

GOESSMANN gazette

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UPCOMING EVENTS

Marvin Rausch Lectureship in Organometallic Chemistry

Prof. Thomas E. Bitterwolf
University of Idaho
April 14, 2011

Senior Awards Dinner
May 3, 2011

Procter & Gamble Seminar
Dr. Benjamin Cravat, Scripps
September 29

William E. Mahoney Annual Lecture
Prof. Hagan Bayley
University of Oxford
October 6

*Stein-Bayer Seminar in Polymer
Chemistry*
Prof. Mohan Srinivasarao
Georgia Institute of Technology
October 13



University of
Massachusetts
Amherst

Chemistry Leads Development of Unique Integrated Science Curriculum at UMass Amherst

A unique undergraduate science program was launched at UMass Amherst on January 18, 2011, marking the beginning of the Spring 2011 semester. The program, called iCons for Integrated Concentration in Science, will train students to synthesize and apply integrated scientific knowledge to solve society's biggest problems in, e.g., renewable energy.

The complexity of the renewable energy problem requires collaborative, multidisciplinary solutions. For example, the emerging biofuel industry will rely on teams of agronomists, chemists, chemical engineers, plant biologists, microbiologists and others to bring new technologies from concept to



iCONS group photo.

market. The same is true for the other RE sources such as solar and geothermal energy. As science educators, we are compelled to ask how well we prepare our students to thrive in such multidisciplinary environments. We traditionally teach the separate silos of biology, chemistry, physics, etc.; teaching such subjects is crucial for establishing deep levels of expertise in individual disciplines. However, such disciplinary expertise alone is not enough. Indeed, both graduate schools and employers

Getting to Know Our Newest Faculty Members

INTERVIEW WITH PROFESSOR KEVIN KITTILSTVED (KK)

GG: Where did you grow up?

KK: Spokane, WA

GG: When did you realize you love chemistry?

KK: In high school, I liked chemistry enough to declare it as my major when I entered my undergraduate career at Gonzaga University. It wasn't until I was introduced to research as an undergraduate working on the synthesis and reactivity of osmium porphyrins that I really started to love chemistry.

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

KK: My love of chemistry was self-inflicted.

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

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AN AWARD WINNING YEAR

2010 was a fantastic year for our faculty, staff, and students. Our faculty received numerous distinguished awards on- and off-campus. Our staff and students also won important and well-deserved awards for their outstanding service and scholarship. The following is a list of our award winners.

FACULTY

Mike Barnes - 2010 University's Distinguished Teaching Award

Lila Gierasch - 2010 The Dorothy Crowfoot Hodgkin Award

Vince Rotello - 2010 Langmuir Lectureship Award, American Chemical Society, Division of Colloid and Surface Chemistry

Vince Rotello - 2010 Fellow, American Association for the Advancement of Science

Vince Rotello - 2010 University Outstanding Accomplishments in Research & Creative Activity Award

Thai Thayumanavan - 2010 CNS Outstanding Service/Outreach Award

Thai Thayumanavan - 2010 University's Spotlight Scholar

STAFF

Marie Whalen - 2010 Chancellor's Citation Award

GRADUATE STUDENTS

Nick Borotto (Vachet lab) - Chemistry-Biology Interface Traineeship

Mylene Ferrolino (Gierasch lab) - Chemistry-Biology Interface Traineeship

Daniella Gonzalez (Thai Group) - 2010 ICE IGERT Fellowship Award

John Hangasky (Knapp lab) - Chemistry-Biology Interface Traineeship

Amanda Hussey (Chambers lab) - 2010 Velantzas-Austin Award

Myoung-Hwan Park (Rotello lab) - 2010 University Fellowship Award

Luis Ramirez-Tapia (Martin lab) - Chemistry-Biology Interface Traineeship

UNDERGRADUATE STUDENTS

Sean Bickerton - 2010 Connecticut Valley Section ACS Award & Senior Class Award; Henry N. Little Award (BMB)


Matt Stevens - 2010 University Commonwealth College Honors Research Assistant Fellowship Award; ACS Award

alumniNEWS

Dr. Richard Holm (PhD '55, '79 Honorary) is one of the recipients of the University of Massachusetts Amherst Alumni Association 2010 Distinguished Alumni Awards.

Dr. Joshua K. Hoerner (PhD '07) received a patent based on his work on two helix binders at GE Healthcare.

Former adjunct Professor **Kerro Knox** passed away on April 18, 2010 at the age of 85. He was a Lecturer in Chemistry from 1989-1993. His 1961 textbook of Inorganic Chemistry is still cited in advanced chemistry courses.

Distinguished alumnus **Paul H. Terry** (PhD '59; retired, USDA) has been selected as a member of the 2010 class of Fellows of the American Chemical Society and was honored at a special ceremony on Monday, August 23, 2010 in the Sheraton Hotel Constitution Ballroom. 

UMass Chemistry Hosts the 2010 Reaction Mechanisms Conference



Group photo of attendees at the 2010 Reaction Mechanisms Conference.

The prestigious Reaction Mechanisms Conference returned to UMass Amherst during 23-26 June 2010, thirty years after Profs. C. Peter Lillya and Bernie Miller were local organizers for the 1980 version of that meeting. Prof. Paul Lahti was the local organizer, and Prof. Bob Sheridan of U-Nevada Reno the conference chair. There were over 160 registered attendees with 69 poster abstracts in the meeting program, as well as 25 invited talks. Prof. Ricardo Metz of UMass Amherst was an invited speaker, and described his group's spectroscopic and spectrometric work to investigate transformations of highly reactive molecules. Attendance at all sessions was very strong, from the opening right through a closing session on Saturday


(honoring Yale Professor Emeritus Jerry Berson) that featured world leaders of physical organic chemistry. The final session was chaired by the new head of the NSF Chemistry Division, Prof. Matt Platz of the Ohio State University. External financial support from several companies, and from the ACS Organic Division, was gratifyingly strong, and a critical factor in making this meeting (in the words of an attendee) "flawless."

See the full news story at <http://www.chem.umass.edu/news/reactionMechanisms.html>

For pictures and other archived information, see the RMC 2010 website at <http://www.chem.umass.edu/~rmc2010> 

Waters Corporation Donates Xevo TQ to Department

In the fall of 2010, the Department received an extremely generous donation from the Waters Corporation, a Xevo TQ ultra high performance liquid chromatograph tandem quadrupole mass spectrometer. The offer to make the donation was first made in 2009 when Dr. Michael Young, Senior Application Chemist at Waters, and dedicated alum of the Department, visited campus to present a classroom lecture in Chemistry 726 on insecticide analysis in the environment. The Xevo TQ offers unparalleled analytical capability in a single instrument platform and is adaptable to a wide variety of different quantitative and qualitative UPLC/MS/MS applications in such areas as bioanalysis, ADME (absorption, distribution, metabolism, excretion) drug screening, food safety, environmental monitoring, forensic investigations, and more.


The instrument has been installed in the Analytical/Physical Chemistry lab of the new Integrated Sciences Building to complement the existing HPLC/MS/MS and other state-of-the-art instruments in the lab (GC/MS, FTIR, AA, Capillary GC, and Electrophoresis). It will be available for research to both graduate and undergraduate students. With the addition of the Xevo TQ, the ISB lab now offers educational/research opportunity in the analytical sciences to undergraduate students that is virtually unique amongst the best US academic institutions. 



Idaliz Voorhees and Ammar Zafar, plan to use the Xevo TQ to determine the enantiomeric ratios of trace unsaturated gamma lactones in diary products as part of their undergraduate research project.

POINTS *of* PRIDE *in Chemistry*

- Prof. Auerbach awarded Department of Energy EFRC, \$610,000, "Rational Design of Innovative Catalytic Technologies for Biomass Derivative Utilization."
- Prof. Auerbach received Camille & Henry Dreyfus Foundation grant "iCons-Integrated Concentrations in Science-Case Study Development for iCons 1."
- Prof. Barnes received the 2010 University's Distinguished Teaching Award.
- Prof. Gierasch received the Dorothy Hodgkin Award from the Protein Society and also a NIH Eureka grant.
- Prof. Hardy invited to serve on the editorial board for **Biochemical Journal**.
- Prof. Kaltashov oversaw the acquisition and installation of a new \$900,000 Fourier transform ion cyclotron resonance mass spectrometer, funded by the NSF.
- Prof. Lahti awarded prestigious multi-departmental Department of Energy EFRC, \$16 M, co-PI with Prof. Russell of PSE, "Polymer-Based Materials for Harvesting Solar Energy (PHaSE)."
- Prof. Maroney appointed vice chair for the 2011 and chair for the 2012 Metals in Biology Gordon Research Conference.
- OWL-voted one of The Best 100 Innovations from Academic Research for providing Interactive Electronic Textbooks.
- Prof. Rotello received the University 2010 Outstanding Accomplishments in Research and Creative Activity Award.
- Prof. Rotello elected 2010 Fellow, American Association for the Advancement of Science.
- Prof. Rotello gave American Chemical Society Langmuir Lecture, "Engineering the Nano-particle Interface for Materials and Biological Applications."
- Massachusetts Clean Energy Center Awards Grant given to Prof. Thayumanavan to Commercialize Fuel Cell Innovation.
- Prof. Thayumanavan and group's Nanogel work represented as ACS Noteworthy Chemistry.
- Prof. Thayumanavan was interviewed about solar technology research by WFCR.
- Prof. Thayumanavan will receive the 2010 College of Natural Sciences Outreach and Service Award.
- Prof. Thompson successfully completed the competitive review/renewal of the NIH Chemistry Biology Interface Training Grant.
- Prof. Thompson and Jeanne Hardy headed a mutual mentoring initiative amongst female stem faculty, sponsored in part by a Mellon Grant from the Office of Faculty Development, which hosted a seminar by Professor Carol Gross.
- Prof. Vachet elected to Board of Directors of American Mass Spectrometry Society.

- UMass Chemistry hosts the 2010 Reaction Mechanisms Conference.
- Marie Whalen was awarded the 2010 Chancellor's Citation. 

labNOTES

In the AUERBACH LAB ...

Professor Scott Auerbach enjoyed a wonderful sabbatical with his family during Spring 2010, in Santa Barbara, CA. In addition to fascinating research on new materials and catalysts at the University of California, Santa Barbara (UCSB) with colleagues Horia Metiu and Brad Chmelka, Prof. Auerbach and his family enjoyed surfing, hiking, cycling and wine tasting (not at the same time) through the beaches, mountains and wineries of Santa Barbara. Professor Auerbach gave invited seminars to the UCSB Physical Chemists, to a local company Gas Research Technologies, to the UCSB Chemical Engineers, and at Los Alamos National



Nobel Prize Laureate Walter Kohn and Prof. Scott Auerbach

Laboratory in New Mexico. These seminars involved Prof. Auerbach's research into new materials and catalysts for renewable energy technologies such as biofuels and

fuel cells. Professor Auerbach also enjoyed meeting UCSB's Walter Kohn (see photo), who shared the 1998 Nobel Prize in chemistry for his work on density functional theory.

Also exciting is the launch of the new Integrated Concentrations in Science (iCons) program being directed by Prof. Auerbach with substantial assistance from **Profs. Venkataraman and Fermann**. iCons offers 18-credit concentrations in areas such as Renewable Energy and Biomedicine, where students from many different majors work together in teams to address these problems. By working on case studies such as Cholera in Haiti, and Biomass vs. Clean Coal, students learn to exert leadership and communicate across disciplines. iCons presently meets in ISB 221 on Tuesdays and Thursdays – all alums are invited to visit to experience this new way of learning.

Usha Viswanathan defended her PhD on "Modeling Proton Transfer in Zeolites and New Fuel Cell Materials" in Fall

2010. **Vishal Agarwal**, **Lin Jin** and **Dr. Ateeque Malani** presented on their research at the Fall 2010 national meeting of the American Institute of Chemical Engineers. **Julian Santander** and **Jacob Harvey** presented on their molecular modeling studies to the Regional Meeting on Kinetics and Dynamics held in early 2011. First-year students **Deb Sondak**, **Angela Migués**, and **Szu-Chia Chien** joined the Auerbach team to begin projects related to zeolite formation and catalysis. Former member **Leanna Toy** (a high-school chemistry teacher in Amherst) will lead an exchange program to Norway. **Autumn Brown**, **Tyler Jordison**, and **Julia Kumpf** (another high-school chemistry teacher) are all headed to graduate school in chemistry. **Dr. Chandra (Saru) Saravanan** and his wife are enjoying their 2-year old child **Varsha**; **Saru** is now assistant vice president for Reliance Industries Limited in Mumbai (Bombay) India.

In the BARNES LAB ...

In the past year, Prof. Mike Barnes continued research supported by the NSF (“Single-molecule spectroscopy of Chiral Nanosystems”) in collaboration with **Prof. D. Venkataraman** (\$420,000 in total costs through 2012). In addition, he was co-investigator and team leader on the newly funded US Department of Energy EFRC at UMass Amherst led by **Profs. Tom Russell** and **Paul Lahti**. Professor Barnes continued work under the support from the US Department of Energy on “Chemical Microscopy of Conjugated Nanomaterials” for \$390,000 (through 2011), and became a member of the executive committee of the 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. In May 2010, Prof. Barnes was awarded the University of Massachusetts Amherst Distinguished Teaching Award, and received an adjunct faculty position in the Department of Physics.

Our group members and research news: **Michael Odoi** finished his PhD Dissertation on time-resolved spectroscopy on single molecules and nanostructured systems. He is

now a postdoctoral associate at the University of Rochester working with **Prof. Todd Krauss**.

Kevin Early finished his PhD Dissertation on polarization properties of fluorescence from nanostructured materials, with a paper polarization-driven charge-transport in quantum dot systems published in *Nano Letters* earlier this year. **Kevin** received a prestigious National Research Council Postdoctoral Fellowship at the Joint Institute for Laboratory Astrophysics (JILA)/University of Colorado-Boulder working with **Prof. David Nesbitt**.

Austin Cybersmith (3rd-year graduate student) has been investigating orientation effects in single-molecule spectroscopy of chiral molecules in connection with our NSF program.

Mina Bahghar (2nd year graduate student-Physics) transferred to our group in May 2010. **Mina** is working on near-field imaging and spectroscopy of polymer nanostructures.

Joelle Labastide joined our research group as a first-year Chemistry graduate student. **Joelle** received her BS degree in Chemical Engineering from UMass Amherst, and decided to stay on in the Barnes group after a year of undergraduate research experience.

Boquian Yang and **Ebru Yalcin** are two new postdoctoral associates in the group. **Boquian** is working on time-resolved fluorescence spectroscopy of organic semiconductors, and their application to local probes of charge-transport in thin-film optoelectronic devices. **Ebru** is working on near-field imaging of polymer and inorganic nanomaterials.

A number of undergraduates have made significant contributions to our group's research efforts: **Artem Maksov** (Chem '10), **Danielle Sowle** (Chem '10), **Jeremy Graham** (Chem '11), **David Ramsdell** (Chem '11), **Michael Louis** (Chem '11), and **Greg Fahs** (Chem '11).

In the CHAMBERS LAB ...

Over the last year, the Chambers group has continued to develop a unique brand of applied medicinal chemistry to questions in neuroscience. As a whole, the projects in the lab are beginning to bear scientific fruit. Synthetic chemistry is now well-established and we are making more molecules than we can possibly test. On the biology front, some of the students have become adept at patch-clamp electrophysiology and, more recently, fluorescent imaging of mammalian cells. We have developed our first small-molecule probe to tag and observe the brain receptors that encode memory. While we are wrapping up the details of the chemical biology involved with this process, some of the



Barnes group 2010.

students have begun work on the neurobiology in which they are labeling native neurons with this fluorescent probe and observing changes in location of these receptors. It is thought that the molecular basis of memory formation comes down to three important details just like in the world of real estate: location, location, and location.

The lab's work has been presented in talks by Prof. Jim Chambers and in poster format by students at regional and national ACS meetings, at the Society for Neuroscience, and at the Human Frontier Science Program Awardees conference in Trivandrum, India. Additionally, a number of students have received generous awards and fellowships this past year and these are listed next to their name.



Chambers group winter 2010.

Presently, the lab consists of five Chemistry graduate students, **Nate Akey**, **Mariel Feliciano** (Best CBI Chalk Talk), **Amanda Hussey** (*Velantzas-Austin Award in Chemical Neuroscience*), **Steve McCarron**, and **Devon McCarthy**, one Neuroscience and Behavior graduate student, **Rosie Combs-Bachmann** (*Eugene M. Isenberg Awardee*), and one Molecular and Cell Biology graduate student, **Kathryne Medeiros**. In addition, **Dr. Vytla Devaiah** has continued to produce super-complex synthetic molecules as a post-doctoral fellow. Last but certainly not least, the lab continues to host a number of undergraduates with majors ranging from Neuroscience to Biology to BMB to Chemistry throughout the year. During the past year, the lab has been helped by the efforts of our wonderful and dedicated undergraduate researchers including **Moriah Carroll** (Psych), **Dan Daly** (BMB; now at Purdue University for grad school), **Nick Druar** (Psych), **Nick Hathaway** (Psych), **Elana Knight** (Psych), **Ben Marsh** (Chem), **Maya Marcus-Sells** (Hampshire College; Justine Salton Memorial Fund Award), **Jessica Royal** (Psych), **Travis Softic** (BMB), **Matt Stevens** (Chem; Commonwealth College Honors Research Assistant Fellowship and ACS Summer UREU Awardee), **Ben Suarez** (NSB; now at NIH), and **Yu Zhao**

(BMB; now MCB MS). Up-to-date info can always be found at <http://www.chamberslab.com>

In the D'ALONZO LAB ...

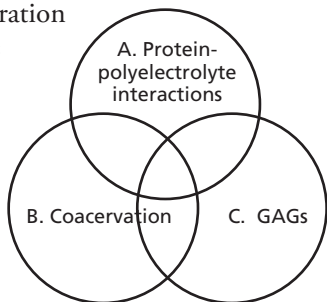
Martin Valdes and **Cate Puccetti** joined the lab earlier this year in the fall where research efforts have focused on determining the ratio of the R and S optical isomers of trace unsaturated gamma lactones in butter, in particular, (Z)-6-dodeceno- γ -lactone (Z6DL). The ratio of Z6DL's optical isomers has not yet been reported in butter. The analysis of this potent flavor contributor is challenging due to the fact that it is present in trace amounts and only produced by cattle on special diets containing linoleic acid containing fats that must be protected with formaldehyde treated casein in order to bypass hydrogenating microorganisms in the rumen. Several butter products were analyzed, but none to date have been found to contain the lactone of interest. **Martin** is a senior chemistry major and is working on synthetic methods to prepare lactones as analytical standards. **Cate** is a freshman in Food Science and joined the lab as a participant in the new Dean's Research Experience program. **Cate** worked on preparing samples by vacuum distillation and analyzing the extracts by GC/Mass Spec. The lab was fortunate to acquire **Cate** on this project as her family owns a commercial dairy farm. We hope to continue work on this project with the help of **Cate's** family business producing butter samples from cattle fed the required special diets.

During the literature search associated with the project, it was noted that saturated lactone isomer ratios differ in different living organisms. For example, the ratio of γ -dodecalactone's R and S optical isomers is 4:1 in butter but 2:1 in *fusarium poae*, a common fungus that infects wheat. This observation has lead to the idea that determining the ratios of optical isomers of volatiles containing one or more asymmetric carbons may be of utility in determining the presence of one organism in another as in the case of infectious disease. As a result, the lab has teamed up with **Prof. Wilmore Webley** in Microbiology to initiate a survey of select microorganisms whereby our lab will attempt to identify volatile metabolites with asymmetric carbons that might be suitable for further evaluation against this objective. **Idaliz Voorhees** and **Ammar Fafar**, undergraduates who joined the lab this spring, are working on this project.

In the DUBIN LAB ...

The Dubin group continues to work along three lines of investigation: PhD student (D3) **Yisheng Xu** is studying the ability of polyelectrolytes (polymers in which every repeat unit is ionic) to inhibit protein aggregation, and the use of polyelectrolytes to separate proteins by coacervation (funded by NSF, *Biomacromolecules* in press). **Marek Marczak** (U4) received an undergraduate research award

for this work. An offshoot of this effort is nanoparticle-protein interactions, pursued by **Kaimin Chen**, a visiting scholar, whose work (in collaboration with **Prof. Vincent Rotello**) has shown that nanoparticles can discriminate among nearly identical proteins on the basis of electrical interactions alone. Coacervation, the spontaneous formation of dense macromolecule-rich fluids from macroion solutions, is also the research topic for **Ebru Kizilay** (D3) (funded by ACS, *Journal of Physical Chemistry*, submitted) who has been working together with postdoc **Simona Maccarrone**. **Ebru** presented their work at the “Winter” Gordon Conference in Ventura. A recent grant from Nestec will support a postdoc working on protein-protein coacervation. GAGs stands for glycosaminoglycans (such as heparin) which appear to control wound regeneration, embryogenesis, stem cell differentiation, tumor suppression (and more) through modulation of signaling proteins. **Burcu Baykal** (D4) has been studying GAG structure-property relations in collaboration with **Prof. Igor Kaltashov**. **Daniel Seeman** (D3) has recently joined the group and has focused on protein electrostatic modeling with applications so far in project A.



The Dubin Lab February 2011.

Collaborations beyond those mentioned include **Prof. Tony Dinsmore** (Physics, Project B), **Lianhong Sun** (ChemE, Project B), **Prof. D. Petri** (São Paulo, Project A) (*Langmuir* 2010), **Prof. D. Pink** (Antigonish, NS, Project A) (*Biomacromolecules* 2010). **Prof. M. Liberatore** (Colorado School of Mines, Project B) (*Langmuir* 2010). A special issue of the *Journal of Physical Chemistry* on “clustering” is being edited with **Prof. Greg Grayson** (PS&E).

Professor Dubin visited **Prof. Basak Kayitmazer** (PhD '07) at Boğaziçi University followed by ☺ 7 days with **Basak** and his wife **Nancy** along the coast of the Aegean sea (where swimming is like dreaming of flying). He also visited **Prof. Yilin Wang** (Postdoc '00) at the Chinese Academy of Science (Beijing) and **Prof. Xuhong Guo** (Postdoc '02) who was the local organizer for the “International Symposium

on Polyelectrolytes” which Prof. Dubin and others founded in 1993 (next meeting: Lausanne). Other alumni news: **Michael Hernon** (BS '07) in residency UMass Medical School. **Elaine Foun** (BS '10) in her first year at URI, and **Margarita Antonov** and **Malek Mazzawi** (BS '09) in second year of the medical programs at BU and Tufts. **Emek Seyrek** (PhD '05) in 2010 joined the University of Geneva. **Prof. Yale Mishaël** (Postdoc '04-05), on the faculty of the Hebrew University of Jerusalem (and now president of the Israel Society of Clay Research) welcomed the birth of her third. **Jeff Gao** (PhD '98) recently joined Genentech, moving with his wife and son to the Bay Area.

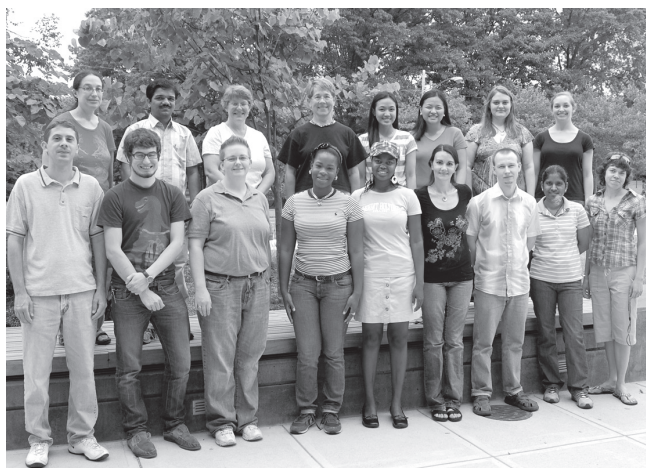
In the GIERASCH LAB ...

The Gierasch lab had a very busy and productive 2010 with exciting science and, as always, new people joining the lab.

We welcomed our collaborator Research Associate Professor **Anne Gershenson**, who has now established her single molecule and fluorescence correlation spectroscopy laser lab instrumentation. We are thrilled to announce that **Anne Gershenson**, **Dan Hebert** and **Lila** were jointly awarded a highly prestigious NIH EUREKA grant to study “Post-Reductionist Protein Folding” and follow how proteins fold in the endoplasmic reticulum.

We were delighted that **Lila** was awarded the 2010 Dorothy Crowfoot Hodgkin Award of the Protein Society. In August, she presented her Award Lecture at the Protein Society Annual Symposium in San Diego. **Lila** also traveled all over US and across the ocean to present the lab's work at several scientific meetings. She went to Florence, Italy to speak about the allosteric mechanism of the Hsp70 molecular chaperone and to Stockholm, Sweden to speak at a Nobel Symposium about protein folding and aggregation in the cell. As usual, the group members also presented their research at many conferences. Several attended the FASEB Summer Research Conference on Protein Folding in the Cell, held in Saxtons River, VT. On the other coast, several lab members attended the Protein Society Annual Symposium held in San Diego, CA. This year, postdoctoral fellow **Anastasia Zhuravleva** went around the globe to present her results at the XXIVth International Conference on Magnetic Resonance in Biological System held in Cairns, Australia.

During our busy summer, we hosted two summer undergraduate interns: **Lorencia Chigweshe** from Mount Holyoke College and **Toussaint Jordan** from Lincoln University. At the end of their stay both did a great job of presenting their research results at the Institute for Cellular Engineering Summer Research Experience for Undergraduates poster session. Amherst Regional High School Senior **Shiyuan Liu** finished her fruitful internship



Gierasch group summer 2010.

in the lab and started her college career at Dartmouth College. We all enjoyed very much their stays in the lab and wish them the best of luck. Last May we welcomed a new postdoctoral fellow to the lab: **Mandy Blackburn**. Mandy is an EPR specialist and graduated from the University of Florida. She will apply her expertise to study the allosteric mechanism of Hsp70 proteins by EPR and NMR.

As we welcomed new people, we sadly said goodbye to other friends: After carrying out his research in the lab throughout his undergraduate years, **David Paquette** left to do his graduate studies at the University of California, San Francisco. While at UMass Amherst, Dave received numerous awards and fellowships. **Mangai Periasamy** finished her MS degree and moved to Paris to start her PhD studies at the Institut Pasteur. We wish them all the best.

Last but not least, we proudly advertise that the lab had a great year in terms of publications, including five research articles, a book chapter in the Encyclopedia of Biophysics, and a commentary.

In the HARDY LAB ...

This year marks the year of the first graduation from the Hardy Lab with **Sravanti Vaidya** defending her thesis in January 2011 and getting married a few weeks later. The work that composed the bulk of her thesis, describing the x-ray crystal structure of caspase-6, a protease involved in both Huntington's and Alzheimer's Diseases, was published in *Journal of Molecular Biology*. **Witold Witkowski** is close behind **Sravanti** on his way to graduation, and added a successful marriage proposal and winning the **Richard and Meryl Brown Fellowship** for outstanding research in Chemistry at the 2010 Chemistry Department ResearchFest to his list of accomplishments. **Greg Tuffy**, a senior undergraduate, is working to publish his first paper in the lab in collaboration with **Witold**. **Kristen Huber** has discovered zinc-specific inhibition in of caspase-9 and is busy working to exploit and understand this inhibition

mechanism. **Kristen** also returned to her alma mater Quinipiac University to discuss her research in January as a result of winning the UMass Amherst Outstanding Achievement in Chemistry Award. **Eli Velazquez**, a nano-IGERT fellow, advanced to PhD candidacy this year and also attended the Protease Gordon Conference in Barga, Italy in May. During the Gordon Conference Prof. Hardy was selected as one the two "Hot Talks" for the work of **Samantha Nicholls** on development of a fluorescent cell-death reporter protein developed in the lab. **Sam** also presented this work at the Apoptosis Keystone Symposium in Vancouver British Columbia. **Muslim Yildiz** also officially advanced to PhD candidacy for his work on the structure-function relationship of Dengue Virus Protease and is working hard to grow crystals of this important protein. This year our first post-doctoral fellow, **Dr. Sumana Ghosh**, was recruited to a Senior Scientist position at Vyome Biosciences in New Delhi, India. One new post-doctoral fellow, **Dr. Peng Wu** joined the group to work on exploiting our protease reporter technology. This year we are also thrilled to welcome two talented new first-year graduate students, **Kevin Dagbay** and **Scott Eron**, to our group.

In the JACKSON LAB ...

The Jackson group continued its theoretical studies of gas-surface reaction dynamics. Two postdocs, **Sven Nave** and **Ashwani Kumar Tiwari**, continued their exploration of methane dissociation on the surfaces of Ni catalysts. This is the rate-limiting step in the important steam reforming process, our primary source for H₂. **Sven** and **Ashwani** demonstrated that the barrier to dissociation varies strongly with the motion of the metal lattice for a wide variety of Ni and Pt surface geometries, leading to strong increases in reactivity with catalyst temperature. Their work also cast some light on the differences in catalytic activity between Ni and Pt surfaces. This work has now been published in several recent *J. Chem. Phys.* articles and a *Phys. Rev. Letter*, and was highlighted in a recent issue of *Chemical & Engineering News*. In collaboration with **Zuleika Medina Torres**, a recent PhD from the group, and researchers in Toulouse, France, a detailed study of the sticking of H atoms to graphite surfaces has recently been completed. Over the past year our work has been presented at invited talks in Lausanne, Switzerland and Toulouse and Bordeaux, France, as well as some less interesting venues.

This past fall, all three recent members of the group started new jobs as assistant professors: **Zuleika Medina Torres** is now at the University of Puerto Rico at Cayey, Puerto Rico, **Sven Nave** is at the Université Paris-Sud, in Orsay, France, and **Ashwani Kumar Tiwari** is at the Indian Institute of Science Education and Research, in Kolkata, India. Congratulations to all three!

In the Kaltashov lab ...

2010 was a very busy year in the Kaltashov laboratory, which included publication of seven papers, including an article in the *Proceedings of the National Academy of Sciences* (Leverence, Mason and Kaltashov, “Non-canonical interactions between serum transferrin and transferrin receptor evaluated with electrospray ionization mass spectrometry.” *PNAS* 2010, 107, 8123). Several



presentations were given by the group members at numerous scientific meetings and conferences, including a key-note lecture at Protein Engineering Summit PEGS-2010 in Boston. The group was also successful in competitive renewal of the grant from the National Institutes of Health, which supported our research during the last decade.

The group continued to expand in size as a result of several exceptional graduate students joining us in December 2009 (Son Nguyen) and December 2010 (Hanwei Zhao, Lola Fatumbi, and Khaja Muneeruddin). However, the most exciting news from the lab is the expansion of families of two group members: Sophia Kita (daughter of Adriana Zeledon Kita) was born on May 28, and Josie Elisabeth Hoang-Bobst (daughter of Dr. Cedric Bobst) arrived on August 29.

Alumni news: After spending several years at Perkin-Elmer, Dmitry Gumerov (PhD '03) opened a new chapter in his career and assumed a position of a Senior Scientist at Mersana Therapeutics (Cambridge, MA).

In the LAHTI LAB ...

PML was an invited speaker at multiple conferences during the past year, including the “Radicals in the Rockies” at Telluride, Colorado; “Physics of Emergent Functional Materials” at Mumbai, India; and a symposium on nitroxide radicals at Pacificchem in Honolulu. He also visited the University of Sao Paulo in Brazil as part of continuing collaboration with the physics department there. He continued his work as co-director of the UMass Amherst Energy Frontier Research Center, Polymer-Based Materials for Harvesting Solar Energy (PHaSE). He was the local organizer for the 2010 Reaction Mechanisms Conference (see story on Page 3), where the Lahti group’s academic grandfather, Jerome Berson of Yale, was honored with a special symposium of world renowned physical organic chemists.

Sadly, William von Eggers Doering, Professor Emeritus at Harvard University and the Lahti group’s academic great grandfather, passed away in January 2011 at age 93. He was one of the progenitors of the Reaction Mechanisms Conference, and an intellectual giant among chemists of the latter half of the 20th century.

Gonca Seber, a present group member, visited Argonne National Laboratory to carry out studies of pressure effects on organic molecular magnets. J. Matthew Chudomel, a present group member, presented his work at the Fall 2010 Materials Research Society Meeting in Boston.

Dave Modarelli visited UMass Amherst during the Reaction Mechanisms Conference with wife Jody. Masaki Minato is now working with ITW Plexus of Danvers, MA, and on last report was still commuting between west and east coast venues for the job. He reports that all is well with Frank Rossitto and his family (including two young sons), as well.

Chris Ling reports that all is well in his work at Abbott Labs; he pursues applications of mass spectrometry for drug discovery. He and his wife are busy parents to two young sons.

Burak Esat reports that all is well for him and his family, including two growing sons. His wife runs her own business close to home. Burak’s work on radicals for rechargeable batteries is going well, and his group gets to make use of Fatih University’s new research center full of instrumentation for materials analysis.



Lahti group fall 2010.

Lora and Jay Field are doing well in Canada, where Lora works with the Ministry of Economic Development and Trade. Yilin Qiu reports that she and her husband, Hao, and their young son Lawrence (born this past year) have moved from Missouri to Washington state. Lawrence is keeping her busy for the present!

In the MARONEY LAB ...

We have been fortunate to have continued funding for our projects including nickel trafficking (NIH), nickel

toxicology (with **Max Costa** at NYU School of Medicine, NIH), the structure and function of nickel-dependent superoxide dismutase, NiSOD, (NSF) and applications of hydrogenase to hydrogen-production and utilization (MassCREST). Highlights include an XAS study of RcnR, a nickel and cobalt responsive transcriptional regulator that controls the production of RcnA, a cobalt and nickel exporter. The study, part of **Khadine Higgin's** dissertation work, produced a mutant that responded to zinc. **Kelly Ryan** reported on the oligomeric structure and a new role of cysteinate ligands in NiSOD. **Dr. Crisjoe Joseph** collaborated with the Dyer lab at Emory University to monitor the hydrogenase reaction using time-resolved infrared techniques. The lab welcomed a new student, **Heidi Hu**, from the MCB program. She joins the nickel trafficking project. There is a new group baby; **Genevieve Bridgit Joseph**, was born in February to proud parents **Crisjoe Joseph** and his wife **Caryl**. Professor Maroney served as Chair of the University Research Council and as vice-chair of the 2011 Metals in Biology Gordon Research Conference.

In the MARTIN LAB ...

Both current students and alums of the Martin lab continue to excel. **Ankit Vahia** (MCB) successfully defended his PhD, with a story challenging the predominant view in the field regarding the energetic origins of abortive cycling during initial transcription by RNA polymerases. The current view has been based solely on "structure gazing" (this following a wealth of structures in the past decade that led to the Nobel Prize in Chemistry in 2009). But structure does not yield energetics and **Ankit** put some of the key structure-derived theories to the test – they failed. Although there is clearly a very large structural rearrangement in the complex on the transition to stable elongation, it does not appear to present an energetic barrier to this transition, as previously thought. **Luis Ramirez** has been developing an alternate explanation for the abortive release of short RNA products during initial transcription and hopes to explain a key protein mutant that lacks abortive cycling. Stay tuned to the next Goessmann Gazette to see if he is on the right track! **Satamita Samata** is expanding our group's RNA polymerase reach into the multi-subunit bacterial system, developing a "unified field theory" to explain basic mechanisms in RNA polymerase. Although the multi-subunit bacterial and eukaryotic enzymes show no structural similarity with the T7 family of RNA polymerases, they appear to show key mechanistic features – convergent evolution towards the same chemical challenges? **Christina Chisholm** and **Ketan Mathavan** have been learning the ropes this year and we look forward to great things from them in the near future.

In the METZ LAB ...

The Metz group continued to study the spectroscopy and photodissociation dynamics of gas-phase metal ion complexes. **Wright Lee Pearson** joined the group as a postdoc as did **Greg Wang** (Junior undergraduate). They are building a new photofragment imaging instrument which will be used to measure the amount and direction of the kinetic energy released when ions photodissociate. This will allow us to measure bond strengths and reveal information on short-lived excited electronic states. **John Gao** (Junior undergraduate) is helping to design the new instrument by building a computer model. **Abdulkadir Kocak** and **Geoff Austein-Miller** (BS '10) characterized the strongly bound, non-covalent $\text{Co}^+(\text{H}_2\text{O})$, $\text{Co}^+(\text{HOD})$ and $\text{Co}^+(\text{D}_2\text{O})$ complexes. **Jennifer Daluz** (BS '10) couldn't escape Amherst's gravitational attraction and elected to remain for a 5th year, studying $\text{Ni}^+(\text{H}_2\text{O})$, $\text{Ni}^+(\text{HOD})$ and $\text{Ni}^+(\text{D}_2\text{O})$ for her MS. These studies measure the rotationally resolved electronic photodissociation spectrum of the M^+ -water complexes, determining the M^+ -water bond strength. They also determine the geometry of the complex from the rotational structure in the spectrum and measure the O-H stretches by combining vibrational excitation in the IR with photodissociation in the visible. **Gokhan Altinay** (PhD '10) accepted a postdoctoral position at Argonne National Lab. In other group news, former undergraduate **Christopher Laperle** (BS '99) is an Assistant Professor at Providence College. He and his wife had their first baby (**Henry**) in December. **Manori (Gunawardhana) Perera** (PhD '08) will be starting as an Assistant Professor at Illinois Wesleyan University in the fall and she and her husband, **Thushara** had a son, **Chathura**, in February. **Fernando Aguirre** (PhD '01) and his wife **Nancy Shina** (BS, RN '99) report that the 'Happy Valley' still pulls on their heartstrings although they are very happily settled in Utah. They and their children (**Jessica, Matthew and Benji**) enjoy sledding, skiing, camping, and hiking in the many nearby National Parks.

In the ROTELLO LAB ...

2010 was once again a busy year in the Rotello lab. **Oscar Miranda, Sarit Agasti, Api Chompoosor** and **Deb Patra** all received their PhDs, with **Oscar** and **Sarit** heading to Harvard and **Deb** heading to chilly Penn State for postdocs. **Apiwat** is headed back to Thailand for a faculty position.



Rotello group summer 2010.

For current members, **Myoung-Hwan Park** received the Graduate School Fellowship. Professor Rotello received the *Langmuir* Award at the Fall National ACS meeting in Boston, along with the Chancellor's Outstanding Accomplishments in Research and Creative Activity Award. Publications continued apace, with 27 in 2010. A partial tally includes one *Nature Chemistry*, one *Nature Nano*, two in *Nano Letters*, three in *Small*, one *Angewandte Chemie*, and three in *JACS*.

In the SCHNARR LAB ...

It was a year of firsts for the Schnarr lab. **Jon Amoroso**, **Gitanjali Prasad**, and **Lawrence Borketey** published their first manuscript in *Organic Letters* describing a method for selectively labeling a key protein involved in the biosynthesis of pharmaceutically-important natural products. Each of them presented their work, for the first time, at the National ACS Meeting in Boston. The trio is now finishing up the final touches of another paper planned for submission in the very near future. **Tsung-Yi Lin** has been furiously working toward identification of a large, multi-enzyme system responsible for bacterial production of an interesting antiviral compound. This work generally takes years for a team of researchers to complete but **Tsung-Yi** has accomplished a large portion of this feat alone in just under a year of effort. Undergraduates, **Taylor Nickerson** and **Dorothy Lui** have been working, in collaboration with **Prof. Ray D'Alonzo's** group, toward the synthesis of flavor molecules in butter. Last but not least, the Schnarr lab welcomes a new member, **Adam Gann**, a first-year graduate student who will be honing his synthetic skills while diving head-first into the joys of molecular biology.

Professor Schnarr also had a year of firsts. He helped organize the department's first annual graduate visitation weekend which hosted over 30 young scientists, from all over the country, who were interested in the University of Massachusetts Amherst for their doctoral studies. The weekend was a smashing success and the coming year's event is already in the works. This fall, Prof. Schnarr taught, for the first time, the large enrollment, organic chemistry course for non-majors. While the challenge of instructing nearly 300 students was difficult at times, the experience was one of the most rewarding of his short career and he looks forward to contributing to this course in the future.

Overall, the year flew by but the lab is beginning to see the light at the end of tunnel and they look forward to a whole new set of "firsts" in the coming year.

In the THAYUMANAVAN LAB ...

The Thayumanavan group enjoyed another productive year in 2010. 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 2010.

Graduate students update: The group **Jing Guo**, **Gladys Murage**, **Ambata Poe**, **Krishna Raghupathi**, and **Jiaming Zhuang** early in 2010. The group hosted **Warathip Siripornnoppakhun** for the year under the Royal Thai Scholarship from Chulalongkorn University in Thailand. **Malar Azhagarsamy**, after finishing his

PhD, is now a postdoctoral associate with **Kristi Anseth** in the Chemical Engineering Department at the University of Colorado. **Tejaswini Kale** finished her PhD and has started as a postdoctoral scientist at the Brookhaven National Laboratory. **Nagamani Chikkanagari** gave an awesome talk at the ResearchFest in the department and was given the Momentive Graduate Student Award. **Tejaswini Kale** took one of the poster awards. **Britto Sandanaraj** has taken a Senior Scientist position at Novartis.

Undergraduate students update: After graduation, **Keith Barbato** is pursuing graduate studies at BU; **Juna Jovani** is pursuing a Pharmacy degree; **Sean Bickerton** has stayed as research assistant in the group for one year, while he is also applying and attending MD/PhD interviews at various schools. We had **Shilpa Vijayakumar**, **Jen Wilcox**, and **Breanna Zerfas** joining our group for undergraduate research last year.

Postdoctoral associates update: **Shreedhar Bhat** took a scientist position at GE India. **Sreedhar Reddy** got a Humboldt Fellowship and is pursuing a second postdoctoral position in Germany. **Sunita Satav** took a consultant job in Pune. **Thirumoorthy** moved for his second postdoctoral position in Canada. **Narayanamurthy** took a position in Stanford University, after two years in the group.

Thai was honored with the first ever Spotlight Scholar award by the University. The College of Natural Sciences also recognized Thai for Outstanding Service and Outreach. The group had studied the advantages of utilizing dendron-rod-

coil as an architecture for photoinduced charge separations, which has implications in polymer-based photovoltaics. This work was published in the *Journal of the American Chemical Society* and the work was further publicized by being picked up as a *JACS* editorial on 'Harnessing Energy for a Sustainable World.' This work was also highlighted in *JACS* website as part of the *JACS* image challenge. The group also invented a new polymeric nanogel platform, which we are very excited about. We are taking this highly versatile platform in different directions. Our first publication in this area in *JACS* was highlighted as Noteworthy Chemistry by the ACS. Perhaps, one of the most exciting things outside of science was that we had some of our group alumni come back to UMass Amherst for a day in the summer. The current and past group members had a great time (see group photo). We decided that we should do this once every five years. We hope many of you will come back for that.

In the THOMPSON LAB ...

Researchers in the Thompson lab are investigating mechanisms of transmembrane signaling by bacterial chemotaxis receptors. We have a new joint NIH grant with the **Weis** lab that focuses on multi-protein signaling arrays. Our current projects use solid-state NMR to measure structure and structural changes between signaling states, hydrogen exchange mass spectrometry to compare dynamics of signaling states, and biochemical methods to investigate the role of clustering in the signaling mechanism.

We congratulated and bid a fond farewell to many lab members this year. Our undergraduates all completed their degrees in May: **Chris Vercollone** (Biochemistry), **Adam Nelson** (Chemical Engineering), and **Max Leabo** (Chemical Engineering) are pursuing careers in medicine and industry. **Shiela Jones** completed her MS degree in December and is happy to be moving back to her home turf in the Pacific Northwest. **Dan Fowler** (PhD '10) completed a short postdoc to wrap up several projects and then commenced a postdoctoral position at University of Vermont, where he is working on electron microscopy studies of membrane protein complexes. Our most recent congratulations go to **Fe Consolacion** who just defended her PhD thesis in January! **Fe** completed a very interesting project demonstrating that clustering changes are not involved in the primary signaling mechanism of bacterial chemotaxis receptors, an important contribution to a controversial question.

We love hearing from our alumni, and this year's news is that **Naima Sharaf** (now a second year graduate student at University of Pittsburgh) gave birth to a baby boy!

We welcomed several new lab members this year. We enjoyed working with summer undergraduates **Julissa Gonzalez** and **Keyana Tyree**, with the CURE and SPUR programs,

respectively. **An-Khanh Ives** (senior biochemistry major) joined the group in September, and **Xuni Li** (chemistry graduate student) joined the group in December to do biochemistry projects on chemotaxis receptors. **Michael Harris** (postdoctoral associate from Columbia University) joined us in November to work on new interface-directed solid-state NMR experiments investigating protein-protein interactions in active chemoreceptor signaling arrays.

Chemistry graduate student **Seena Koshy** completed her CBI Traineeship and presented her hydrogen exchange studies of the dynamics of receptor cytoplasmic domains in active complexes at a FASEB meeting in Vermont: "Molecular Biophysics of Cellular Membranes." Professor Thompson enjoyed attending conferences that span our group's research interests: she was invited to speak at this August 2010 FASEB membranes meeting, at a January 2011 NMR symposium at MIT honoring her postdoctoral mentor, **Robert Griffin**, and at a May 2011 Cold Spring Harbor Asia meeting "Membrane Proteins: Structure & Function" in Suzhou China.

Finally, it was a busy and productive year for the Chemistry-Biology Interface training program, which Prof. Thompson continues to direct. After submitting our competitive renewal in January 2010, we had highly successful back-to-back events in May: our first-ever Career Day and an NIH site visit. Reviewers were impressed by our CBI students and program and recommended that NIH increase the number of CBI Traineeships (pending final funding decisions next month). And Career Day was a fabulous chance to showcase opportunities for current students while re-connecting with our successful alumni, including **Catherine Goodman** (PhD '04, Rotello-now Senior Editor at *Nature Chemical Biology*) and **Rosemary Turingan** (PhD '06, Martin-now Lead Scientist at NetBio), who shared their insights in talks and panel discussions. We would love to hear from other alumni who would like to participate in future Career Day events!

In the TYSON LAB ...

In the Tyson lab, we celebrated **James Kearns'** successful defense of his dissertation. He is now **Prof. Kearns**, teaching freshman and analytical chemistry at Keene State College. We also said goodbye to **Sirinapa (Mai) Wongwilawan**, who returned to Naresuan University in Thailand to finish her undergraduate studies. **Nan Wang**, the most recent graduate student to join the group, has now successfully defended both her dissertation prospectus and her original research proposal. She can now concentrate on her dissertation research into atomic fluorescence spectrometry.

Graduate students, **Tiffany Berg**, **Monique Johnson**, **Chengbei Li**, and **Lindsay Drennan** are all hard at work on their dissertation research. **Tiffany's** work on arsenic speciation is being helped along by **Prof. Dr. Latif Elci**,

who is visiting (for the second time) from the University of Pammukale in Turkey. **Latif's** son, **Gokhan**, started in the graduate program in September, but is headed in the organic direction. Additional international collaborations are being fostered with **Prof. Dr. Sergei Ostromov** a visiting ecologist from Russia, working in **Prof. Xing's** lab in the Plant Soil and Insect Science department. **Sergei** and **Monique** have been hard at work characterizing the distribution of metallic nanoparticles in model aquatic ecosystems. **Lindsay** has been spending time at PerkinElmer as a summer internship that ran on into the fall. We can't disclose what she was working on just yet. **Chengbei** has found a molecule (dithiothreitol) that binds arsenite to the gold electrodes on her piezoelectric crystals and so now has the basis for detecting inorganic arsenic species at relevant concentrations in ground water. The Tyson group is still providing support for the water analysis lab of the Environmental Institute, with **Chengbei** providing the leadership. We are also working with the STEM Education Institute on a new NSF-funded project: STEM DIGITAL (Digital Images in Geoscience Investigations: Teaching Analysis with Light) that will enable high school and middle school teachers and students to conduct environmental research aided by the analysis of images from digital cameras, scanners, and the Internet (see <http://k12s.phast.umass.edu/digital/>). Graduate student **Karen Tallman**, who is pursuing doctoral studies in the School of Education, is helping develop a method for the determination of arsenic in rice based on a portable test kit for this project.

Undergraduate students **Drew Smith**, **Bejan Hakimi**, **Gloria Chan**, **Neil Desai**, **Peter Duffy**, **Andrew Craig** and **William Rowley** worked in the lab in the spring semester, and **Carlos Reyes**, an ARHS student, worked on determination of arsenic in soil during the summer and throughout the fall, when we also were home to a participant in the College of Natural Science's newly created First-Year Research Experience course. **Melanie Muller** worked on a project related to the STEM DIGITAL program as we continue to learn more about digital image analysis. With the 15 who participated in the spring, exactly 400 students have now taken part in the "arsenic project;" however scheduling conflicts prevent it from taking place in the fall when Prof. Tyson was teaching a section of Chem 111.

Faculty members **Peter Uden** (emeritus), **Ray D'Alonzo** (adjunct) and **Ed Voigtman**, continued to make welcome inputs to group activities, though Ray is now establishing his own research group. Congratulations to former graduate student **Dr. Chris Palmer**, who is now married. Professor Tyson can be found on LinkedIn.com, and, if you look hard, even on facebook.com. He is still the associate dean for academic affairs of the College of Natural Sciences (<http://www.cns.umass.edu/>) and is now a member of several Senate Councils and Committees.

In the VACHET LAB ...

Professor Vachet and his lab had another exciting year. Notable was the arrival of two new mass spectrometers, which were acquired to (i) move forward our NIH-funded studies of protein amyloid formation and (ii) facilitate our NSF-funded work on the environmental and biological fate of nanoparticles. Professor Vachet was also thrilled to receive another grant from the NIH to fund collaborative work with **Prof. Rotello** related to nanoparticle drug delivery. 2010 was also a good year for science as Prof. Vachet and his group published seven papers and made 17 presentations at various conferences, meetings, and universities. Finally, Prof. Vachet successfully made it through a very busy fall semester during which time he taught a 300-student section of General Chemistry (Chem 111) for the first time.

In other group news, **Zheng-jiang Zhu** was honored as one of the five speakers at the Chemistry Department's annual Research Symposium in September. In the Spring, undergraduate researchers **Kaitie Sniffen** and **Carolynn Ianello** both finished their BS degrees in chemistry. The group was also very sad to say good-bye to **Vanessa Mendoza** and **Andrea Gomez-Escudero**, who finished their PhD degrees in the summer. **Vanessa** is currently a postdoctoral fellow at the Boston University School of Medicine. **Andrea** moved back to her home country, where she is now working for Ecopetrol, the largest oil company in Colombia. We also welcomed two new members to the group—**Nick Borotto** and **Gladys Murage**. **Nick** is developing new mass spectrometric methods to further our understanding of β -2-microglobulin amyloid formation. **Gladys**, who is jointly advised with **Prof. Thayumanavan**, is synthesizing and applying new amphiphilic molecules that will help us better detect peptides in very complex biological mixtures.



Vachet group 2010.

In alumni news, former postdoc **Rapole Srikanth** left his position as the Mass Spectrometry Facility Director at the University of Connecticut to begin a new position as a scientist at the National Center for Cell Science in Pune, India.

Finally, Prof. Vachet was very busy professionally. He taught his annual two-day short course on Quadrupole Ion Trap Mass Spectrometry at the American Society for Mass Spectrometry meeting in June, served on the Editorial Board for the *Journal of the American Society for Mass Spectrometry*, and served as a member of the Board of Directors for the American Society for Mass Spectrometry.

In the VENKATARAMAN LAB ...

The DV group had another great year. **Dipankar Basak** received the *William E McEwen Award* for outstanding presentation in Researchfest 2010. The award includes a monetary reward of \$400. Undergraduate **Dan Toscano** received the first *Tompkins Award* for his outstanding research in the area of proton conducting materials. **Serkan Yurt** graduated and is now at 3M as a staff scientist. As I mentioned in my previous update, the group's research focus has changed over the past year. The group is getting back to the studies on helicenes and has started research in the area of semiconducting nanoparticles and assemblies. Check out some of our videos on photovoltaic cells at YouTube. In the past year, we have established productive collaborations with various research groups and it has been an exciting experience. For some of the recent research news, check out our group renovated website at URL thedvgroup.com.

With regard to alums, **Jason Field** (PhD '03) continues his position as Senior Sector Advisor for the Life Sciences in the Ministry of Economic Development and Trade for the Government of Canada. I was delighted to learn that **Jay** and **Lora** will be welcome an addition to their family this Fall. I understand from **Jay** and **Lora** that **Rebecca** and **Dylan** are getting ready to be the big sister and big brother. **Derek Van Allen** (PhD '04) is at US Naval research laboratory. **Uche** (PhD '05) is with Momentive (formerly GE) and visited Amherst with **Uche** last year. **Craig Bates** is a Senior investigator at Arqule. **Rattan Gujadhur** (PhD '03) is still with Gilead as Senior Manager for Strategic Outsourcing. He was kind enough to drive to the ACS meeting in SFO and we had a nice lunch. **Pranorm Saejueng** (PhD '06) is a faculty member at Ubonrajathanee University in Thailand. She is pursuing her research in copper-based cross-coupling reactions. **Travis Benanti** (PhD '08) has moved to Connecticut and is now a Process Scientist at Chemtura. **Nestor Chevere-Trinidad** (PhD '08) left his position at Heatbath and is now an Adjunct Faculty at STCC. **Margaret Trombley** (MS '04) is now Chemistry content lead at Pearson Education. **Tom Hill** is a Senior Product Development Chemist at Flexcon. I heard from **Gordon Smith** (BS '07) that he is excited to be a Chemist at Rack and Riddle in CA making sparkling wines! **Jeremy Kintigh** (BS '00) is pursuing his PhD with **Prof. Glen Millar** at UNH. I keep bumping into **Jeremy** at local meetings and he keeps me updated with this research. **Jocelyn Scheintaub** (BS '06) has now become a rocket scientist! She is

a rocket propulsion chemist at Blue Origin, WA. **Dan Burke** (BS '06) is finishing his PhD at UCSB working with **Prof. Craig Hawker**. **Jackie Murphy** (BS '04) is now a postdoc with **Greg Fu** at MIT. **Noah Tremblay** (BS '04) is now a postdoc at Johns Hopkins with **Prof. Howard Katz**. **Thomas van der Poll** (BS '09) works for **Prof. Gui Bazan** at the UCSB. It was a delight to see **Tom** again last fall. **Vishwa Shah** (BS '10) is now a manufacturing engineer at IBM in Burlington. I would like to hear from all the alums from the DV group. So keep me posted and if you are LinkedIn, get connected to UMass Alumni group.

In the VOIGTMAN LAB ...

On January 1, 2010, I became undergraduate program director and continued on as associate head. During the spring semester, I taught CHEM 315 (Quant) lab and then CHEM 121H (Honors Gen Chem I) last fall semester. Working with an undergraduate biology major, we obtained enough data (100 million experimental laser-excited molecular fluorescence detection limits) to get a paper submitted and it is now in press.

Unfortunately, that was all the good news. The bad news was much worse. My first PhD student, **Prof. Mitchell Evan "Mitch" Johnson**, of Duquesne University, died of pancreatic cancer on September 7, 2010. My father died the same day. My "baby" sister **Margie** died last March. This is just the short list.

Mitch Johnson was the best possible "academic son" I could ever have hoped for and I know I got damned lucky to have him throw in with me. He had the rare knack for both knowing the relevant literature (while avoiding "literature paralysis") and of being a gifted experimentalist. When I taught lab in Quant, I showed the undergrads **Mitch's** lab notebooks, so they would know what an excellent lab book looked like. They were all stunned. He set a high standard and I'm sure his students appreciated it. **Mitch** loved life, he loved his wife **Laura** and all the terrific friends and students he had over the years, and he loved a good beer. We all miss him. Rest in peace my friend! Stay healthy all!



Prof. Mitchell Johnson

I also continued as an associate head, while **Craig** made the jump to Department Head in September, and as graduate program director until New Year's Eve. I have another paper in the works (maybe more) and it is exciting to see the department growing even during a down cycle in the economy. Best of success to us all!

... continued on page 21

iCONS—continued from page 1

of science graduates have noted that today's undergraduates are not prepared for the integrative teamwork involved in solving global scientific problems. There is thus a critical need to create new undergraduate science programs that foster the attitudes, knowledge, and skills required for leadership and integrative teamwork in science. To address this need, UMass Amherst has created the iCons program.



iCons students discussing real-world problems.

The mission of iCons is to produce the next generation of leaders in science with the attitudes, knowledge, and skills needed to solve the inherently multi-disciplinary problems facing the world. iCons instruction involves student teamwork on case studies, laboratory experiments, and research, to foster cross-disciplinary communication and integrated problem-solving skills.

The concept of iCons is unique in the United States because it is a four-year program that uses real-world problems to integrate the sciences, culminating in world-class research experiences. iCons does not replace the science major, but rather enhances it by teaching the skills of multi-disciplinary communication, collaborative teamwork, and science leadership.

The 18-credit iCons curriculum consists of one course per year over the four years of college. These are iCons I – Global Problems and Science Solutions, iCons II – Integrated Scientific Communication, iCons III – Laboratory Discovery and iCons IV – Capstone Research. Future concentrations in Climate Change and Clean Water are in the works. All iCons-related activity will take place in the new Integrated Sciences Building.

The UMass Amherst Chemistry Department has played a strong leadership role in the development of iCons, with three faculty members in Chemistry involved in iCons leadership and instruction. In particular, Prof. Scott Auerbach has been director of iCons from late 2008 to the present, and will teach iCons II Renewable Energy in Spring 2012; Prof. D. Venkataraman was one of the first members to join the iCons faculty steering committee, and will join Prof. Auerbach in teaching iCons II Renewable Energy; Prof. Justin Fermann co-taught iCons I this past Spring 2011 to rave reviews, and was interim director of iCons while Prof. Auerbach was on sabbatical in Spring 2010. Suffice to say

that the field of chemistry is particularly well-positioned as the “central science” to lead this integrative science program, and the UMass Amherst Chemistry Department is leading this charge well.

The College of Natural Sciences launched two iCons concentrations in January 2011: Renewable Energy and Biomedicine. Case studies for the initial running of iCons I included:

- Cholera in Haiti
- Alzheimer's and Aluminum
- Gulf Oil Spill
- Potential of Biofuels


The first iCons student cohort consists of mostly freshmen and some sophomores from the departments of Biology, Biochemistry & Molecular Biology, Chemical Engineering, Chemistry, Environmental Sciences, Microbiology, Mathematics & Statistics, Physics, and Psychology. Microbiology professor Sue Leschine, and Geosciences professor Steven Petsch joined Prof. Fermann in co-teaching iCons I this past Spring.

“The great thing about iCons is it gives students the juicy stuff right off the bat. No longer do students have to wait until they are juniors or seniors to start learning about the problems that brought them into science in the first place.”

—iCons director, Prof. Auerbach

iCons students agree with Prof. Auerbach's sentiments. Lily Fitzgerald, a first-year environmental science and nutrition major, said the class is “*certainly challenging everyone.*” But she said everyone “*is really passionate,*” which leads to “*very heated debates and discussion.*” She said she loves being able to approach such problems as the cholera epidemic with students from different disciplines. “*I could never solve such an enormous problem on my own.*”

Ryan Burke, a biology major, said, “*You can't solve things from one direction.*” In iCons, students “*come at it from a bunch of different ways.*”

Students have been so impacted by iCons, they now refer to working in teams on big problems “*science the iCons way.*” Although iCons has gotten off to a very promising start, the ultimate proof of its worth will be shown when a team of iCons students actually solves a really big problem. And to get to that day, the Chemistry Department will continue to exert leadership, the iCons way. For more information, please go to <http://www.cns.umass.edu/icons-program/> 

2010 SEMINAR SERIES

Spanning traditional chemistry research areas as well as cutting-edge interdisciplinary science, the UMass Amherst Department of Chemistry seminar program draws renowned scientists from around the globe to our campus to share their insights and recent developments. In addition to the lectures, the seminar program arranges interactions between the speakers and our students and faculty to open exciting avenues for a two-way flow of inspiration and ideas. The 2010 seminar series continued this long-standing tradition.

Professor Paul Yager from the University of Washington Department of Bioengineering kicked off the 2010 named lecture series with the *Procter & Gamble Lecture* giving a talk entitled, "Microfluidics 2.0: Point-of-care diagnostics for the developing and developed world." **Professor Yager** is one of the founding fathers of microfluidics and presented his journey through the field starting with a brief recap of early developments in on-chip immunoassays. In 2005, he received a fifteen million dollar grant from the Gates Foundation to reduce these early concepts into disposable point-of-care devices. Through collaboration between his lab and Micronics, a biotechnology company based in part on **Prof. Yager's** devices, a portable micro-analytical system, called the DxBox, was developed. Though this promising technology can reduce the cost of clinical diagnostics, **Prof. Yager** lamented the fact that the equipment accompanying the device was still too expensive to be of wide use in the developing world. To solve this problem, he and his team at Washington began experimenting with paper-based lateral flow assays. In contrast to similar commercial assays such as home pregnancy tests, **Prof. Yager** demonstrated the possibility of generating complex flow patterns in two-dimensional paper strips. These are capable of mixing multiple reagents in desired sequence, all using capillary action as the pumping force. The signal is recorded by cell phone camera and analyzed using a downloaded app, making the entire device and analysis extremely cheap. **Professor Yager** wrapped up with some exciting developments in paper-based flow handling, including valves based on dissolving sugar and microfluidic origami.



Professor Paul Yager and Dr. Jeff Seeley



Dr. Karl Haider, Prof. James Heath and Emeritus Richard Stein

The *Stein-Bayer Lecture* (named after **Prof. Emeritus Richard Stein** and sponsored by Bayer Material Science) was given by **Prof. James Heath** from the California Institute of Technology. In a seminal presentation entitled, "Interrogating the paradoxical relationship between cancer and the immune system with applications to melanoma and glioblastoma cancer patients," **Prof. Heath** highlighted a fundamental problem in current healthcare. Specifically, the biological science of many aspects of cancer is poorly established at best, thus the clinical use of extremely expensive cancer drugs is based on sparse information. In an age where protein analysis is incredibly expensive and time consuming, it's no wonder that the cost of healthcare is skyrocketing. **Professor Heath** described a microfluidic approach that promises to revolutionize clinical diagnostics by drastically reducing the cost of traditional ELISA immunoassays. Antibody barcodes patterned on inexpensive paper supports enclosed in a microfluidic platform allow the simultaneous analysis of multiple proteins. The steps of blood plasma separation, biomarker immobilization and detection were performed in ten minutes using this inexpensive, self-powered microchip. Amazingly, the sensitivity of the approach enables the protein pattern of individual cells to be rapidly analyzed, representing an unprecedented achievement in cancer biology. In the near future, it is realistic to expect that the efficacy of drugs through improved clinical diagnosis will be enabled in part by **Prof. Heath's** outstanding program.

Every year the UMass Amherst, Smith, Mt. Holyoke, Amherst and Hampshire Colleges collaborate to host the *Five College Lecture Series*. Throughout his career, **Prof. Ken Dill** from the University of California San Francisco, has exploited deceptively simple models to illuminate fundamental physical principles about chemical systems. His lattice models of protein folding were early illustrations of how important the hydrophobic driving force was to structure formation. His recent work on protein folding was presented in his seminar at Mount Holyoke College. He has also studied the behavior and impact of water as a solvent and how it interacts with solutes, including those of biological importance. In his lecture at UMass Amherst, **Prof. Dill** presented his new methods to treat non-equilibrium systems with small numbers of particles. In collaboration with **Rob Phillips** of Cal Tech, he described a general theoretical approach called Maximum Caliber that focuses on trajectories of particles in a system and how they change with time. Instead of the usual microstates used to develop a partition function for an equilibrium system, he used micro-trajectories and computes a dynamical partition function. These approaches fill a major gap in physical chemistry and should be extremely useful for many small non-equilibrium systems, such as those presented by single molecule spectroscopy experiments.




Professor Ken Dill and Department Head Craig Martin

2010 SEMINAR SERIES –continued

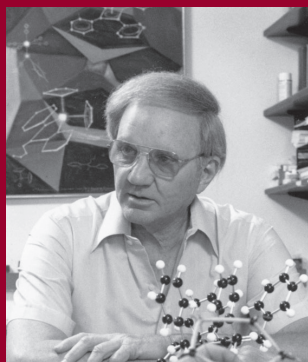
It was standing room only at this year's *William E. Mahoney Seminar Lecture*, presented by **Prof. Harry Gray** from the California Institute of Technology. **Professor Gray** is legendary for his ability to illuminate a room with scientific discourse and following a rousing introduction from **Prof. Mahoney**, the assembled crowd was treated to a one-of-a kind experience. In his presentation entitled, "The Solar Army," **Prof. Gray** discussed the vital research milestones that need to be reached in order to make solar energy a cost-effective reality. The energy from the sun that strikes the earth in one hour is enough to power the entire world for a year, but capturing and storing this energy represents an enormous challenge. The central theme of **Prof. Gray's** presentation was the need to develop new solar materials that can efficiently generate hydrogen from water oxidation. Platinum, which works well for hydrogen generation, is so expensive that it would cost \$50,000 just to create a one square meter solar cell. Therefore, **Prof. Gray** is developing new photocathode and photoanode materials from abundant earth metal oxides. To do this, he created the Solar Army, a network of college and high school students using modified ink-jet printers to combinatorially create novel metal oxide complexes. Students all over the world search for photoactive surfaces and upload "hits" that **Prof. Gray's** lab can then characterize in detail. Through strength in numbers, new compounds have been discovered that are just as good as platinum or better at water oxidation, paving the way forward for more efficient solar energy generation.



Mr. William Mahoney and
Prof. Harry Gray

The success of this year's UMass Amherst Chemistry seminar program was made possible through the generous contributions of our alumni and corporate sponsors. The students and faculty are immensely grateful for the unique interactions and opportunities for learning and enrichment that the alumni and sponsorship support provides. We look forward to continued success in 2011. 

ANNOUNCING THE MARVIN D. RAUSCH LECTURESHIP IN ORGANOMETALLIC CHEMISTRY




Professor Marvin D. Rausch was a devoted faculty member of the Department of Chemistry at UMass Amherst from 1963 to 2001. He was widely recognized for research in organometallic chemistry and authored or co-authored over 350 scientific articles and served on the editorial boards of several journals in this area of chemistry. **Professor Rausch** mentored over 40 PhD students during his tenure here, and his course in advanced laboratory methodology set a standard for the training of advanced undergraduate and beginning graduate students. In addition to sponsoring this honorary seminar, he was also a generous donor to UMass Amherst's Athletic program and gave part of his fantastic crystal and mineral collection to the Department of Geosciences.

The *Marvin D. Rausch Lectureship in Organometallic Chemistry* was established to provide support for a lecture series which will be presented by individuals with outstanding established reputations in any aspect of organometallic chemistry. In this context, organometallic chemistry is described as

the chemistry of chemical components which possess a direct carbon-to-metal bond. Areas of potential expertise for the focus of the *Marvin D. Rausch Lectureship in Organometallic Chemistry* include synthesis, catalysis, structure, bonding, spectroscopy, applications, or related areas.

The inaugural *Marvin D. Rausch Lectureship in Organometallic Chemistry* will feature **Prof. Thomas E. Bitterwolf**, from the Department of Chemistry at the University of Idaho, presenting his seminar, "And then a Miracle Occurs' Recent Adventures in Mechanistic Inorganic Photochemistry" on April 14, 2011 at 11:15 a.m. in Lederle Tower, Room 1634.

We are thrilled to have **Prof. Bitterwolf** share his expertise and enthusiasm for the commencement of the *Marvin D. Rausch Lectureship in Organometallic Chemistry*, and are extremely grateful to the late **Prof. Rausch** and family for the endowment of this seminar series. 

undergraduate SENIOR & AWARDS DINNER



The 2010 Senior Class and Professor Edward Voigtman.

Every spring, the Undergraduate Honors and Awards Committee has the pleasure of examining the records of students who have chosen to be a part of our Department. Every May, as we have done for many years now, we honor those students who have proven themselves to be among the very best this University has to offer. Last May, at our annual Undergraduate Honors and Awards banquet, we recognized the hard work and dedication of 34 graduating seniors. In addition, many students were recognized for their work within the Department: see the complete list below. These awards are only possible because of the generous support the Department receives from our alumni, industrial partners and professional organizations. With considerable pride and gratitude, the committee wishes to thank our outstanding students for their contributions to the Department and University and wishes to thank those who, in turn, support our students.

The following students received awards:

Sean D. Bickerton – Connecticut Valley Section of the American Chemical Society (CVS/ACS) Student Award
Tamara Allen – American Institute of Chemists Award
Peter W. Duffy and Bejan M. Hakimi – Richard W. Fessenden Award
Melissa F. Gold – John A. Chandler Memorial Scholarship Award
Malek M. Mazzawi and Joseph M. Ryan – Merck Index Award
Sean D. Bickerton – Senior Class Award
Edward D. Cooke – Hypercube Scholar Award
Lindsay A. Dawson, Jonathan M. Koppelman and Andrew G. Smith – Departmental Recognition Award
Malek M. Mazzawi, Kyle Reeves and Mark Zbinden – Outstanding Undergraduate Researchers 2010
Jake W. Pawlowski – ACS Analytical Chemistry Award
Robert T. Nathan – Jay A. Pirog Scholarship
Danielle L. Sowell – Bates-Rowell Research Fellowship
Kyle Reeves – Bradspies Research Fellowship
Geoffrey K. Jablonski and Matthew Liu – Hach Fellowship
Scott R. Dooley, Kathryn Geldart, Srinivasa N. Gopalsamy and David M. Ramsden – Robert Maxwell Williams Memorial Scholarships
Matthew A. Cormier, Nicholas R. Degraan-Weber and Jake W. Pawlowski – Edward Shapiro Scholarship
Deborah J. Ehrlich – CRC Freshman Chemistry Award
Daniel T. Toscano – Mr. Tompkins Award
Kyle Reeves – William F. Field Alumni Scholar Award
Kyle Reeves – Barry Goldwater Scholarship Award Nomination 

degrees AWARDED

BA/BS DEGREES

| | |
|----------------------|---------|
| Tamara L. Allen | 05/2010 |
| Keith Barbato | 05/2010 |
| Kyle J. Bernier | 05/2010 |
| Sean D. Bickerton | 05/2010 |
| Yuan Cao | 05/2010 |
| Edward D. Cooke | 05/2010 |
| Frank Coppa | 05/2010 |
| Andrew D. Craig | 05/2010 |
| Jennifer S. Daluz | 05/2010 |
| Lindsay A. Dawson | 05/2010 |
| Peter W. Duffy | 05/2010 |
| Elaine T. Foun | 05/2010 |
| Randy P. Gilbreath | 02/2010 |
| Joshua M. Gleason | 05/2010 |
| Melissa F. Gold | 05/2010 |
| Bejan M. Hakimi | 05/2010 |
| Juna Jovani | 05/2010 |
| Abraham J. Khorasani | 05/2010 |

| | |
|------------------------|---------|
| Berlinda Luong | 05/2010 |
| Malek M. Mazzawi | 05/2010 |
| Timothy T. Ng | 05/2010 |
| Florence Okeny | 09/2009 |
| Jonathan J. Rymasz | 05/2010 |
| Jamal N. Salah | 05/2010 |
| Vishwa A. Shah | 05/2010 |
| Andrew G. Smith | 05/2010 |
| Kaitlyn D. Sniffen | 02/2010 |
| Jeremy K. Spiewak | 02/2010 |
| Karma Tsering | 09/2009 |
| Thomas S. Van der Poll | 09/2009 |
| David P. Waterman | 09/2009 |
| Yu Zhao | 02/2010 |

MS DEGREES

| | |
|-----------------------|---------|
| Caroline A. Dulaney | 09/2010 |
| Jamie Michele Hedrick | 09/2010 |

| | |
|--------------------|---------|
| Aruni Karunanayake | 05/2010 |
| Jennifer LaForest | 02/2010 |
| Jinyi Lim | 09/2010 |

PHD DEGREES

| | |
|-----------------------|---------|
| Gokhan Altinay | 09/2010 |
| Yangbin Chen | 02/2010 |
| Apiwat Chompoosor | 09/2010 |
| Kevin Early | 09/2010 |
| Daniel Fowler | 05/2010 |
| Andrea Gomez-Escudero | 09/2010 |
| Abigail Ida Guce | 02/2010 |
| Robert Herbst | 02/2010 |
| James Kearns | 09/2010 |
| Akamol Klaikherd | 02/2010 |
| Arthur LaPlante | 05/2010 |
| Venessa Leah Mendoza | 09/2010 |
| Michael Odoi | 09/2010 |
| Suriyakala Ramalingam | 05/2010 |
| Bappaditya Samanta | 02/2010 |
| Yong Tong | 09/2010 |
| Serkan Yurt | 09/2010 |

RESEARCHFEST 2010



ResearchFest 2010 in the ISB atrium.

The Chemistry Department welcomed the 2010-2011 academic year with the 20th annual research symposium, Researchfest. The event was held on August 31, 2010 and was a huge success thanks to the support of participants, organizers, and sponsors. The event featured five oral presentations by graduate students who were selected by a faculty committee through a nomination/evaluation process.

Witold Witkowski (Hardy Group) was chosen to receive the *Richard K. and Meryl M. Brown Graduate Scholarship in Chemistry*, a prize of \$5,000 for his work on “Studying the Loops of Caspase-7.” Nagamani Chikkannagari (Thayumanavan Group) received the *Momentive Award for Outstanding Presentation* for her work on “Ion Transporting Polymer Electrolytes for Applications in Fuel Cells and Batteries.” Zhengjiang Zhu (Vachet/Rotello Groups) received the *P&G Award for Outstanding Presentation* for



Nagamani Chikkannagari, Chae Kyu Kim, Dipankar Basak, Witold Witkowski, and Zheng-Jiang Zhu

his work on “Mass Spectrometric Analysis of Monolayer-protected Nanoparticles.” Chaekyu Kim (Rotello Group) received the *Rohm & Haas/Dow Award for Outstanding Presentation* for “Engineering Surface Functionality of Gold Nanoparticles for Drug Delivery Systems.” And Dipankar Basak (DV Group) received the *William E. McEwen Fellowship Award for Outstanding Presentation* for his

research on “Design, Synthesis, and Performance of Discotic Proton Conductors.”

A total of 55 posters were presented in the event, surpassing the number of posters from the past Researchfest events. The following five students received *William E. McEwen Fellowship Award for Outstanding Posters*:



Bo Yan, Sravanti Vaidya, Subinoy Rana, Chandramouleeswaran Subramani, and Tejaswini Kale

Tejaswini Kale (Thayumanavan Group) for “Synthesis and Characterization of Dendron-rod-coil Based Molecules for Applications in Organic Photovoltaics,” Sravanti Vaidya (Hardy Group) for “Structural and Biochemical Studies on the Role of Prodomain and Linker in the Activation of caspase-6,” Chandramouleeswaran Subramani (Rotello Group) for “A Multimodal Nanoimprinted Polyethyleneimine Template for nanoparticle Assembly and Immobilization,” Subinoy Rana (Rotello Group) for “Cell-Surface and Lysate Based Identification of Cell Types and Cancer Stated Using Fold Nanoparticles-GFP Supramolecular Complexes,” and Bo Yan (Rotello/Vachet Groups) for “Laser Desorption/Ionization Mass Spectrometry for the Detection and Characterization of Core-Shell Nanoparticles.”

A whole day with Chemistry and scientific discussions was brought to an end with a delicious BBQ served on Goessmann lawn by the Student Development Committee and graduate student helpers. The BBQ brought the students, faculty, staff, and their families together to socialize.

We gratefully acknowledge the financial support we received for this event from *UMass Amherst Department of Chemistry, Richard & Meryl Brown Scholarship Fund, William E. McEwen Endowment Fund, Rohm & Haas, Momentive, Fisher, and Procter & Gamble*. –Student Development Committee 

INTERVIEW WITH PROFESSOR KEVIN KITTILSTVED (KK)-continued



KK: I never had a chemistry set growing up.

GG: What was your worst job ever?

KK: My worst job was being a cook at KFC for two years during high school.

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

KK: After living in Eastern Washington for 22 years, I decided to attend the University of Washington in Seattle because their chemistry department has a strong reputation, and my future PhD advisor was also an energetic and enthusiastic assistant professor.

GG: What did you study for your PhD?

KK: My graduate research focused on studying the influence of targeted chemical perturbations on the magnetic properties of transition-metal doped ZnO nanostructures.

GG: What was your proudest moment ever (chemistry related or otherwise)?

KK: My proudest moment was when my daughter was born during my time as a post-doctoral researcher in Geneva, Switzerland.

GG: Who do you admire and why?

KK: I admire people that can successfully balance work and home life.

GG: Who in chemistry and related fields do you admire and why?

KK: There are many scientists that are worthy of admiration, but I really admire scientists that have been able to span many different fields with extraordinary success. One that comes to mind was Leslie Orgel. He was best known for his work as a biochemist working studying anti-cancer agents, however, he started out his career as a theoretical inorganic chemist and developed the well-known concept of phase-coupled ligation that occurs commonly in coordination compounds containing bidentate ligands.

GG: What is the most useful tool in your lab?

KK: My UV/Vis spectrophotometer is always the most useful (and easiest for students to use).

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

KK: In addition to the UV/Vis instrument, I have a Fourier transform spectrometer customized with light sources and other optics to allow absorption and luminescence spectra to be collected from the typical infrared region all the way out to the ultraviolet with spectral resolution of better than 0.1 cm⁻¹. In time, I plan on purchasing a magnetic circular dichroism spectropolarimeter that allows for the measurement of the typical circular dichroism spectrum, but with applied magnetic fields.

GG: Do you work in any collaborations?

KK: At the present, I do not have any actively funded collaborations although I hope to pursue internal and external collaborations in the near future.

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

KK: Some of my research focuses on developing nanostructured inorganic materials for solar energy technologies. These materials could therefore be used to benefit society by utilizing our most abundant source of renewable energy.

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

KK: Currently, the biggest barrier is people.

GG: Have there been any major advances in chemistry or the technologies used in research since you were a grad student?/Do you ever find yourself telling your students, “Well, when I was in school, we didn’t even have...”?

KK: I started my graduate career 10 years ago, so I still remember it quite well. But, the major advance in my opinion has been the miniaturization of spectrometers. There are handheld spectrometers nowadays with CCD detectors that don’t require a week of training to learn how to use. And they are cheap enough to allow everyone to have their own, so no down time on data collection. (A close second would be that National Instruments also sells GPIB cards that connect via USB!)

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

KK: Getting a research lab setup and running, while trying to stay within a budget, has been extremely stressful and time consuming.

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

KK: In my free time I enjoy spending time with my wife and two year-old daughter.

NEWEST FACULTY MEMBERS –continued

INTERVIEW WITH PROFESSOR
MIN CHEN (MC)

GG: Where did you grow up?

MN: I grew up in a small town call Xigan, Jiangxi province, located in the middle south of China. Two years ago it was not possible to find it on Google Map. Now you can!

GG: When did you realize you love chemistry?

MN: Chemistry, Mathematics and Physicals have always been my favorite subjects during the high school time. To be frank, I liked Math the most at that time but choose to do chemistry because at that time it was very unpopular for girls to take math and phys as a career in China.

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

MN: Before me, no one studied Chemistry. My younger sister went to study architecture. But my cousin who is 11 years younger is doing a Master right now in material science. She could be inspired by my career.

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

MN: I loved the research group where I did my PhD.

GG: What did you study for your PhD?

MN: I worked on a membrane protein called TAP that plays a critical role in our adaptive immune system. I spent more than four years studying how TAP pumps peptides across the endoplasmic reticulum membrane.

GG: What is the most useful tool in your lab?

MN: The most useful tool in my lab is single channel recording that measures the ionic current through a single protein channel at the lipid membranes. It is considered to be the most direct method to measure the kinetic behavior of ion channels in great detail and precision. In our lab, we employ this tool to guide our design of biosensors that are based on protein channels.

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

MN: Our research aims to develop the third generation DNA sequencing technology based on nanopores that

could make ultrafast, inexpensive sequencing machines. The underlying principle of Nanopore Sequencing is that the bases of a DNA or RNA could be identified directly as it passes through a nanopore (a tiny hole of nm size embedded in a membrane). The successful development of this technology would possibly achieve the sequencing of a human genome within hours and at a cost of \$1000. Genome sequencing could then become routine, allowing much easier identification of the genetic basis of diseases or the factors that cause a drug to work in one patient but not another. Doctors in the future will likely be able to prescribe personalized drugs to a patient based on the individual's unique genomic background that will become part of the medical record as blood pressure.


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

MN: In the current settings, DNA or RNA passes through Nanopore way too fast for any identification of the bases to happen. So far the scientists have not found an effective way to control the motion and the translocation speed of a nucleic acid through a nanopore.

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


MN: Grant proposals.

GG: What would you do if you were not a chemist?

MN: I would still be a scientist, may be in other areas if not chemistry. 

labNOTES –continued from page 14

In the MARONEY LAB ...

The Maroney lab continues to pursue nickel biochemistry in several directions including, cellular nickel trafficking (NIH), nickel toxicology (NIH), the structure and function of nickel-dependent superoxide dismutase (NSF), and hydrogenase (another nickel enzyme) reaction mechanism and applications to energy science with support from MassCREST. The group welcomed **Genevieve**, born to postdoc **Crisjoe Joseph** and his wife **Caryl** (a recent UMass microbiology PhD) in February. **Dr. Joseph** also distinguished himself by winning the Residential First-year Experience Student Choice Award for his teaching in Chem 111. The group also enjoyed having **Volker Berg**, an exchange student from Germany, working in the lab. Prof. Maroney served as Chair of the University Research Council for AY 2010 and will also serve as Chair of the 2012 "Metals in Biology" Gordon Research Conference in Ventura, California in January. 



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DEAR ALUMNI AND FRIENDS OF THE DEPARTMENT OF CHEMISTRY,

We open the new academic year welcoming two new faculty to the Department. Min Chen joined us as an Assistant Professor this Fall. Her research employs chemical, biological and biophysical techniques to explore key aspects of membrane proteins, ranging from functional mechanisms, molecular pharmacology and physiology of membrane channels, receptors and transporters to their applications in bionanoscience. Min comes to us from a PhD with Robert Tampé at Goethe University of Frankfurt and with postdoctoral experience with Hagan Bayley at Oxford University. Kevin Kittilstved has joined us as an Assistant Professor starting in January of this year. He is an expert in using advanced inorganic spectroscopies to characterize nanomaterials. His research focuses on the elucidation of the relationship between electronic structure and materials chemistry of transition metal ions in nanostructured semiconductors and magnetic materials. Kevin received his PhD with Daniel Gamelin at the University of Washington, Seattle, carrying out postdoctoral studies both there and with Andreas Hauser at the Université de Genève in Switzerland.

These new faculty are arriving just in time. Enrollments in our introductory chemistry courses (general and sophomore organic) have almost doubled since 2005, with most of the increase occurring over the past two years! We're also searching this year for three new full time lecturers to handle the increase. We welcome (with some trepidation) this renewed interest in the sciences among today's youth. Also, read about our new initiative, iCons starting on page 1.

At the College awards recognition ceremony in September, Chemistry again stood out among College departments (see "Award Winning Year"). Faculty, graduate students, undergraduates, and staff have all taken home prestigious awards, both locally and nationally, recognizing their excellence in research, teaching and service.

Following the opening of the Integrated Sciences Building, construction of science facilities on campus has been booming. It's great to see cranes and construction crews just outside of the ISB, as we prepare for the New Laboratory Sciences Building (stay tuned to future issues of the Goessmann Gazette!).

We continue to be deeply grateful to all of you who have contributed so generously to our department over the years. Your gifts are invaluable towards improving our teaching and research facilities and providing scholarships to students. With your support, we will forge ahead, pushing the frontiers of knowledge and training top-notch scientists!

Sincerely,


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