DEPARTMENT OF

# Chemistry News

SPRING 2008 UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

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CHEMISTRY
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UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

# Inside this Issue

# Letter from the Department Head

With this inaugural edition of the Department of Chemistry newsletter, I would like to invite you to reflect on your experiences here in Urbana and reacquaint yourself with the department. For those who have been back to campus recently, I hope you will sit back and read about what is new in the past few months. You should take great pride in being a part of our history, which to a large extent is the history of chemical research and education in the U.S. You likely received this newsletter because you are an alumnus or alumnae of one of our programs.

I want to write first about our past, because in the Department of Chemistry we are surrounded by our unsurpassed history. In 2002, Noyes Laboratory was declared a National Historic Chemical Landmark by the American Chemical Society as part of the centennial celebration of this still-imposing structure. Each time a student or faculty member walks into Noyes or Roger Adams Laboratory, he or she is reminded of the two great leaders for which these buildings were named. We see our brilliant past in the posters celebrating the Nobel Prizes; 10 total were awarded to our students and faculty, including the 2003 Prize in Physiology or Medicine to our late colleague Paul Lauterbur, the developer of MRI (see related story on page 9). We hear it in the stories told in lectures and seminars. For example, Phil Sharp, Ph.D. '69, winner of the 1993 Nobel Prize in Physiology or Medicine, returned to campus this past fall and reminisced about how the former chemistry head, Herb Gutowsky, required him to retake many of the courses he'd already taken as an undergraduate. He described it as the best graduate education he could have imagined.

Because of the extraordinarily successful careers of our graduates, we can witness how the past has a direct impact on today's department. You have no doubt heard of the *Brilliant Futures* campaign, the name of the ambitious $1.2 billion advancement campaign here at the University of Illinois. Last fall, the University of Illinois Foundation held its annual meeting and publicly announced several major gifts which were part of this campaign. Remarkably, the three largest gifts, totaling $14 million, were given by chemistry alumni. Bob and Carolyn Springborn's gift is described in this newsletter (see page 18) and our next newsletter will detail the other gifts, which were given by Dick and Joanna Heckert and Victor and Janet Buhrke.

These gifts showcase just a few of the ways in which we benefit from our outstanding past. Another example of this benefit can be seen in the recent renovations of our historic facilities. With support from the campus, 3M, the late Michael (M.S. '38, Ph.D. '41) and Louise Witte (B.S. '40) and others, we have opened a beautiful new chemistry library on the first floor of Noyes and built state-of-the-art organic teaching laboratories in the space vacated by the library on the second floor.

Many other exciting things are happening now. We have recently recruited outstanding faculty from Harvard and Yale. We continue to be a leading producer of Ph.D. chemists—last year we were the second highest in the nation. The average GRE scores and GPAs for entering graduate students have risen significantly every year for the past three years, an indication that we are competing effectively for the most outstanding students. Finally, the discoveries being made by our faculty and students have the potential to impact society in very real ways. Whether it is an innovative new therapeutic approach to treating a range of cancers or an advanced chemosensor array that can detect lung cancer from the breath of a patient, the impact that Illinois chemists are having on society is significant.

This newsletter is just one of the ways in which we hope to strengthen our ties to our community of scholars. You can do your part too. Drop us a line to let us know what you have been up to, or stop back for a visit. *Brilliant Futures* will become a reality only through a partnership with our alumni and friends.

Steven C. Zimmerman
Head, Department of Chemistry

## Madeline Jacobs Delivers

# 2007 Stoesser Lecture

Sylvia Stoesser

Every year since 2003, the Women Chemists Committee of the ACS in East Central Illinois gathers to hold what has become a special event for the Department of Chemistry: the Sylvia Stoesser Lecture. Supported by Dow AgroSciences and UIUC alumna Dr. Yulan Tong, over the years this lecture has grown in stature and importance. What hasn't changed is the unique opportunity for chemistry graduate students from the WCC to gain new perspectives on the field of chemistry, as well as to learn about the short, but highly productive career of Sylvia Stoesser. The lecture also underscores the special challenges women face in chemistry, while featuring an individual who has made outstanding contributions to chemical industry and the community.

"As graduate students, we've learned how the academic environment operates," said Jamie Iannacone, Chair of the Women Chemists Committee (WCC) of the ACS East Central Illinois section. "Those of us interested in industry, however, have little opportunity to hear and learn from successful industrial chemists and we really look forward to the Stoesser Lecture."

As always, the event lived up to all expectations. On March 7, 2007, Madeleine Jacobs, the Executive Director and Chief Executive Officer of the American Chemical Society, delivered a lecture to a packed audience of Illinois students, faculty, and staff.

"It was an honor to have her here," remarked Iannacone after the event. "The WCC members really enjoyed hearing about her career path and appreciated the insights she shared."

Lecture sponsor, Dr. Yulan Tong (M.S. '58, Ph.D. '61), agreed. "I like the idea of bringing people, like Madeleine Jacobs, to talk to students about pursuing different career paths in chemistry," she stated upon returning to campus for this special occasion.

A pioneer in the field of chemistry, Jacobs was the perfect choice as lecturer for this important event. Jacobs was the first woman chosen to serve as Executive Director and CEO of the American Chemical Society (ACS) since its founding in 1876. She is well-regarded in the chemical community for her previous role as editor-in chief at *Chemical & Engineering News*. Her many honors include the Smithsonian Institution Secretary's Gold Medal in 1993 and an honorary Doctor of Science from George Washington University in 2003. She is a Fellow of the American Association for the Advancement of Science, and has received numerous other awards for outstanding scientific writing and advancement of the field of chemistry.

The lecture's namesake was a pioneer as well. In an age where women were not believed to be scientific contributors, Sylvia Stoesser earned her Ph.D. in physical chemistry from the University of Iowa in 1928 and was the first woman chemical researcher hired by Dow Chemical Company in 1929. The Iowa Women's Archive notes that "Sylvia Stoesser was hired directly by H. H. Dow, foregoing the usual hiring procedure, since women were not considered part of the Dow workforce in the 1920s."

During her 11 years working for the company, Dr. Stoesser obtained 39 patents for her work on the use of acid inhibitors in crude oil production and for significant contributions to the development of polystyrene. She was considered by her colleagues to be the finest woman chemist since Marie Curie.

"Sylvia Stoesser accomplished remarkable things under very difficult circumstances," noted Dr. Steven Zimmerman, who was instrumental in starting the lecture series while serving as Interim Head of the Department in 2000. "She reminds me of how we as a society can benefit when the brightest minds are provided access to a career in chemistry." ■

## The Chemistry Library:

# Looking to the Future

The Chemistry Library, the first departmental library at the University of Illinois, began in the early 1890s when faculty withdrew books from the Main Library and deposited them in the Balance Room of the former Chemistry Laboratory, now known as Harker Hall. The library moved to Noyes Laboratory in 1903, then moved again to 255 Noyes Laboratory on April 16, 1916, where it remained for more than 90 years. After years of planning, the library moved to its newly remodeled space in 170 Noyes Laboratory on July 24, 2006.

For more than 100 years, the Chemistry Library has met the challenge of providing quick, convenient and professional access to a rich collection of chemical science materials. The Library has a long tradition of providing the best possible service to its patrons, dating back to the tenure of Chemistry Librarian Marion Sparks, who, in 1919, authored and self-published "Chemical Literature and Its Use" with the goal of training Illinois chemists to understand and contribute to the literature of the chemical sciences.

Today, the Chemistry Library supports the instruction and research needs of departments in the School of Chemical Sciences (Chemistry and Chemical & Biomolecular Engineering) and the Department of Biochemistry. The collections of the Chemistry Library, considered among the best in the country, support these disciplines, while also providing supplementary material for nearly every other science departmental library on campus.

Although the main emphasis for Chemistry Library acquisitions is on scholarly and research materials, primarily periodical and monographic sets, collection strengths include a broad, international journal collection in print and electronic formats. Additionally, emphasis is placed on access—including remote access—to SciFinder Scholar, Beilstein, Web of Science, and a multitude of interdisciplinary electronic resources. The collection of approximately 150,000 volumes, located in the Chemistry Library, the Bookstacks, and in the Oak Street Remote Storage facility, supports a core clientele of more than 950 undergraduate majors in Chemistry, Biochemistry and Chemical & Biomolecular Engineering, 400 chemical science graduate students and postdoctoral fellows, and 90 faculty.

The new Chemistry Library is a model library for the 21st century. The goal is provision of excellent service, both in person and electronically, with collection emphasis being placed on purchase of electronic files. Current and retrospective electronic files of journals have been added and archived, making articles instantly available on every user's desktop. Older, unused print volumes have been moved to storage facilities, enabling the staff to accommodate more users. The library has

wireless access for laptops, along with a large number of computer terminals to access indexes, e-journals, and e-books. A quick look at user statistics for the library (www.library.uiuc.edu/chx/) reveals that the number of users has dramatically increased with a concurrent rise in use of electronic resources.

Through judicious and careful planning, Tina Chrzastowski, the Chemistry Librarian, has created a flexible facility that can easily be modified. The Library is kept quiet through use of cork flooring, rather than carpeting, allowing shelving, files and tables to be added or taken away as patrons' needs change. The conference room is open and available for classes, meetings, group discussions and office hours. Electronic books can be requested and even purchased on demand.

The Chemistry Library has become a model for the contemporary library. Indeed, in every aspect of the new Chemistry Library, it's easy to see that the spirit of the pioneering effort initiated by Marion Sparks is still present today. ■

*The Department of Chemistry gratefully acknowledges the assistance of Tina Chrzastowski, Chemistry Librarian, and Cindy Ashwill, Director of Advancement, Publications and Public Affairs, University Library for their assistance in preparation of this article.*

## In Memoriam:
# Herbert Carter, Former Chemistry Head and Professor

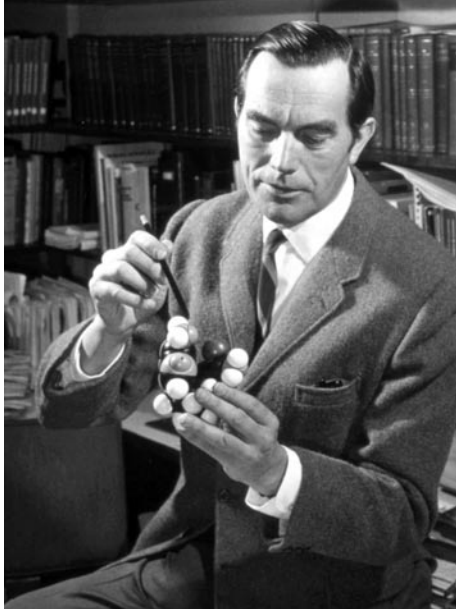
Image Courtesy of University of Arizona News

Herbert E. Carter, a former Head of the Department of Chemistry at the University of Illinois and a pioneer in linking food additives to cancer, died March 4, 2007 in Tucson, Arizona at the age of 97.

After receiving an A.B. degree from DePauw University, Carter came to the University of Illinois, where he worked with Carl "Speed" Marvel. He obtained his M.S. and Ph.D. from the Department of Chemistry in 1931 and 1934, respectively. He was appointed to the faculty as an Assistant Professor of Biochemistry, which was a division within Chemistry at that time. Between 1954 and 1967, he served as the Head of Chemistry and then as Director of the School of Chemical Sciences for the University of Illinois at Urbana-Champaign. Following this position, he held the office of the Vice Chancellor for Academic Affairs between 1968 and 1971. Upon retiring from the University of Illinois, he took a position at the University of Arizona as the first coordinator of interdisciplinary programs. He then went on to establish the Biochemistry Department at Arizona and serve as the department head from 1977 to 1980. Dedicated to education and research, Carter continued to work with the University of Arizona until age 94.

An avid chemist since his youth, Carter was known to say that, "If research isn't fun, it shouldn't be done." True to his words, Carter spent his lifetime pursuing myriad interests in chemistry and biochemistry. With research ranging from antibiotic chemistry, to the biochemistry of lipids, to the study of food additives and cancer, Carter's leadership in all these areas won him multiple honors. In 1953, he was elected to the National Academy of Sciences, and following this, he served as chairman of the President's Committee on the National Medal of Science and as President of the American Society of Biological Chemists. He also has a mountain ridge in Antarctica named after him (Carter Ridge), in honor of his leadership of the National Science Board. ■

> If research isn't fun, it shouldn't be done.



# Nelson J. Leonard: A Celebrated Life

On May 14, 2007, friends and family from across the country gathered in the Illini Union to celebrate the life of Dr. Nelson J. Leonard, chemist, colleague, mentor, teacher, and friend. His children, students, and colleagues came, each with a story to tell and a memory to share. As the memorial went on, it became clear that though Leonard was gone, his legacy was already assured.

"From the very beginning," stated E.J. Corey (Illinois Faculty '51–'59), 1990 Nobel Prize winner in Chemistry and former colleague of Leonard, "Nelson was extremely helpful and kind to me. He personified the friendly and collegial atmosphere for which the U of I Chemistry Department had been well known."

Scott Denmark, Professor of Chemistry at UIUC, reaffirmed this as he reflected upon some of the many lessons that Leonard taught him. "Nelson set an example of how to be a colleague," he said. "He was always very supportive, he made room for me as my group grew faster than the available space on the second floor. He encouraged people like Seemon Pines to send some money my way as I was getting off the ground. [And] he advised to always hire young faculty better than yourself and not be threatened by that; otherwise, the enterprise will spiral downward."

"He was extremely encouraging of younger scientists, urging them to be hard-working and productive, and helping them to become independent," added Lee Melhado (M.S. '91), Executive Director of the Champaign-Urbana Jewish Federation and a former student. "He was eager to share credit—even to relinquish it, to be fair, to be just, to help others, to nurture them, to encourage people, to challenge them, and to celebrate their success."

As the evening continued, his children spoke about the impact their father had on their lives and the lessons they learned.

"He never offered us advice… but we learned a lot simply by observing him," said David Leonard, one of Leonard's children. Taking turns with his sister, Marcia, they proceeded to list some of the lessons they had learned from their father. "Figure out what you love to do and make that your life's work. But don't be afraid to change direction, if that's what your heart and your intellectual curiosity demand. Laugh at your own jokes—and laugh often. [And] adopt strong principles early in life and live by them."

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"Much has changed since the start of Nelson Leonard's Illinois career in 1942," observed Stanley Ikenberry, President Emeritus of the University of Illinois, in his comments at the memorial. "It is no longer common for a world renowned scholar to spend an entire academic career at a single university… it is more difficult to find that perfect balance of personal and professional life …and it is even rarer to find elegance and excellence, wit and wisdom, precision and compassion all combined in a single human being."

In every way, looking around the room as the memorial came to a close, one could see how each story and memory of Leonard was unique and different, but yet wove together a beautiful picture of his life. In the classes his students now teach, in the life lessons they live out, and in the discoveries both recorded and yet to be made, Leonard's impact both in chemistry and the world will be felt for generations to come. ■

## In Memoriam:

# Nobel Laureate Paul C. Lauterbur, Developer of MRI

The world of chemistry lost one of its great visionaries this past year with the death of Dr. Paul C. Lauterbur, a Professor of Chemistry, who joined the University of Illinois in 1985. At age 77, Lauterbur passed away March 27, 2007 from kidney disease while at his home in Urbana, IL.

Best known for his pioneering work with magnetic resonance imaging (MRI) technology, Lauterbur also was recognized as the co-winner of the 2003 Nobel Prize in Physiology or Medicine. He shared the award with Sir Peter Mansfield of the University of Nottingham in England, and was granted the prestigious prize for his groundbreaking discoveries with MRI.

Even in the days before his discovery of MRI, however, Lauterbur already stood out from the pack. From his early days in a high school in Sidney, Ohio, where his science teacher would let him perform experiments in the back of the class while other pupils listened to lecture, to his boyhood days building a science lab in his family's basement, Lauterbur possessed a curiosity about science that was extraordinary.

"I was always impressed with his ability to look at scientific problems in new and insightful ways," said colleague Greg Girolami, professor of Chemistry at the University of Illinois. "He relished being a scientific maverick and had indomitable curiosity."

Lightning struck, however, not in a laboratory or even a classroom, but in a Big Boy burger joint in Pittsburgh in the mid-70s. Between two bites of an ordinary hamburger, Lauterbur realized that the analytical technique of nuclear magnetic resonance (NMR) he had been studying for years could feasibly be used to create images that could reveal illness and abnormalities in human tissue.

From his first experiments performed on simple beach clams to later experiments proving his new technique, originally termed 'zeugmatography,' could see inside the human body with unprecedented accuracy, Lauterbur's discovery revolutionized medical procedure and chemical analysis.

"Paul's influence is felt around the world every day, every time an MRI saves the life of a daughter or a son, a mother or a father," said Richard Herman, chancellor of the University of Illinois at Urbana-Champaign. "He will be greatly missed."

University of Illinois Photo

Those sentiments are shared by colleagues and admirers across the world. Steven Zimmerman, Lauterbur's Department Head, said that "after having an extraordinary impact on the field of medicine, Paul turned his sights on one of the great mysteries of our time—how did life evolve from the primordial mixture of small molecules. He had some very innovative ideas on how the basic building blocks of living organisms were assembled. We have lost a real original."

"Paul was a wonderful colleague—witty and charming, forthright and modest in turn. He also was generous of his time and very approachable," agreed Girolami. "On the morning he was informed of winning the Nobel Prize, Paul insisted on only one thing: that he keep his regular afternoon appointment with his students, which he did. I think that speaks volumes about the man, and he well-represented the 'Illinois spirit.'

"We all miss him," Girolami concluded, "although we (and all of humankind) are richer owing to his efforts."

Lauterbur is survived by his wife, U of I physiology professor Joan Dawson; their daughter, Elise Lauterbur, a student at Oberlin College; and by his first wife, Rose Mary Caputo, and their son, Daniel Lauterbur of Perry, Mich., and daughter, Sharyn Lauterbur-DiGeronimo of Selden, N.Y. ■

## Seeing Smells:

# Ken Suslick Develops Sensor Arrays

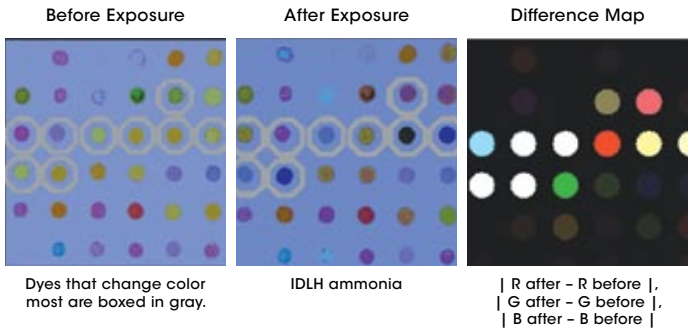
During the past seven years, Chemistry professor Kenneth S. Suslick and his research group have developed a very simple, but extremely powerful, new technology for detection and identification of volatile organic compounds (VOCs): colorimetric sensor arrays. This is an optoelectronic nose technology, dubbed "smell-seeing" based on equilibrium interactions of analytes with metalloporphyrins and other chemically responsive dyes. As with human olfaction, Suslick's colorimetric sensor arrays use a large number of cross-reactive sensors that probe a wide range of chemical properties. By digitally monitoring the change in color of each dye in the array, they have a quantitative measure of a composite response to volatile organics. Chemometric pattern recognition is extremely powerful with these arrays because of their extraordinarily high dimensionality.

The colorimetric sensor array is prepared by printing chemically responsive dyes into a disposable, injection-molded plastic cartridge. The array is then imaged by a handheld reader that contains a digital camera and a white LED, a CPU chip, and a micropump to pull air through the cartridge. The before and after images are digitally subtracted and compared. The difference map provides a unique fingerprint that identifies both the analyte and its concentration paper or porous membranes of various polymers.

There are two fundamental design requirements for a colorimetric sensor array: (1) the chemo-responsive dye must contain a center to interact strongly with analytes, and (2) this interaction center must be strongly coupled to an intense chromophore. The first requirement implies that the interaction must not be simple physical adsorption, but rather must involve other, stronger chemical interactions. Chemoresponsive dyes are those dyes that change color, in either reflected or absorbed light, upon changes in their chemical environment. The consequent dye classes from these requirements are (1) Lewis acid/base dyes (i.e., metal ion containing dyes such as metalloporphyrins), (2) Brønsted acidic or basic dyes (i.e., pH indicators, which turn out to indicate a lot more than just pH), and (3) dyes with large permanent dipoles (i.e., zwitterionic solvatochromic dyes).

The work was started by Neal Rakow (Ph.D. '02) now at 3M, and originally published in *Nature*. The technology has been continued and further developed by a number of postdocs and graduate students. The research, which has resulted in three U.S. patents and a dozen papers, has been developed with grants from NSF, DHS, and DOD. The Suslick group's work is funded as of September 2007 by a four-year $2.4 million grant from the NIH as part of their Genes and Environmental Health Initiative to develop a personal dosimeter for VOCs. In addition, Suslick founded a spin-off five years ago, ChemSensing, which is run by two University of Illinois alumni, Matt Placek and Bill McNamara, and specializes in rapid bacterial detection using the colorimetric array. ■

To learn more about Dr. Suslick's research, visit chemistry.uiuc.edu/faculty/Kenneth_Suslick.html

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2007-2008

# Chemistry Faculty Awards

Prof. Ryan C. Bailey
2007 National Institutes of Health Director's New Innovator Award

2006 Camille and Henry Dreyfus New Faculty Award

Prof. Roman Boulatov
2008 National Science Foundation CAREER Award

Prof. Martin Burke
2008 National Science Foundation CAREER Award

Prof. Scott E. Denmark
2007 Prelog Medal

Prof. John Gerlt
2007 Fellow, American Association for the Advancement of Science

Prof. Gregory S. Girolami
2007 Fellow, American Association for the Advancement of Science

Prof. John F. Hartwig
2008 Paul N. Rylander Award, Organic Reactions Catalysis Society

2007 Mukaiyama Awardee by the Society of Synthetic Organic Chemistry, Japan

2007 Raymond and Beverly Sackler Prize in Chemistry, Tel Aviv University

2007 Tetrahedron Young Investigator Award

Prof. Paul J. Hergenrother
2008 Eli Lilly Award in Biological Chemistry

Prof. John A. Katzenellenbogen
2008 Gustavus John Esselen Award for Chemistry in the Public Interest

2007 American Chemical Society E. B. Hershberg Award for Important Discoveries in Medicinally Active Products

Prof. Neil L. Kelleher
2007 Pfizer Award in Enzyme Chemistry from the ACS Division of Biological Chemistry

Prof. Yi Lu
2007 Fellow, American Association for the Advancement of Science

2007 Society of Biological Inorganic Chemistry (SBIC) Early Career Award

Prof. Benjamin McCall
2007 Cottrell Scholar Award from the Research Corporation

Prof. Ralph G. Nuzzo
2007 Fellow of American Vacuum Society

Prof. Chad Rienstra
2008–2009 I. C. Gunsalus Scholar, UIUC

2007 Sloan Foundation Fellowship

Prof. John Rogers
2007 Leo Hendrik Baekeland Award from the American Chemical Society

Prof. Scott K. Silverman
2007 Fellow, American Association for the Advancement of Science

Prof. Kenneth S. Suslick
2007 Sir George Stokes Medal from the Royal Society of Chemistry

Prof. Wilfred van der Donk
2007 Tetrahedron Young Investigator Award

Prof. M. Christina White
2008–2009 Bristol Meyers Squibb Unrestricted Grant in Synthetic Organic Chemistry

2008–2009 Pfizer Award for Creativity in Organic Chemistry

2008 Alfred P. Sloan Research Fellowship

2008 Amgen Young Investigator Award

2008 Boehringer Ingelheim Pharmaceuticals New Investigator Award

2007 Eli Lilly Grantee Award

Prof. Andrzej Wieckowski
2006 Gold Medal of the International Society of Electrochemistry

Read about our faculty, catch up on the latest chemistry news, and stay up-to-date on alumni events by visiting our new website chemistry.uiuc.edu.

Science Breakthrough of 2007:

# Christina White Discovers New Synthetic Method

It has long been recognized that discovering a way to oxidize the inert and ubiquitous aliphatic C–H bonds found in complex molecules with predictable selectivity could fundamentally change the state-of-the-art of organic synthesis. Despite tremendous efforts for many decades, such a reaction had eluded chemists. That is, until UIUC chemistry professor M. Christina White and her graduate student Mark Chen recently made a breakthrough discovery (M.S. Chen, M.C. White, *Science*, 2007, 318, 783).

The first challenge was finding a way to make a typically inert bond become reactive without resorting to harsh reagents that are incompatible with the functionalities of complex molecules. Promise in this area had been demonstrated with iron-based catalytic systems, but the breakdown of the catalyst always led to indiscriminate side reactions that destroyed complex substrates. To overcome this barrier, White and Chen discovered a new, conformationally rigid ligand framework that stabilizes the iron catalyst and sharply focuses its reactivity. Moreover, they use cheap and mild hydrogen peroxide as the oxidant and the reaction generates only water as a byproduct.

The second challenge was daunting: selective oxidation of only one of the many C–H bonds that decorate the skeleton of a complex small molecule without the use of scope-limiting directing groups. The dogma to which most experts in the field subscribed was that the use of enzymes or elaborate enzyme-like catalysts would be essential for such selectivity.

White believed otherwise. She has built her entire independent career around the visionary expectation that subtle

To learn more about Dr. White's research, visit chemistry.uiuc.edu/faculty/Christina_White.html

Left: White with research group.
Right: White with Chen.

but finite differences in electronic and steric environments could be exploited to achieve the selective oxidation of C–H bonds in complex molecules. She has now proven that vision to be true.

In one example, the new White-Chen catalyst predictably oxidized only one of the 22 C–H bonds on the complex antimalarial natural product artemisinin while leaving intact a plethora of potentially reactive functional groups, including a notoriously sensitive endoperoxide moiety. There are myriad and immediate potential applications in both academia and industry, including the faster, cheaper, and more environmentally-friendly (green) synthesis of pharmaceuticals, the one-step preparation of drug metabolites for understanding and minimizing side effects, and the enablement of a fundamentally new strategy for target-oriented synthesis. The tremendous potential of this method has been highlighted in numerous press articles appearing in prominent international science magazines and journals such as *Chemical & Engineering News*, *Nature*, MIT's *Technology Review*, *Chemistry World*, and *Chemistry & Industry*.

Beginning her career as an Assistant Professor at Harvard, White made an early advance in this area when she discovered a new palladium catalyst (now sold by Aldrich as the "White catalyst") that could selectively oxidize the C–H bonds proximal to a terminal olefin. She and her coworkers further discovered that this new reaction was operating via a novel mechanistic manifold, dubbed *serial ligand catalysis*, in which reversible interactions between one metal and multiple ligands enabled the execution of different product-forming steps of an otherwise unworkable catalytic cycle. The Department of Chemistry at UIUC recognized the extraordinary potential of White's nascent program, and, in 2005, offered her the opportunity to move to UIUC.

In the past three years, the White group has grown to become recognized as a leader in the area of C–H oxidation for complex molecule synthesis. This is evidenced in the numerous awards White has received, such as the Camille and Henry Dreyfus New Faculty Award, the NSF CAREER award, the A.P. Sloan fellowship, and the Eli Lilly Grantee Award. The group's original allylic C–H oxidation reaction has dramatically expanded into a series of general methods for regio- and stereoselective functionalization of this important chemical group, using a variety of both oxygen- and nitrogen-based nucleophiles.

For example, in 2007, White and graduate student Ken Fraunhoffer discovered the first catalytic system for allylic C–H amination for complex molecule synthesis, thereby solving a 30-year old problem in chemical reactivity. Both the aliphatic C–H oxidation and allylic C–H amination work have been selected as "breakthrough of the year" papers by Chemical & Engineering News for 2007. The White group has forcefully demonstrated the capacity of these C–H oxidation methods to streamline the syntheses of complex organic molecules, eliminating many protecting group and oxidation state manipulations that plague the state-of-the-art.

And now, with the recent discovery of their new iron-based catalyst for selective oxidation of aliphatic C–H bonds, the potential of White's program to fundamentally change the way complex molecules are made in the laboratory has developed from vision to reality. ■


# One on One with Christina White

Dr. Christina White, Assistant Professor of Chemistry at the University of Illinois, is an organic chemist with an interest in synthesis, especially new methodology. Her research has garnered national and international praise for its innovation and impact. A highly sought-after speaker in the U.S., Japan and elsewhere, her work in selective aliphatic C-H oxidation is considered groundbreaking, and was selected as one of the top 10 breakthroughs of 2007 by *Science* magazine. Recently, we caught up with Dr. White and had the opportunity to discuss some of her work as well as her early years in the field of chemistry.

*Department of Chemistry:* How and when did you become interested in chemistry?

*Dr. White:* Although I had always excelled in science, I had primarily been very interested in the arts for most of my high school education and also early in my college career. I became interested in chemistry because it allows the scientist to create rather than just observe.

Was there a memorable experience or person that influenced your interest in chemistry?

Stuart Rosenfeld was my undergraduate research advisor at Smith College. He instilled in me a love for making things and the creative process that it fosters. Anyone can teach you the fundamentals and the techniques of synthesis. Inspiring a student to have passion for it is really the intangible achievement.

Who was your greatest inspiration when you started pursuing a career in chemistry?

K. Barry Sharpless and E.J. Corey. Both scientists have in common that they have fundamentally changed the way people make molecules. In Sharpless's case, he dared to look beyond nature for what was possible with respect to chemical reactivity and selectivity. The catalytic asymmetric reactions

## I became interested in chemistry because it allows the scientist to create rather than just observe.

he pioneered that are general and yet highly selective have revolutionized the way that three dimensional molecules are made. Corey developed and systematized the fundamental strategies by which we think about using these and other powerful reactions to construct functionally and topologically complex structures. The systematized planning algorithm known as retrosynthetic analysis has become so routine that it is being taught as part of introductory courses on organic synthesis.

Much of your education and early career took place on the east coast. Now that you live in the Midwest, how does it all compare?

The University of Illinois is an outstanding place to do chemistry. The facilities are second to none in the world and the students, both at the graduate and undergraduate level, are phenomenal. During my time here, I have had the extreme privilege of working with students who are extraordinarily creative, intelligent, and passionate about what they do.

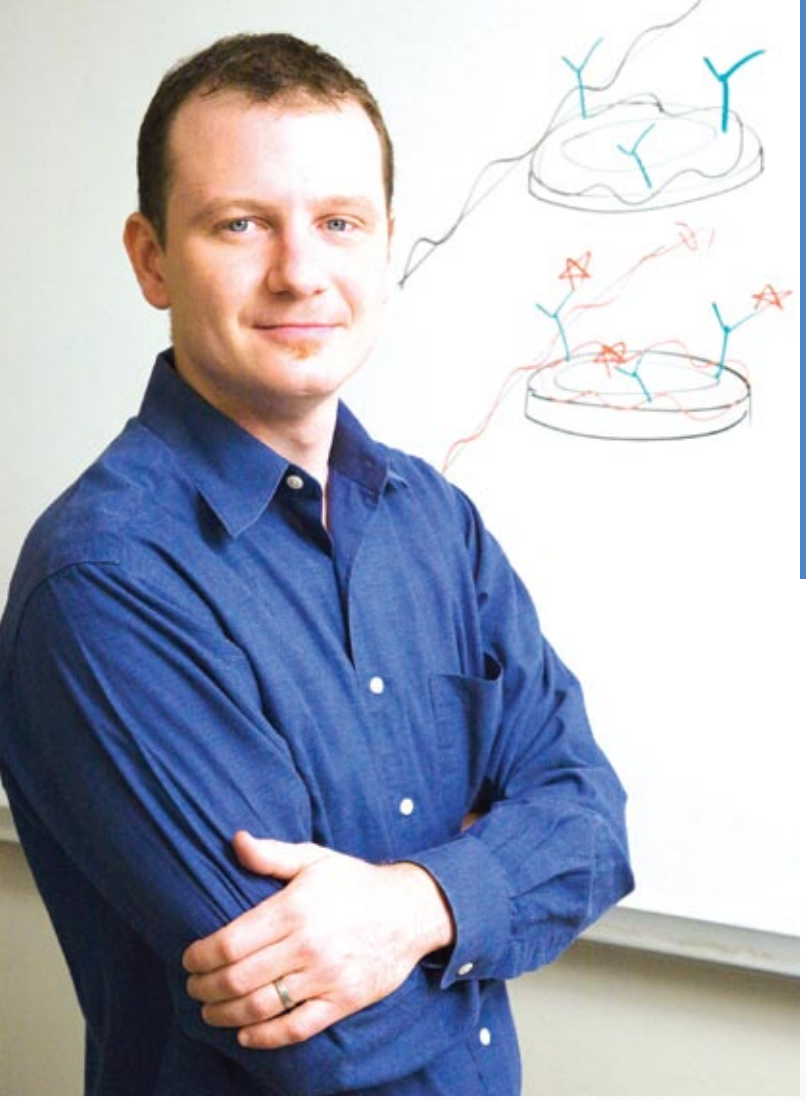
Your recent research into selective aliphatic C-H oxidation was chosen as one of the top 10 science breakthroughs of the year by *Science* magazine. What has this selection meant to you?

Ultimately, it has meant that a very broad audience of scientists have read our work and hopefully been influenced by it.

How did you become interested in that as an area of study?

My doctoral work involved developing a relatively lengthy multistep synthesis of a complex vitamin D3 analog. During that time I found myself doing a significant number of chemical manipulations in order to prepare my molecule to undergo desired, productive chemical reactions. In fact often for the one reaction step I wanted to do, I would find myself doing two to four steps of manipulations. These "chemical manipulations" are operations like protections and deprotections of reactive functionality. I realized that if one could start with unreactive functionality and convert it to reactive functionality late in a synthetic sequence, many of these wasteful chemical manipulations could be avoided. In order to do this, entirely new chemistry would have to be discovered and developed.

As a postdoctoral fellow at Harvard in Eric Jacobsen's labs (Illinois faculty '88–'93), I learned how to discover and develop reactions using metal catalysts. When starting my independent career, I realized that the way that I could make a significant impact on how people make molecules was to discover and develop new reactions that allow chemists to transform unreactive C—H bonds to reactive functionality like oxygen or nitrogen. I also wanted to contribute to developing new strategies and planning algorithms for how to use this novel type of chemistry to streamline the synthetic process. My lab at UIUC is currently involved in both pursuits. The aliphatic C—H oxidation work described in the Science paper was particularly significant because it demonstrated for the first time that all C—H bonds, particularly in complex molecule settings, are not equivalent towards oxidation. Given the right metal catalyst, one can distinguish between these bonds based on subtle differences in sterics and electronics in predictable ways. Because the aliphatic and allylic C—H oxidation methods my group has developed are so mild, they can be used at very late stages of a synthesis to install reactive oxygen and nitrogen functionality. My group's ultimate vision is that new reactions like these will transform C—H bonds into standard functional groups, routinely utilized by chemists during the synthetic planning process. By developing these methods and the corresponding synthetic strategies, our ultimate goal is to streamline the process of synthesis. This would allow the exploration of much more diverse areas of chemical space in the discovery of new drugs and other biomedically important molecules. ■



Portrait by L. Brian Stauffer, UIUC News Bureau

## A Moment with Ryan Bailey,

# NIH New Innovator Award Winner

Dr. Ryan Bailey, Assistant Professor of Chemistry at the University of Illinois, has just received the 2007 National Institutes of Health Director's New Innovator Award. Created in 2007, this new award recognizes promising new investigators who have the potential to produce groundbreaking medical advances. Only 29 awards were given throughout the field of medicine and science in 2007, and Dr. Bailey was one of only two chemists chosen. Each award comes with a grant of $1.5 million in direct costs over a five-year period. This award grants Dr. Bailey unprecedented freedom to pursue his research involving ultra-sensitive sensors that screen genes and proteins for signs of cancer and other diseases. Despite his busy schedule, we caught up with Dr. Bailey and were able to spend a few minutes with him discussing the award, its effect on his work, as well as his inspirations that led to his groundbreaking new research.

To learn more about Dr. Bailey's research, visit chemistry.uiuc.edu/faculty/Ryan_Bailey.html

*Department of Chemistry:* When did you first know that you wanted to become a chemist?

*Dr. Bailey:* My dad was the chemistry teacher at my high school, so I was first introduced to the subject at a young age while sitting around the dinner table. While I always wanted to be a scientist and enjoyed taking chemistry courses, I don't think that I really knew that I wanted to be a chemist until my junior year of college. My first introduction to quantum mechanics served as an awakening of sorts, demonstrating the power and influence of chemical intuition in the world surrounding me. It was at that point that chemistry truly became a passion rather than a hobby.

What led to your interest in analytical chemistry?

That's actually a funny question. When I was an undergraduate, I swore to my instructors that I would never be an analytical chemist. I enjoyed working with instrumentation, but found the contrived "unknown" samples and laboratory experiments to be boring. When I started graduate school, my advisor suggested that I work on a "pilot project" for a couple of months during the summer before I began my real

research project. One thing led to another and after four and a half years, those initial experiments led to a Ph.D. thesis forming the basis of an entirely new class of chemical and biological sensors. Looking back, I realize that I was always interested in analytical chemistry. It just wasn't apparent until I worked on problems to which the answers weren't already known.

### Has any chemist been a particular inspiration to you?

I have always been fortunate to be surrounded by great teachers and mentors, starting with my dad and continuing through my undergraduate, graduate, and postdoctoral training. I have worked with many types of scientists who have completely different demeanors and styles. Each of them has inspired me in one way or another. Today I find myself drawing inspiration from my students. I enjoy and am motivated by the opportunity to help shape the future directions of young scientists, just as my mentors helped shape my career.

### You recently won the NIH Director's New Innovator award. How did it feel to learn that you had been granted this recognition?

In a word—incredible! It is the type of award that you can't realistically expect you'll receive so it's difficult to put into words how excited I was when I received the phone call notifying me of my selection. I actually didn't tell anyone until I received a follow-up e-mail from the NIH later that day. I was worried that I had either misunderstood the caller or that I had fallen asleep at my desk and dreamt about winning. My wife had given birth to our son, Marty, about two weeks prior so both were realistic possibilities given my level of sleep deprivation.

### The award has brought considerable publicity. What will the award mean to you and your research?

The monetary component of the award is uniquely enabling for a scientist at my career stage. It allows my group to grow at an otherwise unsustainable rate and also affords us the luxury of being more aggressive with our science. Rather than having to spend considerable time obtaining preliminary results and applying for incremental funding, we're able to focus our initial efforts on larger-scale challenges. The publicity has given our group some early recognition, resulting in invitations to speak and share our results, ideas, and future directions. I hope that these opportunities will lead to continued benefits for my research program as well as open doors for students leaving my group in search of jobs.

### You had many options for a faculty position. What attracted you to the University of Illinois?

There are multiple reasons, but first and foremost is the quality of the department at Illinois. My group's research interests are highly interdisciplinary and I wanted to be in an environment where I was surrounded by outstanding chemists of all types. My colleagues in the analytical area are terrific and equally important is the overall strength of the department. I don't think that there is a stronger top to bottom faculty in the country. The second reason was location. My wife, Maria, and I are both from Illinois and after spending two years in California for my postdoc we realized that we were ready to move back to the Midwest. We were both familiar with the area and now that we've started our own family, it's nice to be closer to the grandparents. The final reason, and an important one at that, is that I grew up an avid Illini sports fan and couldn't pass up the chance to be close to the action. ■

## Robert and Carolyn Springborn Create

# Student Support Program with $10M Gift

I value the education I received, and I want to ensure our country can compete scientifically in the future; Illinois is the best place to invest to achieve both goals. I owe my success to my education.

How does one leave a lasting legacy? When it comes to making an impact for generations to come, people often think of their family, their life's work and accomplishments, and what they might do to show their appreciation to the people and institutions that helped to make their successes possible. This expression of gratitude, however, can take many forms.

For Dr. Robert and Mrs. Carolyn (Connie) Springborn of Naples, Florida, there was no better way to convey that gratitude than to help provide an opportunity for others to receive a wonderful learning experience in Chemistry at the University of Illinois.

This past fall, during the University of Illinois Foundation (UIF) weekend, the Springborns quietly and unassumingly arrived for the announcement of their contribution to the university, a donation that would be revealed as the single largest gift of the UIF weekend: a total of $10 million to support undergraduate scholarships and graduate and post-doctoral fellowships in the Department of Chemistry.

"I give for two reasons," said Dr. Springborn. "I value the education I received, and I want to ensure our country can compete scientifically in the future; Illinois is the best place to invest to achieve both goals. I owe my success to my education."

Competitive and groundbreaking, the Springborn Graduate Fellowships have already begun making an impact. Last spring, two Springborn Fellows were chosen from more than 200 applicants. Consisting of a stipend, waiver of tuition and fees, and support for travel to conferences or other laboratories, these fellowships continue for three years, allowing the recipients unprecedented freedom to pursue their goals and research interests.

"The Springborn Fellowship has been one of the greatest honors I could have received upon entering graduate school," said Jessica Klinkenberg, a recipient of the Springborn Fellowship. "The freedom to choose a research group without the added pressure of available funding has allowed me to focus on the research in which I'm most interested. While on fellowship, I will be able to concentrate my efforts nearly

exclusively on research. I am so honored to have been chosen from a field of well-qualified incoming graduate students, and the award will stand out as quite an achievement as I go on in my career as a scientist."

Beth Lindquist, recipient of the Springborn Fellowship, agreed. "I am honored to have been selected as a Springborn Fellowship recipient," she said. "I recently had the opportunity to meet the Springborns, and the Chemistry Department is fortunate to have alumni who so eagerly support and encourage graduate students to achieve their scientific goals."

Springborn's comments on UIF weekend drew attention not to his gift, but to the impact that Illinois chemistry has had on generations. "When I attended Illinois, it was the 'Roger Adams Era,' and the chemistry program was one of the top in the world; 50 years later it still is," he said. "They are producing great scientists, including CEOs, government officials, and Nobel laureates. That says it all."

The impact of the Springborn's gift is already being seen beyond the halls of Noyes and Roger Adams Laboratory. "Bob and Connie's goal was not just to bring outstanding students to Illinois, but to encourage the best students throughout the U.S. to consider chemistry as a career," noted Steve Zimmerman, Head of the Department of Chemistry. "They want our fellowship program to serve as a model for the country, and judging by the attention the Springborn Fellowship Program is getting from chemistry programs at other universities, that appears to be happening already."

What will become of the graduate and postdoctoral fellows granted this prestigious award? Will the Springborn's gift pave the way for another Nobel Laureate or for a research breakthrough leading to a cure for cancer or Alzheimer's disease? No one can say. But no matter the successes that future Illinois chemists attain, the Springborn's gift has left an impact for generations to come. ■

## Margaret Kosal:

# The Science of Bioterrorism Defense

Image Courtesy of UIUC *LAS News*

These days you hear a great deal about weapons of mass destruction and the fear of bioterrorism. Scientists around the world are hot on the trail of new ways to defend against enemies that use weapons smaller than the eye can see to wreak major havoc on innocent populations. Of those scientists, recent UIUC graduate Margaret Kosal, winner of the 2007 LAS Recent Alumni Award, is leading the pack.

A 2001 graduate of the University of Illinois Department of Chemistry, Kosal is using the skills and research interests that she honed during her time as a Ph.D. student with Professor Ken Suslick at UIUC and then as a science fellow at Stanford to track down and defend against the threat of bioterrorism on the world stage.

Her projects and publications have covered topics ranging from analyses of the United States' vulnerabilities to chemical attack to studying nascent developments such as nanotechnology. Recent accolades from Jean Reed, special assistant for the Chemical and Biological Defense and Chemical Demilitarization Programs of the Pentagon, hail Kosal as one of the nation's leading young experts on chemical and biological defense.

It is for these reasons that the College of LAS at the University of Illinois decided that Kosal was the perfect candidate for the 2007 LAS Recent Alumni Award. LAS grants the award to an alum whose work reflects their education through outstanding achievement, by significantly improving the lives of others, or by enhancing the lives of others through exemplary leadership and service.

Though she continues to receive awards and accolades for her work, Kosal has not let the attention slow her down in the least. Recently, she has undertaken a new position as the Co-Director of the Emerging Technology and Security Program at the Center for International Strategy, Technology and Policy at the Georgia Institute of Technology. She also is at work on a new book, *Nanotechnology for Chemical and Biological Defense*, which will examine potential scenarios and strategies regarding the benefits and possible proliferation threats of nanotechnology to national security. ■

David A. Matthews:

# Developing Medicines to Combat HIV Virus

Image Courtesy of UIUC *LAS News*

In 1984, researchers first isolated the HIV virus, the culprit behind the AIDS epidemic that was spreading fear across the United States. It was also the year that a group of scientists formed a small start-up company known as Agouron Pharmaceuticals—a company that would go on to develop one of the most effective drugs to battle the HIV virus.

David Matthews, who received his Ph.D. in chemistry from the University of Illinois in 1971, was the scientific founder of Agouron. He is also a 2007 winner of the LAS Alumni Achievement Award.

The College of Liberal Arts & Sciences grants the LAS Alumni Achievement Award to an alumnus or alumna who, by exceptional achievement, demonstrates the values they learned through a liberal arts education. Past awardees have been noted for inventing life-saving drugs, creating humane programs or organizations, and attaining other outstanding professional achievements. With his ground-breaking work with HIV and life-saving medical treatments, Dr. Matthews was a clear choice for the distinguished LAS award.

As Matthews recalls, "In the mid-'80s, the National Institutes of Health (NIH) was in a panic mode trying to figure out ways to develop drugs that could have an effect on HIV." Agouron became part of an elite group of five research centers that received a grant from NIH to face this daunting challenge. This seed funding eventually led to the drug Viracept, which Agouron discovered and developed, and which rapidly became the leading HIV protease-targeted drug.

Matthews credits the U of I with giving him in-depth training in the X-ray methods that became crucial to his future work. After graduating from the U of I, he took a position in the chemistry department at UCSD, where he worked with X-ray crystallography, the tool of choice for determining molecular structures at the atomic level. Matthews used this method to figure out how various known drugs bound potently and, in some cases, selectively to different species of dihydrofolate reductase (DHFR), required for living cells to replicate. A drug that binds well to bacterial DHFR without binding to the corresponding human enzyme makes it possible to selectively kill bacteria.

When confronted with the AIDS crisis, Matthews realized he and his colleagues could use the same technique to study the structure of molecules in creating new drugs. Prior to this, the approach to developing drugs that knocked out bacteria and viruses was much more random. "You exposed bacteria to many different chemicals, looked for the one that killed them, and hoped they also didn't kill the host," he explains. "It was pretty hit and miss."

Since then, many companies, including large pharmaceutical companies such as Pfizer and Merck, use approaches in drug discovery similar to that developed by Matthews.

In 2005, Matthews retired, but he still remains active in disease research. Currently he is working with two organizations to discover and develop medicines to treat diseases in developing countries. ■

*Adapted from an article by Doug Peterson and used with permission from College of Liberal Arts and Sciences LAS News.*

# Alumni Notes

Eric Eisenhart and Jo (Steinkamp) Eisenhart continue to work at Pfizer Inc. Eric, B.S., 1980, Arduengo, is Director of Research Formulations for Pfizer Global Research and Development. In this role, he is responsible for early toxicological and clinical formulations for new prospective drugs. Despite trying pizzas around the world, Eric still longs for Papa Del's pizza. Jo, B.S., 1981, Suslick, is Vice President of Colleague and Operations Support for Worldwide Human Resources at Pfizer, Inc. In this role, she is responsible for delivery of HR services for Pfizer's global workforce. She received a Ph.D. in Human and Organizational Development at the Fielding University in 2006. Jo also misses Papa Del's pizza. Eric and Jo both received Ph.D. degrees in chemistry from the University of Wisconsin after finishing at Illinois.

Eric Chronister, Ph.D., 1985, *Dlott*, a Professor of physical chemistry in the Department of Chemisty at the University of California at Riverside was recently appointed the Head of the Department.

Stephanie Watts, B.S., 1988, a Professor of pharmacology and toxicology at Michigan State University is the 2008 American Physiological Society's (APS) Bowditch Award winner. The Bowditch Lectureship is awarded to a regular member, younger than 42 years of age, for original and outstanding accomplishments in the field of physiology.


We'd like to hear from you. Submit your alumni note. Visit chemistry.uiuc.edu/alumni/chem_alum_news.html

Patrick Jeffries, Ph.D., 1992, *Girolami*, won an Oscar (Academy Award) in 2007. He has worked at Kodak in Rochester, NY, since his graduation in 1992, and one of his research projects was to develop improved camera film for motion pictures. He, along with three other scientists at Kodak, won the 2007 Academy Award of Merit for Scientific and Technical Achievement, which is the highest award for technical achievement given by the Academy of Motion Picture Arts and Sciences. The award is for his development of the Kodak Vision2 line of color negative films. Introduced in November 2002, within 18 months, Vision2 film accounted for about 70% of color negative film shot in Hollywood. In honor of his achievement, Dr. Jeffries attended the Academy Award Scientific and Technical Achievement Award dinner at the Beverly Wilshire Hotel on February 9, 2008.

Monica Baloga, Ph.D., 1995, *Zimmerman*, has recently received four separate awards from the Florida Institute of Technology: the President's Award for University Excellence, the Kerry Bruce Clark Award for Excellence in Teaching, the Student Government Association College of Science Teacher of the Year Award, and the Florida Tech Chapter of FHS National Honor Society Excellence in Teaching Award. In addition to serving on the Department of Chemistry faculty, she was also promoted to an Assistant Provost serving as the university's Accreditation Liaison.

Ha Kung Wong, B.S., 1996, *Gewirth*, was recently elected as partner at his law firm,

*Continued on page 20*

*Continued from page 19*

Fitzpatrick, Cella, Harper & Scinto, in New York, NY. Wong practices general intellectual property law with an emphasis on complex patent litigation in pharmaceuticals and chemistry.

Chris O'Donnell, B.S., 1999, *Zimmerman,* was promoted to Director of Medicinal Chemistry in the Antibacterial/Central Nervous System Chemistry group at Pfizer in Groton, CT. He leads a group of about 30 chemists on a variety of CNS medicinal chemistry projects targeting novel medicines to treat Alzheimer's Disease and Schizophrenia.

Matthew Mio, Ph.D., 2001, *Moore,* was recently awarded University of Detroit Mercy's 2007 Faculty Excellence Award, an honor given to faculty members who have best contributed to the education of the university's students, service to the campus, and the Southeastern Michigan community. According to University of Detroit Mercy President, Fr. Gerard L. Stockhausen, S.J., Ph.D., "He (Matt) is committed to the mission and ideals of our university and is a credit to the culture of UDM. Matt's work exemplifies the excellence of the UDM faculty and therefore meets the criteria required for the granting of UDM's 2007 Faculty Excellence Award."

Michael Wendland, Ph.D., 2001, *Zimmerman,* was promoted to Research Specialist at 3M. In his six years at 3M, Mike has worked in a range of research areas including dental materials, living free radical polymerization and sensors, and has 23 issued patents.

# In Memoriam

Carl E. Banfi, Chemistry, B.S. 1976, born August 14, 1953 in Oak Park, IL to Edwin and Geraldine Banfi, passed away April 8, 2007 at his home in Burien, WA after a fight with cancer. Carl was a graduate of the University of Illinois in Champaign/Urbana earning a B.S. in chemistry and a MBA in information systems. He is survived by his loving wife Pat of 21 years; brothers and sister Lee, Glenn, Dale, Lynn and their families, and many good friends.

John Allard Chandler, Chemistry, M.S. 1958, Ph.D. 1959, *Moeller,* 74, of Amherst, professor emeritus of Chemistry at Amherst College, died March 4, 2007 after an extended illness. He received his M.S. in chemistry in 1957 and his Ph.D. in chemistry from the University of Illinois, Champaign-Urbana in 1959. He leaves his wife of 51 years, Joann (Hilliard); sons Charlie, of Amherst, and Jack, of Singapore, a daughter, Michelle, of Amherst, and eight grandchildren.

Marvin H. Gold, Chemistry, Ph.D. 1940, *Adams,* was born June 23, 1915 and died October 21, 2007 at 92 years of age. He is survived by his companion, Naomi Kabakov of Sacramento; his children, Norman Gold of Sacramento and Judy Bloom of Hillsborough; a sister, Rae Brooks of Winnetka; five grandchildren; and four great-grandchildren.

Wyvona Lane, Chemistry, Ph.D. 1946, *Snyder,* died June 8, 2007 at the age of 91. Born in Yorktown, Texas, she attended Oklahoma College for Women, earning a bachelor's degree in chemistry. She completed a master's degree at Oberlin College and a Ph.D. at the University of Illinois. Lane is survived by her husband, Joseph Lane.

David Turnbull, Chemistry PhD, 1939, *Phipps,* passed away April 28, 2007 at the age of 92. Born in Elmira, Illinois, he attended Monmouth College before pursuing graduate studies at the University of Illinois. In 1939, he graduated, earning a Ph.D. in chemistry with emphasis on physical chemistry. After working in industry for several years, he took a position at Harvard in 1962, where he remained for the rest of his life. He is survived by his sons, Lowell and Murphy; his daughter, Joyce McDonald; and four grandsons.

John Michael "Mike" White, Chemistry, M.S. 1962, Ph.D. 1966, *Yankwich,* died August 31, 2007 from a sudden heart attack. White was a professor at the University of Texas–Austin, where he had served since 1966. He was born November 26, 1938 to John and Frances White, in Danville, IL. He is survived by Gwen, his wife of 47 years; son, Mark and his wife, Melissa, Houston; daughter, RaeAnne Landrum and her husband, Todd, Frisco; son, Paul, Oklahoma City; grandchildren, Melody and Carter Landrum; mother, Frances; brothers Ben and Andy; and sisters Mary White and Ruth Siddens.

Zeno W. Wicks Jr., Chemistry, Ph.D. 1944, *Adams,* a research chemist, industry executive, educator, and consultant who made major contributions to the fundamental understanding of coatings and inks, died at his home in Louisville, KY, June 5, 2007. He was 86. Dr. Wicks is survived by five children: Robin, Zeno III, David, Kathleen, and Douglas; and 12 grandchildren: Steven Denoms, Adam and Eliza Wicks-Arshack, Jay Connelly, and Maxine, Molly, Zeno IV, Sunny, June, Chelsea, Graeme, and Dakota Wicks. He was preceded in death by his wife, Susan Wicks; son, William; and daughter, Lucy.

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