making tons of DNA constructs for basically

every member of the lab, **Genevieve Abbruzzese** got engaged. Engagement seems to be the theme in the lab as **Sam Bernard** soon also came to lab wearing a sparkly diamond. This has sparked a betting pool in the lab about who will be next! This year we have had four terrific rotation students, **Leslie Conway**, **Daniel Seeman**, **Elih Velazquez**, and **Muslum Yildiz**, who we hope will become permanent members of the lab soon.

Last July the entire Hardy lab attended the the 22nd Symposium of The Protein Society in San Diego, California. **Kevin Olsen**, a chemistry undergraduate, presented a poster there that generated a great deal of commercial interest. After five days full of talks and poster sessions, the lab spent a beautiful sunny day at Sea World laughing hysterically at the sea lion show and being wowed by killer whales leaping in time to fireworks. The Hardy Lab is pictured here just after being soaked by Shamu!



In the Jackson lab ...

The Jackson group continued its theoretical studies of gas-surface interactions, with a focus this past year on the reactions of methane on Ni and Pt catalysts. The Department of Energy grant which funds most of this work was successfully renewed this past year. Recent

highlights of this work will be presented in an invited lecture at this summer's Dynamics at Surfaces Gordon Research Conference. Professor Jackson is now in his seventh and last year as Department Head, and is looking forward to his return to regular faculty status on September 1. In other group news, **Joe Quattrucci** successfully defended his PhD thesis this past summer, and is looking for teaching positions at area colleges.

In the Kaltashov lab ...

2008 was a very busy year in the Kaltashov laboratory, which included publication of five papers in peer-review journals, three book chapters and giving several presentations and posters at numerous scientific meetings and conferences, including an invited presentation at the ACS meeting. The group continued to expand the scope of the research work, which is exemplified by new collaborations with our colleagues in academia (**Prof. George Lorimer**, University of Maryland at College Park) and industry (Shire Human Genetic Therapies, Cambridge, MA). The group was awarded a new grant from the National Science Foundation to develop new mass spectrometry-based methods to study macromolecular conformations and interactions in biophysics and nanotechnology.

Alumni news: **Wendell P. Griffith** (PhD '05), who is now in the second year of his faculty appointment at the Department of Chemistry, University of Toledo (Toledo, OH) published his first paper as a corresponding author on Phenotypic analysis of Atlantic cod hemoglobin chains using a combination of top-down and bottom-up mass spectrometric approaches.

In the Labti lab ...

Safo Aboaku completed his PhD dissertation, "Organic Radicals as Potential Magnetic Materials and Bio-probes." He accepted a position as Instructional Assistant

new FACULTY

Matthew Holden joined the Department as an assistant professor in September 2008. He is a bio-analytical chemist with interests in bionetworks and biological membrane transport. His previous training (BS from University Florida, PhD from Texas A&M and postdoc at University Oxford) positions him well to use the tools of analytical chemistry to explore these fascinating biological processes. According to Prof. Holden, "We reconstruct cell membranes from natural and synthetic molecular components. These lipid bilayers provide a general bio-architecture that can be precisely tuned to study a variety of biological problems. In the end, we hope to make a synthetic network of simplified cells, to mimic and explore the rich array of communication that exists between and among cells in a complex biological medium." We wish Prof. Holden well as he launches his career at UMass Amherst.



Professor Matthew Holden

Professor at Ole Miss, and moved there with wife, **Kate**, and son, **Kofi**, starting September 2008. **Zeynep Delen** says she is enjoying her position as a Visiting Assistant Professor of Chemistry at Amherst College. **Yilin Qiu** reports that all is well at Brewer Science Inc. in Missouri, for her and husband, **Hao**. **Jacqueline Ruiz** is still at her position as a research PhD Chemist at the Veterans Medical Research Foundation at San Diego, CA doing some adjunct teaching on the side. **Rajdeep Kalgutkar** reports that all is well at 3M for him and his wife, **Aarti**. **Rusty Denton** reports that he continues to be very interested in science and entrepreneurship; he is a chem/pharma patent attorney “under his own shingle,” and has academic connections also to University of Georgia and Kennesaw State University.

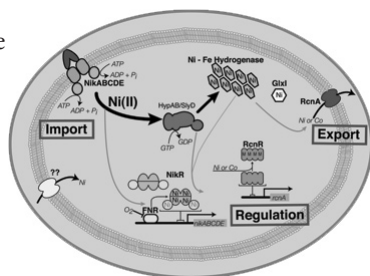
PML's research on molecule based magnetism was funded again by the National Science Foundation. He is very grateful for the NSF support of this project—in various evolving guises—since 1992.

PML gave invited talks to “new” audiences at the American Crystallographic Association meeting in Knoxville, TN during Spring 2008, and at the Argonne National Laboratory in Fall 2008. The rest of his time has been spent teaching this past year.

In the Maroney lab ...

Highlights from the Maroney lab include graduation of

a new PhD, **Sharon Leitch**, who is currently a postdoc at Johns Hopkins. I am also pleased to report that both my NIH grant (Nickel trafficking—see image) and my NSF grant (on Ni-SOD, a protein that protects against oxidative damage) were renewed. Last, I was elected to chair the Gordon Research Conference on Metals in Biology in 2012 at that meeting in January.



Nickel biochem studied by Maroney.

In the Metz lab ...

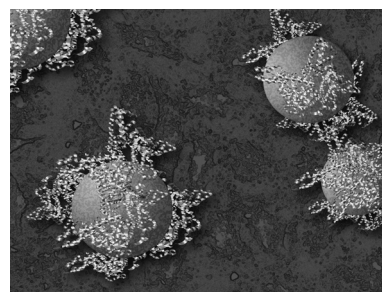
2008 was a year of many transitions in the Metz group. Our ion spectroscopy and dynamics studies led to four papers and a review article. **Manori (Gunawardhana) Perera** (PhD '08) and **Paul Ganssle** (BS '08) finished up their studies of the spectroscopy and photodissociation dynamics of Co_2^+ and Ni_2^+ solvated by two to five acetonitrile and/or water molecules. **Paul** is now in the chemistry PhD program at Berkeley, while **Manori** is studying astrochemistry as

a postdoc with **Prof. Ben McCall** (Illinois). **Manori's** study of the photodissociation kinetics and dynamics of $\text{TiO}^+(\text{CO}_2)$ was recently accepted by the *Journal of Physical Chemistry A*. She and Prof. Metz carried out a series of photoionization studies at the Advanced Light Source (Lawrence Berkeley National Lab). A highlight was measurements of the ionization energy of several platinum-containing molecules, including H-Pt-CH_3 . This is the key intermediate in methane activation by atomic platinum and these measurements allow us to characterize the potential energy surface for the reaction.

Gokhan Altinay and **Geoff Austein-Miller** (Sophomore undergraduate) implemented multi-pass infrared excitation for multiphoton dissociation studies. They have used the set up to measure vibrational spectra of $\text{Fe}^+(\text{CH}_4)_n$ ($n=1,2$), complementing work by **Murat Citir** on complexes with $n=3$ and 4. **Gokhan** has also measured vibrational spectra of intermediates of oxidation of benzene to phenol by FeO^+ . **Manori Perera**, **Gokhan Altinay** and Prof. Metz presented their results at the American Society for Mass Spectrometry meeting and the Gordon Conference on Gaseous Ions. Prof. Metz also hosted the 27th Annual Regional Meeting on Kinetics and Dynamics on Jan. 31, 2009.

In the Rotello lab ...

The Rotello group was busy in 2008, with 34 papers published (including six cover articles) and three new grants 1) NSF (protein-mediated nanocomposite assembly) 2) NIH (sensing of bacteria), and 3) BAE Industries (fluorescence sensors). Collaborative work has likewise flourished, including the NSEC-funded seed program with **Vachet** and **Tyson**. Professor Rotello has been appointed as Associate Editor for North America at the *Journal of Materials Chemistry*, as well as guest-editing special issues for *Advanced Drug Delivery Reviews* and the *Journal of Materials Chemistry*. He also served on two NIH study sections and co-edited (with **Prof. Thayumanavan**) the book “Molecular Recognition and Polymers: Control of Polymer Structure and Self-Assembly.”



Rotello's nanoparticles hard at work.

In current group member news, **Mrinmoy De** will be joining **Vinayak Dravid's** group at Northwestern for a postdoc, while **Brian Jordan** accepted a position at

US Genomics. There has been some traveling to further collaborative efforts, with **Myoung-Hwan Park** visiting the Netherlands (**Jurrian Husken**'s groupe at Twente) and **Oscar Miranda** spending time in Atlanta with **Uwe Bunz** at Georgie Tech.

In Alumni news, **Faysal Ilhan** has accepted a position at Eren Holdingin Istanbul, where **Amitav Sanyal** is also working as an Assistant Prof. at Bogaziki University. **Andy Boal** moved from Sandia to MIOX Corp, **Tommy Chen** is back at Ames Iowa at the National Labs, and **Tyler Norsten** has made a BIG move to Singapore to work at the Institute for Materials Research & Engineering.

In the Schnarr lab ...

The Schnarr Lab continues to their work toward generating new drug-like molecules using engineered bacterial hosts. After much renovation, the lab is fully operational and beginning to produce interesting results. **Jon Amoroso**, now in his second year, is splitting his time between synthetic organic chemistry and molecular biology in attempts to develop reactive probes for detecting and isolating valuable biosynthetic components capable of making novel therapeutics.

Lawrence Borketey and **Carrie Dulaney**, also second year graduate students, are collaborating on efforts to determine mechanistic rules that govern small molecule output in a variety of bacterial species. They hope to use this information to genetically reprogram these systems toward an environmentally friendly means of producing thousands of biologically active compounds in short-order. **Cornelius Taabazuig**, a senior biochemistry major, was awarded a **Bradspies** Fellowship for undergraduate research during the summer in addition to an HHMI Research Award for that same time period. Two new undergraduates, **Esther Manu** (Biochem) and **Andrew Ramsey** (Chem), have joined the lab and are quickly mastering valuable laboratory skills.

Nate, now in his second year of teaching and service, is beginning to find a rhythm. He continues to teach Chem551 (Advanced Organic Chemistry) in the fall and will teach Chem756 (Advanced Synthesis) this spring for the first time. He is serving his second, and final, term as the Chemistry Department Seminar Chair and was recently appointed to the Chemistry Development Committee. Soon after becoming a new uncle, Nate married his fiancé, **Lindsay Comeaux**, in Montague, MA on July 5th. The new husband and wife team purchased a lovely home in Amherst, and Nate spends whatever free time he can muster remodeling the interior and enjoying the omnipresent yard duties. Overall, it has been a busy but extremely rewarding year.

In the Thayumanavan lab ...

The Thayumanavan group enjoyed another productive year in 2008. We are listing here some of the highlights of the group. Please visit us also at <http://www.umass.edu/thaigroup> for more on our news and achievements. If you are a group alum and we do not have your updated whereabouts, please let us know.



Thai group.

Graduate students update: The group welcomed **Reuben Chacko**, **Daniella Gonzalez**, **Bhooshan Popere**, and **Sompit Wanwong** early in 2008. We now have **Diego Amado Torres**, **Andrea Della Pelle**, **Raj Rami Reddy**, and **Feng Wang** doing their January rotations. Beginning summer 2008, the group welcomed **Judy Ventura** as a visiting student from University of Puerto Rico at Mayaguez. **Elamprakash Savariar** ("Elam") and **Arpornrat Nantalaksakul** ("Nam") graduated with their PhD. **Elam** is now with **Roger Tsien** (Noble Laureate 2008) as a postdoctoral associate. **Elam** landed his postdoc before the Nobel announcement, but joined the lab afterwards. It was fun seeing **Elam** floating in air for a couple of days. **Nam** has joined Thai's postdoctoral mentor **Seth Marder** as a postdoctoral associate in Georgia Tech. **Raghunath Roy** has accepted an offer from the Chemical Engineering Department at the University of Delaware with **Thomas Epps** and will be leaving soon. **Akamol Klaikherd** won the **Procter and Gamble** outstanding graduate student award during the ResearchFest in the department.

Undergraduate students update: **Matthew Sochat**, **Dan Terk**, and **Jimmy Tran** finished their honors thesis. **Lisa "Raven" Brodsky** (Hampton College), **Kelley Hutchins** (Adrian College) and **Ambata Poe** (Lincoln University) spent summer of 2008 in the group as REU students. **Raven** was the MassNano REU student, while **Kelley** and **Ambata** were part of the Collaborative Undergraduate Research in Energy (CURE-REU). **Pardeep Thandi** and **Dan Terk** got early admission at the UMass Worcester Medical School and are very excited. These two guys also got the outstanding undergraduate researcher award from the department. **Dan** also won the **Merck** Index award and **Pardeep** won the **CD Youngren** Scholarship. **Dave Waterman** was named the **William F. Field** Alumni scholar by the department. **Matthew Sochat** is weighing his options as

he got admission in a couple of medical schools. **Keith Barbato**, **Sean Bickerton**, and **Juna Juvani** joined the group as undergraduate research students.

Postdoctoral associates update: **Suhrit Ghosh** took his independent position at the Indian Association of Cultivation Sciences in Kolkata and is starting his own group there. **Antara Dasgupta** is moved to Germany as a Humboldt fellow and **Arisa Jaiyu** and **Ashootosh Ambade** moved to Thailand and India respectively. **Jayaprakash Pagadala** took his second postdoctoral position at the University of Tennessee Medical School. **Narayana Murthy** joined as a postdoctoral associate. **Zeynep Delen** is focusing on her teaching at Amherst College.

Thai has won the American Chemical Society-Connecticut Valley Section's Burlew Award in 2008. The group has developed a new method for generating polymer nanotubes, which is attracting lots of attention. This work was published in *Nature Nanotechnology* early 2008. This work was also highlighted in a few nanotechnology web sites. Thai also edited a book in collaboration with **Prof. Rotello**, published by Wiley. The title of the book is: "Molecular Recognition and Polymers: Structure and Self-Assembly." Thai is also co-leading the renewable energy cluster (Cluster E) within the Center for University of Massachusetts Industrial Relations on Polymers program.

In the Thompson lab ...

It's been a busy year in the Thompson lab, pursuing multiple projects and approaches probing mechanisms of membrane proteins. Our studies of bacterial chemotaxis receptors have moved into a new phase: we've integrated our efforts with the **Weis** lab to tackle this system on multiple levels. **Dan Fowler** has used the template assembly approach developed in the **Weis** lab for assembly of functional arrays of receptor fragments on vesicles and has optimized the sample for NMR, so that he can measure a distance constraint that will distinguish between the two proposed organizations of this protein array. **Shiela Jones** helped **Dan** to test the NMR conditions for this experiment; she's learned the NMR techniques and biochemical methods to be able to do new NMR projects on this system now that it is optimized. **Fe Consolacion** has used biochemical approaches, membrane reconstitution and activity assays, to investigate the role of clustering in the transmembrane signal. She presented this work in July at the "Molecular Biophysics of Cellular Membranes" FASEB conference in Vermont. **Seena Koshy**, who has just been awarded a CBI Traineeship, has been developing a mass

spectrometry hydrogen exchange approach to measure the dynamics of the cytoplasmic fragment in functional arrays. This will probe the role of dynamics in the signal—a question that has intrigued us since the work of the first Thompson lab PhD, **Stacy Seeley**!

We also have projects investigating two other membrane proteins. Two undergraduates are conducting biochemical experiments to test the proposed transport mechanism of an ABC transporter. **Ngoc Ho**, a senior biochemistry major/chemistry minor, is continuing her work on this project with support as a Junior Fellow. In September **Chris Vercollone**, a junior biochemistry major, joined the project and was awarded an Academic Year HHMI internship. Finally, **Fe Consolacion** initiated a new project: she is using her expertise in membrane protein biochemistry to reconstitute the M2 protein channel into vesicles, as part of a collaborative project with the **Hardy** and **Thayamanavan** labs that seeks to make hybrid biological/artificial proton conducting membranes.

There is happy news to share about Thompson lab alumni as well. **Greg Gallagher** (PhD '06) married his girlfriend **Shannon** on July 5 in Virginia. And last but not least, **Frank Kovacs** (postdoc 1999-2002) earned tenure and promotion to associate professor at University of Nebraska at Kearney, and he and his wife **Sharyn** are expecting a baby in June.

In the Tyson lab ...

Four graduate students, **Chengbei Li**, **Monique Johnson**, **Tiffany Berg** and **Lindsay Drennan**, joined the group in the spring. **Maura Mahar** and **Elena Dodova** successfully completed their PhD studies and are now working for Leeman Teledyne and the Center for Disease Control, respectively. Undergraduate researchers continue to work on arsenic project topics, mostly under the watchful eye of graduate student **James Kearns**, who spearheads the group's studies on low-cost, field-portable methods for the determination of arsenic in water. In the spring, **Brie Chaney-Ryan**, and **Daiiki Okamoto**, joined continuing students **Bart Smith**, **Hagit Ben-Daat**, **Andrew Bell**, and **Berlinda Luong**. The group also continued to support teachers **Susan Fisher** and **Christine Wheeler** in the STEM RAYS after-school science club project. Over the summer, undergraduate **Paul Nardi** started and the group again hosted students from Lincoln University. **Mark Chikwem** and **Brandon Fleming**, who had just graduated from high school, and juniors, **Christina Chisholm** and **Keyana Tyree** were part of the NE Alliance summer program of undergraduate research

(SPUR). Middle-school science teacher **Uma Palreddy** also joined this effort for several weeks. In the fall, **Paul** was joined by undergraduates **Gloria Chan**, **Nick D'Eramo**, **Bejan Hakimi**, **John Laparidis**, and **Drew Smith**. Several numerical milestones were passed this year: 50 undergraduates have worked in the group since Prof. Tyson came to UMass Amherst in 1989, including 10 students from Lincoln University, who have worked on summer projects; and the 50+ participants from Chem. 121, 122, 312 and 315 in the arsenic project brought the total arsenic project numbers to well over 300. Prof. Tyson's NSF Discovery Corps Fellowship program took him on two trips: one to Thailand and the UK, and the second to Bangladesh and Vietnam. He visited scientists, at several institutes, who are working on aspects of environmental contamination by "heavy metals." Discussions are on-going over possible future collaborations. During his absences, the group was ably mentored by **Prof. emeritus Peter Uden** and **Prof. Edward Voigtman**. In the fall, **Prof. Ray D'Alonzo** also attended group meetings. In June, Prof. Tyson was appointed the Associate Dean for Academic Affairs of the College of Natural Sciences and Mathematics.

In the Vachet lab ...

It was another busy and successful year for the Vachet lab. Professor Vachet taught his annual two-day short course on Quadrupole Ion Trap Mass Spectrometry at the American Society for Mass Spectrometry meeting in June. We started a new project in lab using seed money from the Center for Hierarchical Manufacturing, which is an NSF funded Nanoscale Science and Engineering Center on campus. As part of this new project, we are studying the bioavailability and toxicity of nanoparticles by using model nanoparticles and developing new mass spectrometric techniques to track these nanoparticles in complex samples. This project is in collaboration with several other scientists at UMass Amherst. Two other projects are also continuing in the lab: (1) the development of extraction, concentration, and detection agents based on nanomaterials, and (2) the development of mass spectrometric methods to better understand the early stages of β -2-microglobulin amyloid fibril formation. In 2008, we were able to publish a total of seven papers on work related to these projects.

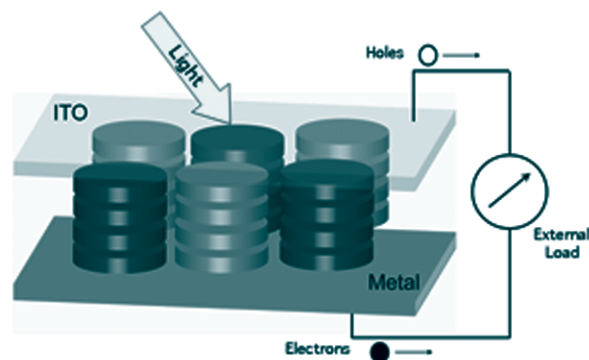
In group news, postdoc **Srikanth Rapole** departed to start a new position as the Mass Spectrometry Center Director at the University of Connecticut. **Mark Olbris** also finished with his MS degree in the summer. Current PhD students **Vanessa Mendoza** and **Andrea Gomez** had very good years. **Vanessa** was selected to be one of the four speakers at the Chemistry Department's annual Research Symposium in September. She was also

honored with the **Rohm and Haas** Award for her talk. **Andrea** received a prestigious **Isenberg** Award, which is sponsored by School of Management alumnus **Eugene M. Isenberg** and supports students who demonstrate strong academic skills and have a commitment to the integration of science and management. Finally, two new graduate students joined the group in 2008: **Shaynah Browne** and **Guanshi Zhang**. **Shaynah's** research focuses on understanding the oligomeric changes undergone by β -2-microglobulin before it forms amyloid fibrils. **Guanshi** is investigating ways to inhibit the formation of β -2-microglobulin fibrils.

Some news about former group members is also worth noting. **Juma Bridgewater** took a new position at the Abbott Bioresearch Center in Worcester, MA. **Michelle Herrmann** will begin a new position at the National Institutes of Health in Maryland after working for many years at Johnson & Johnson in San Diego, CA. Finally, former postdoc **Srikanth Rapole** and his wife, **Deepthi**, are expecting their first child in 2009.

In the Venkataraman lab ...

The DV group had another great year. **Travis Benanti** received his PhD degree in February 2008 and now works for solar cell company called Solarity Inc. in PA. **Nestor Chevere-Trinidad** successfully defended his PhD thesis in November 2008 and now works for Heatbath Corporation in Indian Orchard, MA as Chief Research Scientist. **Harihara Venkatraman**, a third year student in the group received the **Bill McEwen** Award for outstanding poster presentation in Researchfest 2008. The award includes a monetary reward of \$250. DV received the College of Natural Sciences and Mathematics outstanding teacher award. The DV Group's 2001 Org. Letter Paper on copper-based catalysts (with **Rattan** and **Craig**) has become one of the top 20 most cited Org. Lett. papers in the past 12 years!




Solar energy studied by DV.

The group welcomed **Nagarjuna** and **Sravan Kumar** as first year graduate students. For some of the recent research news, check out our group website at <http://people.umass.edu/dv/>

The DV group alums **Uche Anyanwu** (PhD '05), **Derek Van Allen** (PhD 2004), **Jason Field** (PhD '03), **Craig Bates** (PhD 2007) and **Tom Hill** (BS '02) had a mini reunion in Amherst in July 2008. It was fun to see the ex-DV group members and reminisce about their days at UMass Amherst. The alums joined the current DV group members for dinner in DV's house and traded stories about their experiences. **Jason Field** is now a Senior Sector Advisor for the Sector Competitiveness Branch in the Ministry of Economic Development and Trade for the Government of Canada. **Derek Van Allen** is at US Naval research laboratory. **Uche** is with Momentive (formerly GE). **Craig Bates** has returned to Arqule this year. **Rattan Gujadhur** (PhD '03) is still with Gilead as Manager for Strategic Outsourcing. **Pranorm Saejueng** (PhD '06) is a faculty at Ubonrajathane University in Thailand. She is pursuing her research in copper-based cross-coupling reactions. **Tom Hill** finished his PhD with **Prof. Larry Scott** in Boston College and now works for Cytec Industries in Springfield. **Andy Kalaydjian** (BS '07) after taking some time off from graduate studies has decided to go to medical school. He now works for Konarka, Inc, a company that manufactures organic photovoltaics in Lowell, MA. **Gordon Smith** (BS '07) is now working with **Prof. Fred Wudl** in UCSB. **Dan Burke** (BS '06) is also at UCSB working with **Prof. Craig Hawker**. **Jocelyn Scheintaub** (BS '06) is at UC Berkeley, working with **Prof. Angie Stacy**. She informs me that she is now a part-time blacksmithing apprentice. **Jackie Murphy** (BS '04) visited UMass Amherst and gave an excellent talk to our undergraduates about her experiences in grad school. She is doing her PhD with **Prof. John Hartwig** at UIUC and won the prestigious 2007-2008 **Nelson J. Leonard** ACS Division of Organic Chemistry Graduate Fellowship. **Ingrid Swenson** (BS '07) works for a

company in Wales, MA as a supervisor for the analytical chemistry lab. DV would be pleased to hear from other alums too.

In the Voigtman lab ...

Another hectic year, gone in a flash! During the Spring 2008 semester, I taught CHEM 312, after not having taught it since 1995. Several new labs were introduced and the class went well, but was also very time consuming, with three lectures and four labs per week, and I was in all the labs each week except for PittCon. Summer brought various parent issues (both needed to be relocated during August, one just before a hurricane) and then this past fall semester, I taught a 185 student section of CHEM 111, and also a grad class (CHEM 715). For the coming spring, I will be teaching a 300 student section of CHEM 112 in our terrific new ISB facility, and, like everyone else here at UMass Amherst, I want to thank again all those whose generous gifts of time, money, labor and thoughtfulness have made this possible! On another front, I also continued as an associate head (now joined by **Craig Martin**) and became graduate program director, following the superb multi-year stint **Craig Martin** put in. Space issues also came up, on multiple levels, and I am temporarily (I hope) out of my labs so our newest hire, **Matt Holden**, can get started up while we get his new lab ready. I have several more papers in the works, and completely updated my LightStone web site (www.chem.umass.edu/~voigtman/LightStone/), with many new models and free, commented source code. New spectrometric models are also under construction for the CHEM 513 (Instrumental Analysis) course this spring semester. Hopefully, 2009 will be a great one for us all, and I'm looking forward to what the year brings! 

degrees AWARDED

BA/BS DEGREES

Andrew P. Bell	05/2008
Hagit Ben-Daat	05/2008
Benjamin R. DiTrollo	02/2008
Paul J. Ganssle	05/2008
Hutchinson, Kenneth	02/2008
Arionela Jashari	05/2008
Francois H. Jean-Charles	05/2008
Julian M. Kumpf	05/2008
Paal J. Lawrence	05/2008
Kyle M. MacEwen	05/2008
Jonathan G. Mehtala	05/2008
Jacob D. Miller	05/2008
Yelena A. Urgina	05/2008
Sarah M. White	05/2008
Yin S. Wong	05/2008

MS DEGREES

Jeffrey Martin	02/2008
Michael Pollier	05/2008
Shiv Kumar Redhu	09/2008
Jay Stone	09/2008

PHD DEGREES

Safo Aboaku	09/2008
Hesham Ahmed	09/2008
Prince Amoako	02/2008
Halil Bayraktar	09/2008
Travis Benanti	02/2008
Elena Dodova	09/2008
Metewo Selase Enuameh	05/2008
Meaghan Germaine	09/2008
Sharon LaMont Leitch	09/2008
Rachael Leverence	02/2008
Maura Mahar	05/2008
Annamarie Marcelino	05/2008
Zuleika Medina Torres	02/2008
Joseph Quattrucci	09/2008

CENTER FOR FUELING THE FUTURE 2008-2009 UPDATE

Following its launch at the end of 2007, the NSF Fueling the Future Center for Chemical Innovation (CCI) has gotten off to an excellent start. The center, under the leadership of Prof. Sankaran Thayumanavan, concentrates on investigating chemical proton transfer for increasing the efficiency and operating range of renewable energy devices such as fuel cells. Far from relying on the discoveries of a single laboratory, the CCI is a large-scale collaboration among nine investigators at UMass Amherst and one at Yale University, each bringing a specific area of expertise. Teams of researchers closely coordinate their efforts to investigate the molecular scale (Team 1 led by Prof. Scott Auerbach), inter-molecular scale (Team 2 led by Prof. Jeanne Hardy), and bulk material scale (Team 3 led by Prof. Thayumanavan), with each team in turn comprised of specialists in theory and modeling, chemical synthesis, and characterization.

Early results from 2008 are very promising. For instance, on the molecular scale, in Team 1, CCI researchers have succeeded in designing a “tunable molecular scaffold” allowing the separate study of site energy and site-to-site distance on proton jump speed. On the nano-scale in Team 2, CCI investigators have made progress in synthesizing a protein-like scaffold for proton transfer, using the machinery of biology. On the macro-scale in Team 3, CCI scientists have synthesized and tested the performance of new “comb” polymer membranes, finding that including longer sidechains to the proton-binding groups can dramatically increase the speed of macroscale proton transport. Taken together, these fundamental advances begin to pave the way to new organic, solid-state materials for proton conduction, which can make fuel cells cheaper and more reliable.

The Fueling the Future CCI is designed to integrate world-class research with equally important education, dissemination, public outreach and diversity efforts. The center benefits from dedicated leaders such as Prof. Justin Fermann, the CCI’s Education and Outreach Coordinator, and Prof. Ray D’Alonzo ‘77G, serving as Industrial Partnerships Director. Outreach highlights from the past year include hosting 53 academically-talented middle school students and their parents in October 2008 at a weekend workshop on renewable energy, and a visit to the center in December 2008 by Massachusetts House Speaker Salvatore F. DiMasi, President Jack Wilson and UMass Amherst Chancellor Robert Holub.

At the October workshop, both students and parents enjoyed activities such as synthesizing biodiesel and constructing their own working photovoltaic (solar) cell. The workshops were safe enough for students to share with their school science classes, multiplying the number of students exposed to the excitement of chemical energy research. According to Prof. Fermann, one reason that

mixing parents and children in university-based science outreach activities adds impact is that “science suddenly becomes real. In contrast to a science museum visit, spending time with their children in workshops led by




Middle school students synthesizing biodiesel at the Fueling the Future workshop in October 2008

university professors in actual research labs may lead parents to give serious thought to how they plan to help their child attain a college education and become actively involved in a science career.”

The visit by Speaker DiMasi featured hands-on demonstrations of model hydrogen fuel cells and photoelectric devices by Prof. Fermann and Prof. Venkataraman. Speaker DiMasi, a strong supporter of clean energy legislation in Massachusetts, applauded the Center’s efforts to advance renewable energy R&D in the state, and thanked CCI Director Thayumanavan for his efforts. “The Center’s expected statewide impact,” Thayumanavan said, “includes scientific breakthroughs to elevate Massachusetts’ global profile as a leader in clean technology, transforming innovation into technology opportunities for Massachusetts companies, training the scientists, engineers and technical workers needed for the 21st century green economy, and encouraging Massachusetts students to pursue science careers through the Center’s education and outreach programs.”



Professor Justin Fermann and House Speaker Salvatore F. DiMasi discussing fuel cells.

We look forward to another exciting and productive year for the Center for Fueling the Future in 2009. 
—Michael Wright

NEW STATE-OF-THE-ART TEACHING LABORATORIES—continued from page 2

Similarly, the analytical/physical suite of labs are designed to share a central core facility area with upper level biology and biochemistry. Moving from a building that was state-of-the-art in 1922, the physical (and analytical) labs have been well equipped with new, truly state-of-the-art equipment of the type that graduating students would use in industry or academic research. The analytical labs likewise are moving from 1950's "New" Goessmann labs to a space that will allow ample sharing of equipment and expertise with the physical labs. For both, we again anticipate lots of cross-fertilization with our new biology neighbors. The lab wing has student study areas at the end of each floor, with cozy seating around ample windows looking across campus. We are excited about the fruitful developments that are already being discussed to take advantage of this design, such as integrating biochemical labs that synthesize proteins with physical/analytical labs that measure their concentrations and spectroscopic properties. With this integrated design, we are limited only by our imagination!



New ISB labs.

In a separate, but contiguously attached, wing of the ISB lie brand new lecture facilities. The 300 seat auditorium has great sight lines and has ethernet and power at every seat! A connected demo prep room and lecture theater hood with digicam for close-ups of demos insure the ability to wow an audience with the beauty and power of chemistry.

An 85 seat lecture hall is similarly fully wired for 21st century interactive learning and will house prelab lectures, as well as larger upper level courses. On the third floor, is an expanded "resource center" that will serve all students taking chemistry courses or lab courses in the building. The center is composed of three contiguous units. In the middle lies the heart of the facility, with tables and break-out areas for student and student-TA discussions. The room will be equipped with 24 brand new iMac computers, all configured with OS X and with Windows emulation software to allow use of the widest possible array of educational software. Specialized software will also be available for students to calculate electronic structures or analyze data. Flanking the central core, are two 48 seat lecture rooms, one with an additional 24 computers for use in classes during the day and for drop in use at night. These rooms will house the smaller freshman chemistry classes for majors, upper level courses, and higher level small sized discussion sections. All of the lecture facilities are set up with outstanding projection capabilities and large chalk boards (yes, chalk - some 19th/20th century things can't be improved upon). And of course—comfortable seating. This is indeed the beginning of a new era for Chemistry at UMass Amherst.




ISB solarium fills interior with natural light.

We hope you will soon find a chance to come visit the Integrated Sciences Building. Across North Pleasant Street and not far from Goessmann, the building is situated at one end of Stockbridge Road, which will become a pedestrian mall. Just drop by and sit in the foyer for a while to see all of the activity, then visit the faculty on the second and third floors. We guarantee you will be enthused by a building designed to encourage students to take the opportunity to learn in the best possible facility, as well as to mix, to talk, and to be inspired by a great investment in science for all students.

Finally, stay tuned to future issues of the Gazette for news on improvements to our research space!

We encourage you to take a look at the building through our web cam at: <http://umassamherstisb.webcam.chilmarktech.com/>

Please also visit the following link for additional ISB information: <http://www.umass.edu/fp/projectmanagement/constructioninformation/integratedsciencebuilding/> 

inMEMORIAM

Professor Marvin D. Rausch **1930-2008**

Marvin D. Rausch, emeritus Professor of chemistry at the University of Massachusetts Amherst died May 2nd in Amherst, MA. Born in Topeka, Kansas, Prof. Rausch earned his BS and PhD (1955) degrees at Kansas University. After service in US Air Force as a Projects Officer at Wright-Patterson Air Force Base in Ohio from 1955 to 1957, he joined the laboratory of the future Nobel laureate, E.O. Fischer, in Munich as his second post-doctoral fellow. Upon his return to the US, he took a research position at the Monsanto Company in St. Louis, MO, and in 1963 he joined the chemistry faculty at the University of Massachusetts Amherst. He was promoted to the rank of professor in 1968 and served the university until he retired in 2002.



Professor Marvin Rausch

Marv ran one of the largest research groups in this department over many years and enjoyed a high international profile in organometallic chemistry. Many chemistry majors will remember the challenges of his advanced organic chemistry laboratory course. Marv was a stalwart on the graduate recruiting committee and continued to serve after his retirement through 2007. He was honored at the Chemistry Department Alumni Reunion in 2005. Exposure to metallocene chemistry at Wright-Patterson AFB kindled his interest in organotransition metal chemistry, and this became the abiding love of his scientific career. His group in Amherst synthesized and explored the chemistry of metallocenes, extending the range of known structural types, as well as pentafluorophenyl and perfluoroalkyl derivatives of transition metals. Later in his career, he and his colleague **Jimmy Chien** developed important new Group IV metallocene catalysts for polymerization of alpha-olefins. He visited Germany as von Humboldt Fellow in three different decades and served as a lecturer sponsored by the Japan Society for Promotion of Science.

Outstanding service to the field of chemistry was a hallmark of Marvin Rausch's career. He was an

early chair of the Organometallic Subdivision of the American Chemical Society's Division of Inorganic Chemistry and was a major figure in creating and sustaining the International Conferences on Organometallic Chemistry. He hosted the sixth ICOMC in Amherst, and in 1988 he was elected Permanent International IOMOC Secretary. He served on multiple editorial boards, and his long service on the board of Journal of Organometallic Chemistry was highlighted by his guest editorship of the 1990 Mond Centennial volume. He mentored 44 PhD students along with numerous MS and BS students, and his former students pervade the field of organometallic chemistry.

Alongside chemistry, mineralogy became his passion, and he assembled one of this country's outstanding private collections of minerals, which he called "Inorganic Natural Products." After his active Air Force duty, he remained in the Air Force reserves until his discharge as a Captain in 1967. He is survived by his wife, **Jane (Meyer) Rausch**; a daughter, **Kathleen Rausch Henchey** of Saline, MI; two grandchildren, **Craig** and **Laura** and also by his former wife, **Carol Kreischer** of Ann Arbor, MI.

—Peter Lillya

Richard Warner, WWII veteran, chemist **1917-2009**

Richard Stearns Warner, a long-time resident of South Amherst, passed away in his home on January 9, 2009. Richard was a graduate of Massachusetts State College in 1940 majoring in chemistry. He served in the Army Air Corps in World War II and was employed by Chicopee Falls Tire Co., later Uniroyal, as a chemist. In 2005, he was recognized for 75 years of participation and service to the Boy Scouts. He was an active member of his church. His joy in life and generosity in spirit was a great contribution to the community and country that he loved.

A memorial service will be held on May 2 at the Amherst South Congregational Church, 1066 South East Street, Amherst, MA.

Professor Robert Rowell

1932-2009

Emeritus Professor Robert L. Rowell, long-time associate editor of the ACS journal *Langmuir*, former department head, and a highly active member of our department, passed away on 18 January 2009 at the age of 76. A lifelong New

Englander, Bob grew up in eastern Massachusetts, went to Bridgewater State Teacher's College [where he met his future wife **Elizabeth Ann (Lisa) Hellstrom**], and got a BS as a math and science major in 1954. He went on to earn a master's degree in physical chemistry at Boston College in 1956, and a PhD at Indiana University in 1960.

He joined the faculty at UMass Amherst in the same year he received his doctorate, and rapidly became a strong contributor to teaching and research in the general area of physical chemistry. He was a founder of the UMass Research Computing Center and its first director from 1961-1964; that facility evolved from its inception in the Chemistry Department to become the present day Office of Informational Technology. As acting head during 1983-1986, he worked with then-Dean **Fred Byron Jr.** of the College of Natural Sciences and Mathematics to make a transformative hire of three faculty in one year, the Chemistry faculty "class of 1985." All of the group whom he hired have gone on to be tenured and productive members of the present department. The department had been through quite challenging times in the 1970's, but Bob always believed in a brighter future. Though he was only head for a fairly brief period, his leadership laid a strong base for the present department, with its NSF-recognized strength and breadth in PhD level research, but continued pride and focus in excellence as educators and mentors.

Beyond the recognition and appreciation he had from colleagues and students within the Chemistry Department, Bob Rowell was well-recognized and highly valued in the greater scientific community. He served on a number of professional and journal advisory boards and panels. He published about 100 scientific papers, and gave over 200 lectures and



Professor Robert Rowell

seminars. As a co-editor of the Academic Press Colloid Science Series of eight books, he was widely known and influential in colloid science, an area whose importance has grown enormously in recent years. He was particularly active in organizing and teaching scientific workshops, both on campus and many off campus.

In terms of professional contributions (which were particularly strong within the American Chemical Society), Bob was perhaps best known as a long-time member of the editorial team at the highly regarded ACS journal *Langmuir*, a position at which he worked and to which he contributed right into the week he passed away. As described above, he was long a well-known chemist for his high quality work in colloid chemistry, making him an influential member of the editorial team of *Langmuir*. A recent journal cover of *Langmuir* honored his scientific career (<http://pubs.acs.org/doi/abs/10.1021/la058018g>). In that 2005 issue, noted scientist and *Langmuir* editor-in-chief **David Whitten** noted, "Bob Rowell has been part of *Langmuir* since day 1... He became an Associate Editor in 1986 and has remained an editor for 20 years, so he is by far the longest serving member of the *Langmuir* 'family.' Bob has participated in the growth of *Langmuir* from a relatively small journal to the 3rd journal of the ACS publications in terms of both submissions and manuscripts published."

Like many New Englanders, Bob Rowell was not much for flash, self-advertisement, or loud demonstrations of opinion. He was about focus and results. Most important, whether he was mentoring graduate student research, acting as a leader of his own department, or serving his chosen profession, Bob Rowell found ways to elevate that which was promising to become that which would become impressive. He seemed equally capable when crafting woodwork and furniture, or crafting ways for individuals and groups to become more successful. Former students and colleagues present and past will miss him greatly.

A memorial celebration of Bob's life and career is planned for spring of 2009. There are also plans to create a scholarship fund in his honor; Bob's wife, **Lisa**, has asked that contributions be made to the Robert L. Rowell Scholarship Fund, in care of the Department of Chemistry, Lederle Graduate Research Tower A Room 104, University of Massachusetts, 710 N. Pleasant Street, Amherst, MA 01003. g

—Paul M. Lahti

2008 SEMINAR SERIES

The Chemistry Department Seminar Series has historically attracted many of the finest scientists from all areas of interest to share their perspective with a diverse and highly interdisciplinary audience. This year was no exception. From a very recent Nobel Prize winner to a leader in current and future governmental energy policy, we were dazzled by state-of-art research and engaging conversation.

The 2008 Five-College Seminar kicked things off with a world-renowned leader in biological fluorescence and imaging, **Prof. Roger Tsien**, from the University of California–San Diego. Throughout his three lectures, presented to audiences at UMass Amherst, Amherst College, and Mount Holyoke, **Prof. Tsien** beautifully illustrated the enormous value of fluorescent markers for visualizing cellular events at the molecular level. His work, which ultimately won him a share of the 2008 Nobel Prize in Chemistry, has led to development of an astonishing spectral array of chemical and biological tags capable of “illuminating” biological events ranging from simple protein trafficking to cancer metastasis. Upon hearing the news of the Nobel Prize honor, **Prof. Jeanne Hardy** put together a letter of congratulations signed by nearly all UMass Amherst faculty and staff who participated in the visit.

As the opening to our fall named lecture series, **Dr. Patricia Dehmer**, Deputy Director of Science Programs at the US Department of Energy, presented a very informative lecture entitled “Facing Our Energy Challenges in a New Era of Science” as the 2008 Mahoney Seminar lecturer. The large and diverse audience was treated to a history of both domestic and international energy usage which underscored the urgent need for new technologies and improved management of resources. Combining both the basics and more complex scientific issues, this was truly a lecture from which all citizens of the world would benefit. Given current energy-related thrusts with the department we were very fortunate to have this opportunity and it was clear that everyone came away with increased appreciation for matters of energy consumption and conservation.



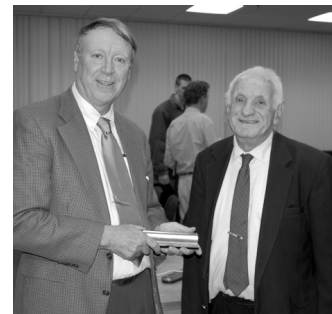
Congressman John Oliver and Prof. Patricia Dehmer




Professor Victoria McGuffin

The following week, **Prof. Victoria McGuffin** from the Center for Integrative Sciences at Michigan State University visited as the Procter & Gamble Lecturer. Her seminar, entitled “CSI East Lansing: Recent Advances in Forensic Analytical Chemistry,” gave an exciting look at two applications of forensic science from a laboratory perspective. The first dealt with spectroscopic analysis of fire accelerant residues in arson cases for matching these samples to those found in the possession of potential criminals. In the second, **Prof. McGuffin** described ongoing work toward analytical methods for detection of common drugs related to sexual assault cases. Witnessing the power of modern chemical techniques for real-world applications was a pleasure for all those in attendance and the subject seemed to spark numerous fascinating conversations.

Capping off a stellar semester, the 2008 Stein-Bayer Lecture featured **Prof. Ned Thomas** from the Massachusetts Institute of Technology. As a former faculty member in the UMass Amherst Polymer Science and Engineering Department, **Prof. Thomas** was quite pleased to be back amongst a number of good friends and familiar scenery. To a large and enthusiastic crowd, he presented a wide-ranging lecture, “Periodic Materials for Photonics and Phononics,” which examined many of the successes and aspirations of his esteemed research group. The work presented offered remarkable potential for materials applications from small luminescent devices to theatre-size acoustics. The banquet dinner, held in **Prof. Thomas’** honor, proved to be the perfect end to a truly enjoyable day.



Professors Ned Thomas and Richard Stein

We would like to once again offer our enormous appreciation to all of our alumni who, through their generous contributions, make this seminar series possible. These events remain a valuable source of knowledge and networking for all faculty, students, and friends involved. We look forward, as always, to continued excellence in the future of this program. 

researchFEST 2008

Thanks to the many supporters and organizers, the 18th Annual UMass Amherst Chemistry Research Symposium was, once again, a huge success. The symposium was held on August 26th and the halls of Goessmann were filled with inventive posters and lively scientific discussion. This event offers our community the unique opportunity to learn about each other's chemistry research in an open, informal environment. Choosing award winners for this year's poster presenters was particularly difficult for the judges, as so many students demonstrated great preparation and enthusiasm. A few individuals did stand out to the judges based primarily on scientific merit and presentation clarity. These award winners are:

Peter C. Uden Outstanding Poster Award Sponsored by William E. McEwen Fellowship: Kristen Huber (Hardy Lab) for "Caspase-9 Inhibition and Activation by Dimerization Control"

C. Peter Lillya Outstanding Poster Award Sponsored by William E. McEwen Fellowship: Hariharan Venkatraman (DV Lab) for "Proper Packing of Polymer Semiconductors into Functional Heterojunctions"

George R. Richason Outstanding Poster Award Sponsored by William E. McEwen Fellowship: Usha Viswanathan (Auerbach Lab) for "Condensed Phase Proton Transfer: Modeling Proton Transfer in HY Zeolites"

Marvin Rausch Outstanding Poster Award Sponsored by William E. McEwen Fellowship: Zhengjiang Zhu (Rotello/Vachet Lab) for "Multiplexed Screening of the Cellular Uptake of Gold Nanoparticles Using Laser Desorption/Ionization Mass Spectrometry (LDI-MS)"

Our main event featured four students selected from a diverse set of research groups who orally presented their work to a large audience of peers, faculty, and visitors. It was quite clear that each student put a phenomenal amount of work into these presentations and, as with the posters, judges were assigned the difficult task of designating awards. After much discussion, a consensus was met and honors were presented as follows:

Procter & Gamble Outstanding Chemistry Graduate Student Award – Kelly Ryan (Maroney Lab) for "Nickel Superoxide Dismutase: Effects on Structure and Function in First and Second-Sphere Modifications"

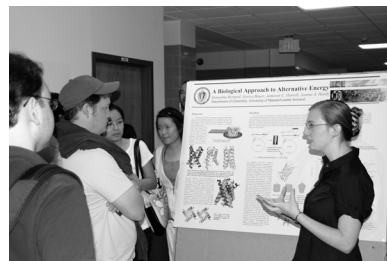


Akamol Klaikherd, Vanessa Mendoza, Michael Odoi, Kelly Ryan

Procter & Gamble Outstanding Chemistry Graduate Student Award – Akamol Klaikherd (Thayumanavan Lab) for "Macromolecular Tailoring for Stimuli Responsive Block Copolymers"

Rohm & Haas Outstanding Chemistry Graduate Student Award – Vanessa Mendoza (Vachet Lab) for "Combined Covalent Labeling Methods for Studying Beta 2m Oligomer Assembly by MS"

William E. McEwen Fellowship – Michael Odoi (Barnes Lab) for "Probing the Mechanism of Photophysics of CdSe-OPV Nanostructures at the Single Molecule Level"




Samantha Bernard discusses her research in the Hardy lab with Bob Herbst from the Maroney group.



Zhengjiang Zhu discusses his research on gold nanoparticles with fellow students.

To cap off a fantastic day, we were treated to a delicious BBQ on the back lawn of Goessmann arranged by graduate students **Bob Herbst** (Maroney Lab), **Kevin Early** (Barnes Lab), and **Kristen Huber** (Hardy Lab). Long lines at the grill provided families and friends the opportunity to reunite and reflect while scientific discussions stilled echoed.

We would like to thank all who participated in the 2008 Researchfest, especially our judges and sponsors for their contributions: *UMass Amherst Department of Chemistry*, *Rohm & Haas*, *Procter & Gamble*, and the *William E. McEwen Fund*. A very special thanks goes out to the organizers of the event; **Ruthanne Hassey** (Barnes Lab), **Kevin Early** (Barnes Lab), **Harihara Venkatraman** (DV Lab), and **Oscar Miranda** (Rotello Group) who worked tirelessly to ensure a successful and fascinating affair. 

undergraduate SENIOR & AWARDS DINNER



Professors David Adams and Paul Lahti, and the 2008 Senior Class.

The Chemistry Department held its tenth annual Senior and Awards Dinner at the Murray D. Lincoln Campus Center on the UMass Amherst campus on Tuesday, May 13, 2008. More than 100 students, parents, faculty and staff attended the event that recognizes those undergraduates who have distinguished themselves in the pursuit of academic excellence. The program included a welcome by Department Head **Bret E. Jackson**, the introduction of 26 graduating seniors by Undergraduate Program Director **Paul M. Lahti**, a buffet dinner, and the award presentations. Over 40 deserving students received awards, certificates, honors and scholarships. All award winners were guests of the Chemistry Department and graduating senior chemistry majors received door prizes consisting of cups, pens, paper pads, and other departmental mementoes. **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 door prizes 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:

Julia M. Kumpf

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

Benjamin R. DiTrollo

– American Institute of Chemists Award

Samuel B. Bearg, Andrew P. Bell and Hagit Ben-Daat

– Richard W. Fessenden Award

Emma L. Downs

– John A. Chandler Memorial Scholarship Award

Paul J. Ganssle and Samuel B. Bearg

– Senior Class Award

Sarah M. White and Daniel G. Terk

– Merck Index Award

Julia M. Kumpf

– Hypercube Scholar Award

Paul J. Ganssle, Ngoc Ho, Daniel G. Terk and Pardeep Thandi

– Outstanding Undergraduate Researchers 2008

Julia M. Kumpf

– 21st Century Leaders Award (nominated)

David P. Waterman

– William F. Field Alumni Scholar Award

Emma L. Downs

– ACS Analytical Chemistry Award

Britanny J. Chaney-Ryan

– Jay A. Pirog Scholarship

Thomas S. van der Poll

– Bates Research Fellowship

Cornelius Y. Taabazuing

– Bradspies Research Fellowship

Brittany J. Chaney-Ryan and Karma Tsering

– Hach Fellowship

Pardeep Thandi

– C.D. Youngren Scholarship from the College of NSM

Cameron J. Butova, Joon Hyung Kim, Eric I. Marks and Khoa D. Tran

– Robert Maxwell Williams Memorial Scholarships

Jamal N. Salah, Xiaoliang Yao, Benny Chen, Tamara L. Allen and Edward D. Cooke

– Edward Shapiro Scholarship

Muriel M. Herd, Caitlin A. Lauer, Emma N. Rudie and Kathleen E. Franklin


– CRC Freshman Chemistry Award

Emma N. Rudie, Haiyan Xu, Kyle Reeves and Idin Zhalehdoust

– Honors General Chemistry Poster Award 


new ADDITIONS




Suzanne Palmer gave birth to twins on April 30, 2008. She had a boy, **Kieran Alexander** (left), weighing in at 7 pounds 7 1/4 ounces, measuring 20 1/2 inches long, and a girl, **Ada Zoe** (right), 5 pounds 6 1/2 ounces, 19 inches long. 

staff CHANGES

Jon Belanger left for a position at Fidelis Security Systems, in Bethesda, MD, designing and implementing IT for a new and growing company. His expertise will be missed.

John Maher, our new Senior Systems and Networking Administrator, comes to us from a diverse educational and professional background. Most recently employed at the School for International Training, prior to that he was a UMass employee in OIT's Network Services group and brings to Chem/BMB much needed skills in network management. 

alumni SNIPPET

David Henderson (PhD '75) and Prof. Susan Henderson, (MS, Prof. Curran) have a paper accepted in *Chemistry and Ecology* 24 (5) entitled, "Acidity of machine made snow and its effect on pH and aluminum speciation in New England streams during spring thaw." This paper was a result of our interest in skiing and our question about the impact of machine made snow, which appear to be positive. They also have a forthcoming entry in the 2nd Edition of the Handbook of HPLC, Fall 2009 entitled, "The Control and Application of Temperature in Analytical High-Performance Liquid Chromatography." 

A WORLD OF INDUSTRY—continued from page 1

Pizza Parleys, a summer seminar program exclusively for graduate students to discuss current research fields. ResearchFest has been sponsored in recent years by The Procter & Gamble Company, Rohm and Haas, Momentive Performance Materials, Fisher Scientific, Brucker Corporation and Cambridge Isotope Laboratories. And, while many companies seek our graduates through the University's Career Services office, The Procter & Gamble Company, Rohm and Haas, and Bayer Material Science send PhD researchers directly to the Department to interview our graduate students and to meet with research faculty and Department administrators.

CHANGING TIMES

With respect to collaborative research, much has changed in the last decade between academia and

industry. Increased competition, financial constraints, and advances in information technology have combined to steer industry away from its long-held model of internal-only discovery research. As a result, many companies have downsized their basic research and discovery operations in favor of a more open model of innovation/acquisition, which widely canvasses the globe for new technologies from all sectors including academia. In doing so, industry has worked with academia to define acceptable terms pertaining to publication/patent rights and commercialization. On the academic side, evidence of collaboration with industry has often been the key differentiator in determining which universities receive key government grants, particularly large grants earmarked to create national level research centers. Academia is not without its financial challenges either. In addition to

... continued on page 2

supplementing its research expenditures with industrial grants and contracts, discoveries made by academia and subsequently commercialized by industry can bring significant royalties to university campuses after the 1980 Bayh-Dole Act. For example, such royalties at both Florida State University (Taxol® synthetic method patent) and Northwestern University (Lyrice® composition of matter patent) have resulted in the construction of new science buildings. Indeed, when properly constructed and executed, industry/academic collaborative research projects can provide handsome incentives for both parties.

It is very important, however, to recognize that these collaborative research opportunities are not meant to replace the main academic objective of basic research; nor should they be viewed as substitutes for more substantive longer-term government grants. Industrial collaboration should be seen as supplemental – but a necessary component in a complete university research strategy in a world that is rapidly becoming more interdependent across all sectors.

PRESENT PARTNERSHIPS

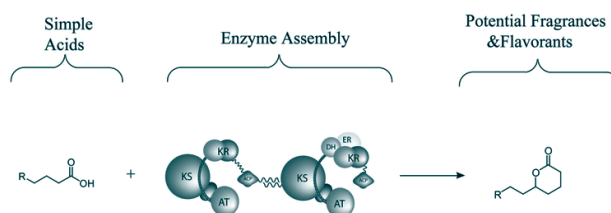
In full recognition of this changing landscape, the Department has endeavored to further build on its connections with industry. For example, the Department's Fueling the Future Center, an NSF-funded research team led by Prof. Thayumanavan working towards new fuel-cell technologies (for more info see pg. 14), will convene the first meeting of its Industrial Advisory Group (IAG) in April. The Center is currently in the process of finalizing the IAG's membership, which will provide input on research direction as well as have opportunities to enter into contract research with the Center. DuPont, Arkema, GM and Bayer have already indicated their commitment to participate. In 2007, the UMass Amherst Center was selected by the NSF Chemistry Division to be one of two new centers across the nation to receive funding. In its first phase, the Center receives \$500,000 per year, potentially increasing to \$4 million per year starting in 2010 as a Phase II Center, or \$40 million over the anticipated ten years.

UMass Amherst Chemistry research has also led to the formation of a new company. In particular, Protein Attachment Technologies, LLC, (PA Tech) a start-up company based on the discovery of Template-Directed Assembly in Prof. R. Weis' lab, continues with its commercialization efforts with the introduction of BioForm™. This product enables test-tube assays to

replicate the membrane environment that is critical for the function of signaling proteins inside cells. No other test-tube assay provides this benefit. BioForm is a simple, add-in reagent that works seamlessly with current high throughput screening (HTS) systems without re-engineering equipment or making changes to established read-out methods. To learn more visit www.patechllc.com.

In another industry-UMass Amherst partnership, members of Prof. Rotello's lab are working with BAE Systems (Rockville, MD) on the creation of sensors for biowarfare agents based on the sensor array technology (patent pending) developed at UMass Amherst and Georgia Tech in collaboration with Prof. Uwe Bunz. In this project, the Rotello group is developing and testing new "chemical nose" array sensors for pathogenic bacteria. In complementary research, the BAE group is working on platform development as well as new data processing protocols to enhance application of this methodology in real-world sensor systems.

Another exciting new area of collaboration with Givaudan Flavors Corporation involves research in Prof. Schnarr's lab, which studies intracellular enzyme machinery for the synthesis of small molecules with defense properties. These synthesis pathways are well known for their ability to produce lactones with antibacterial and antifungal activity. Lactones however are also important natural compounds imparting characteristic flavor to such foods and beverages as apricots, blue cheese, butter, fresh coconut milk, guava, mangos, peaches, plums, strawberries, tea, and wine to name a few. However, many natural flavor-related



Using natural and modified enzyme assemblies, the Schnarr Lab is working to convert simple organic acids into industrially useful fragrances and flavorants.

lactones remain unidentified or can be difficult to prepare synthetically. By manipulating intracellular enzyme machinery, it may be possible to more easily prepare and isolate new lactones with important flavor characteristics and applications.

A WORLD OF INDUSTRY—continued from page 22

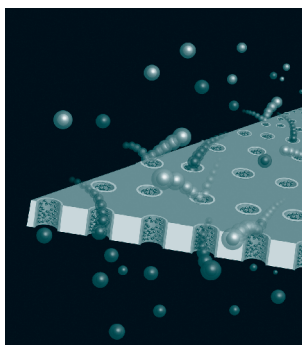
FUTURE COLLABORATIONS

To facilitate additional UMass Amherst-industry partnerships, we have initiated a new Industry Liaison Program spearheaded by Prof. Ray D'Alonzo (PhD '77). Prof. D'Alonzo joined the Department in September 2008 after more than 31 years of management experience with Procter & Gamble. As a retired industrial chemist, Prof. D'Alonzo has much to offer to the Department's missions in research and education (see page 6 for more info on Prof. D'Alonzo's activities.)

During the fall semester, discussions with research faculty members in the Department yielded several new potential research projects of industrial interest, a few of which are highlighted here. In Prof. Thayumanavan's lab, porous polymer membranes are envisioned to offer the potential to revolutionize separation science. Pores across the width of a membrane can be assembled with relatively uniform dimensions with diameters of approximately 20 nanometers and lengths of approximately 60,000 nanometers. The inner walls of the pores can be chemically modified to produce chromatography columns of true nano dimensions.

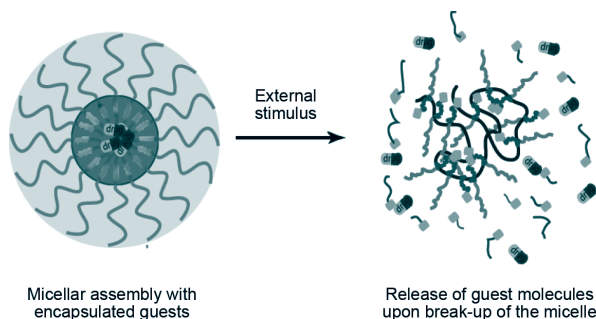
These nano pores may provide chromatographic resolution equivalent to conventional packed columns but offer the ability to accomplish separations on extremely small samples in just a few seconds, like the contents of a single cell.

Pore sample loading and separation may be accomplished by field flow fractionation while micro array detectors may be suitable for the detection and quantification eluting components.




Thai's new nanoporous membranes.

Professor Thayumanavan has also developed polymer micelles with the ability to control the release of encapsulated drugs by responding to disease biomarkers or proteins in vivo. This novel approach opens a totally new avenue for achieving individualized medicine. The principle of individualized medicine is based upon the fact that each person responds to a medication differently. Some individuals may require high doses while others much lower doses. The optimal dose required by an individual is determined by measuring



a relevant biomarker of wellness or disease severity from a plasma, urine or saliva sample. In practice, individualized medicine is hampered by the need to commercialize multiple dose strengths of the drug and the sampling and analysis of patient specimens. Biomarker-sensing polymer micelles avoid these limitations by tailoring the release of a drug in response to the severity of the disease state, or even in response to the patient's state of wellness depending on the biomarker chosen for interaction with the micelle.

Professor Maroney is investigating an economical on-demand system for hydrogen production and utilization. Although many politicians have described a "hydrogen economy," most of the world's hydrogen comes from steam reforming of petroleum, which itself adds substantial amounts of atmospheric carbon dioxide, the purported cause of global warming. An important carbon-free method of hydrogen production involves "splitting" water into hydrogen and oxygen. Natural enzymes called hydrogenases, studied in the Maroney lab, catalyze the oxidation of H_2 to protons when they are linked with electron acceptors such as O_2 , N_2 , or CO_2 . Hydrogenases can also catalyze the reverse process, the reduction of protons to H_2 when these enzymes are linked with electron donors such as ferredoxin or cytochrome c3. Prof. Maroney and coworkers are working on optimizing this process for hydrogen fuel production, and constructing enzyme-based devices of interest to commercial partners.

Department graduates who have pursued careers in industry are invited to renew old acquaintances and establish new contacts at this year's Chemistry Reunion on Saturday, June 6, 2009 from 2-5pm (see page 28 for more info). Attendees are encouraged to explore potential industry partnering ideas with any of our faculty. With all this activity, it's no wonder that alums like Dr. Brian Jordan thrive in the real world of industrial chemistry! 

Dubyne, whose passion for chemistry and teaching started me on the path to where I am now.

GG: *Does the love of chemistry run in your family?*

NS: My mother is a high school English teacher and my father is a retired police officer so genetics don't seem to play a role in my attraction to chemistry. Interestingly, despite this background my brother has also found a home with science and currently works as a pharmacist outside of Detroit.

GG: *What was your worst job ever?*

NS: My least favorite, yet most lucrative job was painting dorm rooms at the Chi Omega Sorority House on the campus of Michigan State University. This job took place in the dead of Michigan summer while I was in high school and the building was without air conditioning. At \$100 per room though, I really cannot complain.

GG: *What convinced you to go to the grad school you attended?*

NS: I am a devoted fly-fisherman and Colorado State University seemed like a great place to satisfy my cravings. Little did I know, graduate school requires a fairly significant time commitment and, as a result, I didn't find myself on the river as much as I might have liked.

GG: *What did you study for your PhD?*

NS: I studied model peptide systems that mimicked protein recognition interfaces. We were ultimately able to design a system that behaved very similarly to a part of the HIV viral entry complex which enables the virus to enter a human host cell.

GG: *Have you ever had a job in industry?*

NS: As an undergraduate at Hope College, I took advantage of the proximity to Parke-Davis/Warner-Lambert (now Pfizer) and acquired a summer internship position there in the analytical chemistry division of research and development. Directly observing the daily tasks of scientists at all levels ranging from B.S. to Ph.D. is what ultimately convinced me to attend graduate school.

GG: *Assuming your research is wildly successful, how will it impact society?*

NS: Our research focuses on engineering biosynthetic pathways in bacteria to generate novel therapeutics such as broad-spectrum antibiotics and anticancer compounds. We like to think that success in these ventures will change the way we, as a community, think about drug discovery and design. The processes that we are manipulating will provide an environmentally benign

route to small-molecule pharmaceuticals where simple starter units can be added to innocuous bacterial cultures to produce complex molecules that would take many tens of steps to synthesize by traditional means.

GG: *What are the biggest barriers towards your research being wildly successful?*

NS: Our biggest hurdle is understanding how individual enzymes in our biosynthetic machines communicate with each other and, more importantly, how to get them to behave when we introduce alterations to their structure and function.

GG: *Bio focuses (biological chem-Hardy; biological/organic chem-Chambers; biochemistry/biophysics-Chen; bioanalytical chem/biophysics-Holden; organic chem/chemical biology of complex biosynthetic systems) seem to be all the rage among the young chemists; is this a trend among chemists, in general? What could this be attributed to?*

NS: In the past, I think that the natural sciences were significantly more separated where chemists focused on chemistry and biologists focused on biology. However, over the past few decades, it has become increasingly clear that progress in either field relies heavily on the interplay between them. For instance, chemical probes are often needed to reliably interrogate biological systems. Similarly, it is difficult to rationalize development of a chemical process without some sort of real-world application, and biology is often a prime target. It is a bit dangerous, given our increasing interdisciplinary community, to maintain a narrow outlook and young scientists are becoming more adept in multiple fields at an early stage.

GG: *Which is more stressful, grant proposals, research or teaching?*

NS: Hands down...grant proposals. For me, research and teaching are the fun parts. They are why I chose a career in academics. However, neither of these things can persist without funding which adds to the already stressful process of convincing people that your ideas are worth supporting. These economic times are particularly bad so I may change my tune when funding is good and I am teaching in front of 300 undergrads.

GG: *What do you do when you're not being a chemist?*

NS: Outside of work, I have many hobbies. I play the guitar (although not well), cook, play a variety of sports, and dabble with photography. My wife and I are big foodies and love trying new restaurants whether in one of our big, nearby cities or the valley itself. Since the purchase of our new home, I have become a sort of handyman finding various things to fix and remodel.

JUNIOR FACULTY—continued from page 24

INTERVIEW WITH PROFESSOR JAMES CHAMBERS (JC)

GG: *Where did you grow up?*

JC: Long Island, NY – in a little town called Hicksville, believe it or not. It was not at all “smalltown” or what most people would think of when you hear the name – and I only learned after leaving that “Hicksville” has negative connotations! It was a great place to grow up for me since it was just a 20 minute drive to the water. I spent a ridiculous amount of time fishing on both the north and south shores. It was a ton of fun...



GG: *When did you realize you love chemistry?*

JC: I found out that I absolutely loved chemistry when I realized that my first chemistry set was good enough to actually make things – colorful and smelly and smoky things. Probably 4th grade?

GG: *Does the love of chemistry run in your family?*

JC: Definitely NOT...my parents had no idea how I could spend hours in the basement mixing chemicals together. The noxious smells of burning sulfur should have given me away, but did not – except for that one time.....

GG: *Did you have a chemistry set when you were little?*

JC: We had a Sears catalog store about three blocks from the house I grew up in. I saw a beautiful, fully stocked chemistry set in the catalog and begged my parents to order it. They did. The rest, I suppose, is history.... I used the set so much that we had to order refills of almost all of the chemicals after just a couple of months. As for glassware, I was lucky enough to have a store called Copernicus nearby that catered to kids like me and sold Erlenmeyer flasks, glass tubing, burners, filter paper, etc. Something tells me that in today's over-protective and security-crazed society, these materials might be harder to come by for a kid just like me...

GG: *What was your worst job ever?*

JC: Worst job I ever had was as an overnight shelf stocker for a major supermarket on Long Island. I decided it was not my cup of tea after about 25 minutes of training. That was my first and last normal job. My other high school jobs included stints at various home and garden supply places. Those jobs were great because they were physically challenging and I was able to teach people about gardening which, for some strange reason, I found very rewarding.

GG: *What convinced you to go to the grad school you attended?*

JC: The reason I went to grad school at Purdue University was to work with Dave Nichols. He was doing simply amazing work on serotonin-2A receptor agonists and the idea of working on these drugs and deciphering their molecular mechanisms intrigued me greatly. His reputation for producing excellent scientists was also an attractor. The education I received in his group was simply amazing and I cannot thank him enough. I have tried to model his methods in my own lab, but I have found that it is very hard to replicate – he is one of a kind.

GG: *What did you study for your PhD?*

JC: I studied the agonist binding site and activation mechanisms of the serotonin-2A receptor. I basically wanted to figure out how serotonin-2A agonists activated the receptor to bring about profound neurological effects. I did a bunch of serious organic synthesis and learned how to do some pretty advanced modeling of protein dynamics.


GG: *Do you use any novel techniques or tools, or work with any unique materials for your research?*

JC: Probably the most unique tool that we use is actually a set of tools – almost all of the new drugs and chemicals we are making are meant to be activated or changed by exposure to light. Thus, we use everything from sophisticated, tunable monochromatic, high-intensity xenon light sources to non-sophisticated incandescent bulbs and laser pointers to do our neuroscience experiments. I think that makes my lab unique, at least in the UMass Amherst Chemistry department.

GG: *Do you work in any collaborations?*

JC: Yes – we are working closely with neurobiologists at both UC Berkeley and UCSF on experiments involving learning and memory formation in the mammalian brain.

GG: *Assuming your research is wildly successful, how will it impact society?*

JC: Assuming all goes perfectly, my group's research will finally decipher how exactly new memories are formed, at the molecular level, in the human mind. Right now, we think we know the players involved in the process, but we do not know where or when they are operating and with whom they are teaming up. By learning the answer to this basic question, we will be able to move onto the larger questions and topics that we are interested in such as improving memory formation in humans and, maybe, just maybe, gaining some insight into human consciousness. 



friends of umass amherst chemistry

THANKS FOR YOUR SUPPORT!

Giving Period: January 1, 2008–December 31, 2008

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On the cover: *Reception of Reunion*
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ALL ALUMNI ARE CORDIALLY INVITED TO THE
CHEMISTRY ALUMNI REUNION 2009
"INDUSTRIAL CONNECTIONS"


 YOU are cordially invited to the next Chemistry Reunion on Saturday, June 6, 2009. The Department of Chemistry will feature lectures on INDUSTRIAL CONNECTIONS, by various speakers, including our own Prof. Ray D'Alonzo. Please mark this date on your calendar. We hope to see you for Reunion 2009, an occasion to learn about partnerships between industry and academia, and about the research here in Chemistry at UMass Amherst which exemplifies these collaborations.

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

Saturday, June 6, 2009

2:00-3:00 p.m. Reception
3:00-4:00 p.m. Lectures
4:00-5:00 p.m. Social Hour

Please RSVP to Ms. Carrie Morrison Penland by phone at 413-545-2585, by email at carriemp@chem.umass.edu. For more information about the reunion weekend including lodging information, call Ms. Penland or visit our department website at <http://www.chem.umass.edu>.

The Reunion will take place in the beautiful, new Integrated Science Building (ISB), Room 221. ISB is just south-east of Goessmann Laboratory. We hope to see you all there in June 2009! 



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