Department Of Chemistry
IOWA STATE UNIVERSITY

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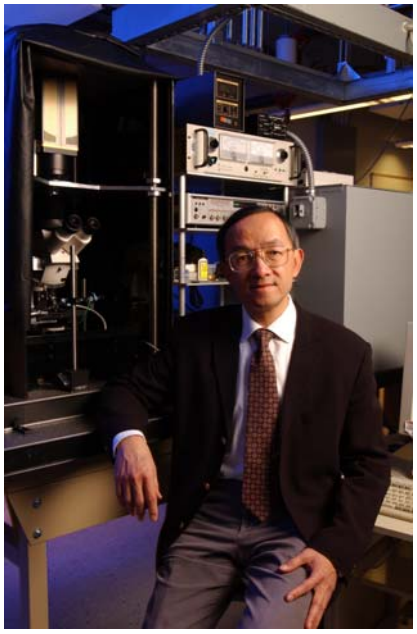
ED YEUNG NAMED INVENTOR OF THE YEAR



Ed Yeung

Wright Professor of Chemistry

The Iowa Intellectual Property Law Association has named Iowa State University chemistry professor Edward Yeung the 2004 Inventor of the Year. The award was presented Oct. 22 in Des Moines.

Yeung is Distinguished Professor in Liberal Arts and Sciences and director of the Chemical and Biological Sciences Program at the U.S. Department of Energy's Ames Laboratory.

Yeung holds 21 patents for technologies. He was named Iowa Inventor of the Year for his development of a DNA sequencer that combines laser microfluorescence with capillary electrophoresis, two analytical chemistry methods for determining the minute components of a substance. The sequencer can detect, monitor and quantify materials 24 times faster than earlier DNA sequencers. The system is a combination of several technologies for which Yeung holds patents.

The DNA sequencer technology, which was pivotal in the completion of the Human Genome Project, has been licensed exclusively to Applied Biosystems, Foster City, Calif., the major company in the DNA sequencing market.

"Yeung's program of discovery recognizes that chemical analysis does not stop at just providing measurements, but must be directly involved in the development of science as a whole. His innovations create opportunities for researchers from several biological disciplines to design novel experiments that open doors to new discoveries," said Kenneth Kirkland, director of the ISU Research Foundation.

Yeung has been on the Iowa State chemistry faculty for more than 30 years. He earned his doctoral degree in chemistry from the University of California, Berkeley.

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VICTOR LIN RECEIVES AWARD FOR EARLY ACHIEVEMENT IN RESEARCH

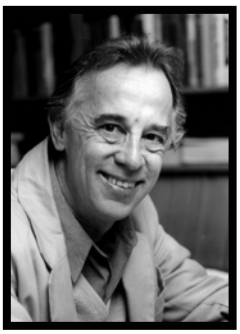
Victor Lin

Assistant Professor of Chemistry

Victor Lin, an Ames Laboratory associate and an Iowa State University assistant professor of chemistry, has been honored with a 2004 College of Liberal Arts and Sciences Award for Early Achievement in Research. The award recognizes a faculty member who has demonstrated outstanding research activities, unusually early in his or her professional career.

Lin has designed and conducted cutting-edge research projects that required expertise in chemistry, physics, biology and materials science. Since he joined Iowa State, Lin has been actively engaged in interdisciplinary research to develop synthetic methods to multifunctionalize new inorganic mesoporous materials for various catalytic and biomedical applications. Lin was formally recognized during the LAS Faculty/Staff Convocation, September 1.

REMEMBERING GERALD J. SMALL, WHO TACKLED EVERYTHING IN LIFE WITH AN INTENSE AND ENVIABLE PASSION



Gerald J. Small (1941-2004)

Dr. Gerald J. Small, distinguished professor of chemistry at Iowa State University and a senior chemist at the U.S. Department of Energy's Ames Laboratory, passed away on Saturday, August 7, 2004, at the Israel Family Hospice House in Ames (IA), as a result of advanced lung cancer. Gerald J. Small was born in Vancouver, B.C., where he received his primary and secondary education. Graduating from John Oliver High School in 1959 (where he was the President of the student body), he entered the University of British Columbia, from which he received a B.Sc. with honors in Chemistry and Mathematics in 1963. This combination of expertise has been the trademark of his remarkable career. In 1963 Gerry went to the University of Pennsylvania, where he became a graduate student in the group of Professor Robin Hochstrasser. Gerry played an important role in his group and quickly started setting up a laboratory for low temperature spectroscopy of solids.

Gerry's Ph.D. thesis research advanced understanding of the spectra of mixed crystals at liquid helium temperatures, and his contributions were very much self motivated. He discovered the substitutional solid solution of phenanthrene in biphenyl, a mixed crystal system that displayed a variety of beautiful sharp line spectra, which helped explain a number of spectroscopic processes that were problematic at the time.

One was the mysterious occurrence of multiplets of lines in the vibronic spectra of aromatic hydrocarbons that had been reported by Shpolskii a few years earlier for molecules in frozen paraffin hydrocarbons.

When Gerry first saw that these multiplets in a mixed crystal had a well-defined structure, their origin as multiple sites became clear. He developed a simulation of the potential surface responsible for the motions of phenanthrene molecules in the lattice that was based on what was known at the time regarding interatomic potentials and thereby found a quantitative explanation for the multiplets [Hochstrasser and Small 1968]. He also did the first "hole-burning" experiments before lasers were available by creating spectral "holes" in the phenanthrene spectrum using a band of wavelengths filtered from a high powered xenon lamp! His spectra of phenanthrene also clearly showed the significant involvement of totally symmetric vibrations in Herzberg-Teller effects. This was very unusual at a time when spectroscopists were still trying to set down the principles of analyzing electronic spectra of larger molecules in condensed phases. Gerry later went on to develop a full theory of such effects [Craig and Small 1969].

After receiving his Ph.D. in physical chemistry from Penn in 1967, Gerry moved as a postdoctoral fellow to the laboratory of David P. Craig at the Australian National University in Canberra. David's interests were in both the theory and experimental study of molecular excitons, and Gerry had the opportunity to become involved in both of these activities while he was there.

This powerful combination of theory and experiment that Gerry was honing through these experiences shows up again and again in the different fields that he pioneered during his scientific career.

In 1969 Gerry joined the faculty of Iowa State University (ISU) in Ames, where in 1991 he would become a Distinguished Professor of Liberal Arts and Sciences. At ISU, Gerry's outstanding research quickly brought him national recognition as an Alfred P. Sloan Foundation Fellow from 1974 to 1978 and later election as a Fellow of the American Physical Society. He served on the editorial advisory boards of the *Journal of Chemical Physics, Chemical Physics,* the *Journal of Physical Chemistry, Chemical Research in Toxicology,* and *Spectrochimica Acta.* He chaired a number of Gordon conferences, including the 1985 Gordon Conference on electronic spectroscopy, as well as numerous other conferences and seminars in the area of photosynthesis and electronic processes.

His pioneering work on molecular polaritons in the '70s and '80s showed, through elegant experiments using one and two photon absorption, how photons and excitons couple in molecular crystals. Gerry introduced a theory of polariton relaxation to explain these important results [Robinette et al. 1978; Stevenson et al. 1981]. He later showed that by tuning the polariton wavepacket velocity, one can vary the quantum yield of a host exciton to trap energy transfer by orders of magnitude [Stevenson et al. 1988]. This research illustrates how Gerry was able to bridge physics and chemistry, bringing new concepts into molecular science from solid state physics.

A very significant form of spectroscopy that was pioneered by Gerry in the period from 1978 to 1981 is now termed nonphotochemical hole burning [Hayes and Small (*Chem. Phys.*) 1978; Hayes and Small (*Chem Phys. Lett.*) 1978; Hayes et al. 1981]. He introduced the concept of tunneling between bistable configurations as being responsible for hole burning in amorphous solids and developed theoretical models that advanced the understanding of glasses and other disordered materials [Jankowiak et al. 1993; Jankowiak and Small 1987]. The methods and theory he introduced turned out to be enormously important, since they enabled the simplification of complex spectra, stimulated current day understanding of the dephasing of molecular excitations, and led to seminal discoveries in disordered materials and photosynthesis, about which we will say more later.

Gerry's unbounded enthusiasm for his science eventually led him to apply his considerable talents and experience to the study of photosynthesis, a process where he could realize significant applications for the spectroscopic techniques he developed for amorphous solids. A rigorous background in hole–burning spectroscopy and spectral dynamics combined with vast experience gained while studying amorphous solids provided Gerry with an ideal background to explore the initial events of photosynthesis, which occur in a span of a picosecond or less. After a brief foray into the study of pigments isolated from photosynthetic organisms, he turned his enthusiasm towards exploring energy and electron transfer in photosynthetic proteins. Using primarily the technique of spectral hole burning, he proceeded to make seminal contributions to the understanding of photosynthesis.

For his first major accomplishment, Gerry applied hole–burning spectroscopy to examine the P870 absorption band of the primary electron donor in photosynthetic bacteria. At that time P870 was known to be a special pair of bacteriochlorophylls involved in the initial act of photochemical charge separation. Prior hole–burning and photon–echo studies deduced that the initial act of bacterial photosynthesis occurred in 20 femtoseconds at 4 K, a view inconsistent with the non–adiabatic electron transfer theory used to explain the primary charge separation events of photosynthesis. Gerry realized that the 20-femtosecond interpretation of the earlier studies was most likely incorrect and in a series of theoretical and experimental papers, which culminated in 1993 [Lyle et al. 1993], he offered the now generally accepted model. In Gerry's explanation, the P870 absorption band of the special pair is almost entirely homogeneously broadened as a result of strong electron–phonon coupling and not because of decay of $P870^*$. His interpretation was not universally accepted in the beginning, but his steadfast defense of his views eventually prevailed. To further unify the field, Gerry's experimental hole–burning data proved that the initial charge separation act occurs in about a picosecond in agreement with pump-probe experiments. At that point, essentially all spectroscopic measurements capable of providing pertinent information on this very fast time scale were in agreement, to a large extent because of Gerry's efforts in providing and explaining the hole–burning data.

During this same period, Gerry introduced three spectroscopic techniques for the study of additional photosynthetic complexes: 1) vibronic satellite hole–burning spectroscopy, 2) zero–phonon action spectroscopy and 3) correlation hole–burning spectroscopy. The first technique led to the determination of the Franck-Condon factors for intramolecular chlorophyll modes and protein phonons associated with their important $S_0 \rightarrow S_1(Q_y)$ transitions. The determination of the Franck-Condon factors was significant, because they entered into the spectral density of the non–adiabatic rate expression for excitation energy transfer in photosynthetic light harvesting complexes (LHCs). The second spectroscopic technique, zero–phonon action spectroscopy, led to the first determination of the contribution of static, inhomogeneous broadening of the $S_0 \rightarrow S_1$ transitions because of the glass–like structural disorder of proteins. It was also used to identify and characterize the lowest and weakly absorbing exciton level of the cyclic light harvesting complex 1 (LH1) and light harvesting complex 2 (LH2) of purple bacteria [Reddy et al. 1991; Reddy et al. 1992; Zazubovich et al. 2002]. Gerry presented a simple theoretical argument based on cyclic symmetry for LHCs that explained his experimental results. The high-resolution x-ray structures that followed, along with electronic structure calculations by several groups, supported his benchmark interpretation for LH1 and LH2. The third spectroscopic technique, correlation hole-burning spectroscopy, allowed him to determine whether the site excitation distribution functions of the excited states of complexes are correlated. Gerry and his coworkers studied over ten isolated complexes and found little or no significant correlation, such that the electronic energy gaps between donor and acceptor states are distributed. As a result, the kinetics can be dispersive under certain conditions as defined by Gerry and R. S. Silbey [Small et al. 1992].

Another area where Gerry performed significant work was in the experimental determination of the electron-exchange contribution to Chl–Chl interactions in excitonically coupled aggregates. When two or more chlorophylls (or bacteriochlorophylls) interact such as in the special pair, charge transfer (CT) states become involved and interact with the normal $^1pp^*$ states. Gerry recognized that CT states are difficult to calculate and decided to provide experimental data relevant to these CT states. Subsequently, Gerry performed Stark and high pressure hole burning at hydrostatic pressures as high as 1.2 GPa and at liquid helium temperatures. He provided the first reports of Stark hole burning in photosynthetic complexes. In keeping with Gerry's commitment to rigor with simplicity, he developed a powerful methodology for exploring photosynthetic states with significant charge transfer character. In the 1990s Gerry extended his spectroscopic studies to other protein–chromophore complexes, such as photosystem I (PS I) of green plants and cyanobacteria. He also explored PS II, the protein–pigment complex involved in oxygen production in algae and higher plants. Both were done with the cooperation of a number of collaborators [Jankowiak et al. 1989; Tang et al. 1990; Jankowiak et al. 2002; Jankowiak et al. 2003; Zazubovich et al. 2003]. One (MS) remembers numerous discussions of PS II over dinners at Aunt Maude's restaurant during visits to Ames in this period, many times including Therese Cotton, who passed away in 1998. Gerry was also very generous with his time, educating his biological collaborators on the power of hole-burning spectroscopy.

Gerry conducted a limitless pursuit of important applications for hole–burning spectroscopy in photosynthesis. The techniques and views that he pioneered and championed are now essential to anyone investigating primary photosynthetic processes. Gerry also has been one of the leading pioneers in developing the basic model of fluctuating two-level systems, which was crucial for the interpretation of high-resolution optical studies of chromophores in amorphous solids and glasses. These systems show interesting lineshapes with unusual universal scaling properties with temperature. The series of studies performed by his group in the '80s provided an in-depth analysis of dispersive kinetics, dephasing mechanisms, and relaxation processes and furthermore established their relationship to the density of states and distributions of other key parameters in a broad range of materials. Gerry developed microscopic models for electron-phonon coupling and vibronic interactions that allowed the simulation of hole burning, fluorescence and nonlinear four-wave mixing of complex chromophores and their coupling with various types of environments.

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NICOLA POHL RECEIVES NATIONAL SCIENCE FOUNDATION EARLY CAREER AWARD

Nicola Pohl

Assistant Professor

Faculty member Nicola Pohl in Iowa State University's College of Liberal Arts and Sciences has been recognized by the National Science Foundation (NSF) with a Faculty Early Career Award.

Pohl will use her $510,000 Career Award, "Meshing Synthesis and Biosynthesis in Research and Teaching," to pursue further understanding into carbohydrates. Pohl's research group will explore the potential of sugars for synthetic and therapeutic applications by looking at the differences in carbohydrate utilization among the three major life forms.

"We're starting to get a sense of how nature solves the problem of carbohydrate recognition and catalysis," Pohl said. "We have surprising results that will have consequences on how pharmaceuticals are designed and how these biocatalysts are used."

In the education component of the foundation's Career Award, Pohl will redesign the undergraduate organic laboratory curriculum for discovery-based learning and introduce state-of-the-art concepts and techniques into the classroom.

"I want to safely bring the use of sight and smell back into the organic chemistry laboratory to help student learning," explained Pohl, one of several faculty supported by Iowa State's Plant Sciences Institute.

Nicola Pohl, assistant professor, received her B.A. degree from Harvard College in 1991 and her Ph.D. in Chemistry from the University of Wisconsin-Madison in 1997. Following an NIH Postdoctoral Fellowship in the Department of Chemical Engineering at Stanford University, she joined the faculty at Iowa State University in the fall of 2000. She is a member of the Department of Chemistry and the Plant Sciences Institute and was named a Cottrell Scholar of Research Corporation in 2003.

"I want to safely bring the use of sight and smell back into the organic chemistry laboratory to help student learning"

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Tom Greenbowe

- James Huntington Ellis Award for Excellence in Undergraduate Teaching

Mei Hong

- Mary Lyon Alumnae Award from Mount Holyoke College

William Jenks

- Cottrell Scholar (Research Corp.)
- Promoted to Professor

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- University Professor
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- Appointed Assistant Director for Biorelated Initiatives, Ames Lab
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Richard Larock

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- Paul Rylander Award of the Organic Reactions Catalysis Society

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NEW POST

George Kraus
University Professor of Chemistry

Ames Laboratory Director Tom Barton announced the appointment of Dr. George Kraus as assistant director for bio-related initiatives at the U.S. Department of Energy's Ames Laboratory. Kraus becomes only the second person to hold the position of assistant director at the Laboratory. The first was Michael Crow, who currently is president of Arizona State University.

Kraus is a professor of chemistry at Iowa State University, director of Ames Laboratory's Biorenewable Resources Consortium (BRC) and ISU's Center for Catalysis. Kraus received his bachelor's degree in 1972 from the University of Rochester and his Ph.D. from Columbia University in 1976. He joined the faculty at ISU that same year. Kraus has been a fellow of the Alfred P. Sloan Foundation and a recipient of a DuPont Young Faculty Award in 1976, a 3M Young Faculty Award in 1981, and a Frasch Award in 1987. In 2002, he was appointed director of Ames Laboratory's BRC. The goal of the BRC is to develop agricultural alternatives to fossil resources and petrochemicals. Kraus is the author of 235 publications.

In making the announcement, Barton said, "George's appointment to this important post will greatly assist Ames Lab in adding biocomponents to most if not all of its existing and future programs." Kraus' appointment was effective September 1, 2004.

Ames Laboratory is operated for the U.S. Department of Energy by Iowa State University. The Lab conducts research into various areas of national concern, including energy resources, high-speed computer design, environmental cleanup and restoration, and the synthesis and study of new materials.

THANK YOU

3M Foundation, Abbott Laboratories Fund, Neal S. Adams, Roger J. Adams, Douglas G. Adolphson, Clyde E. Amtzen, Argonne National Laboratory, Ashland Inc. Foundation, AstraZeneca, Aventis, John M. Bablin, Joseph A. Beckman, John W. and Jill R. Benson, Michelle J. Bernaski, Lisa M. Berreau, Richard A. Biddle, Jorjan Borlin, David R. Boylan, BP Foundation, Horace D. Brown, John M. Brunscheon, Francis P. Burke, Caltech Industries, Cargill, Randal S, and Lori Cassling, Dwight C. Burnham, Christian F. Casper, James D. Carr, Chevron Phillips Chemical Co., Alan H. and Cynthia Childs, Betsy S. Clark, Andrew M. Clausen, Clorox Company Fund, ConocoPhillips Foundation, Dean M. and Christibel A. Coons, Neil D. Danielson, Lawrence F. Dahl, Daimler Chrysler Corp. Fund, Neil D. Danielson, Richard A. Day, Kenneth E. De Bruin, William E. and Pamela J. Delaney, Douglas L. and Gretchen C. Denton, Thomas C. DeVore, Dow Chemical Co., Dow Coring Corp., Joseph G. Duff, Thomas S. and Ann Elleman, Equistar Chemicals LP, Exxon Mobil Foundation, William D. Fellows, Velmer and Mary K. Fassel Trust, Bruce M. Foxman, Nelson D. Gardner, Richard G. Gingerich, C. Thomas Gnewuch, Jack P. Guillory, Clarence E. Habermann, Hach Scientific Foundation, Peter J. and Kathryn W. Harris, Robert Harris, David C. Henderson, James W. Hershberger, Susan A. Smith Hershberger, Alan L. Himstedt, Barry L. Hogan, David J. Hogan, Camden R. Hubbard, Jon W. Isenhart, Donald E. Johnson, Stephen G. Johnson, Joseph R. Kaczvinsky, Robert H. Karraker, Robert J. Kinney, James F. Koerner, Richard D. Kriens, Charles E. Lang, Jackie and Larry Larew, David F. and Nellie Lawson, Bruce E. and Sharon Leach, Thomas M. Lees, Jun Li, Eli Lilly Co., James T. Lloyd, Lockheed Martin Corp., Herbert L. Malkus, Martha H. Mackin, Dale W. Margerum, Kenneth and Susan Mattes, Celia M. McClinton, Thomas C. McGee, Stephan J. McLain, Clifton E. Meloan, Merck Co. Foundation, Jean A. Merrick-Mack, Fredrick A. Miller, Francis P. Modic, Gary A. Molander, Anthony J. Moye, Charles L. Myers, Robert L. and Annetta Myers, Jan F. Nakahara, Leo A. and Judy K. Ochrymowycz, Bernice E. Paige, Richard F. Palmer, Gerald J. and Sharon K. Payton, Yvonne I. Pettinga, Pfizer Foundation Matching Gifts Program, Richard J. Phillips. Joseph C. Picken, James A. Pierret, Fred and Wanda Plagens, Benjamin F. Plummer, Arthur W. and Ada R. Potratz, PPG Industries Foundation, Proctor & Gamble Co., Steven I. Richter, Sharon J. Robbins, Wayne J. Rohrbaugh, Richard C. Ross, Martha Russell, George J. Samuels, Gerald J. Scheppers, Joseph H. Schoeb, Patricia A. and Robert S. Schroeder, Ivan and Marian Schwabbauer Charitable Trust, W. Robert Schwandt, Bing-Zhi Shi, William S. Shore, Tiberiu M. Siclovan, Robert C. Smith, Granville L. Smyser, Nancy C. Spencer, David B. Springer, Steven M. Stensvad, Roger W. Strassburg, E. Thomas and Charlotte F. Strom, Arthur W. Struss, Osram Sylvania Inc., Charles and Joan Tanger, Joseph J. Thompson, Robert Q. and Lou Thompson, Robert W. and Sally A. Todd, Robert M. Valletta, Arthur C. Wahl, Dongmei Wang, Tso M. Wang, Thomas R. Webb, Raymond L. Welch, Mark T. Werth, Lawrence E. Welch, Phillip R. and Donna K. Whittle, Mary Ann Williams, Gary P. and Marlys Wulfsberg, Sachio and Irene Yamamoto, Siu-Yeung Yu, Susan K. Zawacky, Ernest A. Zuech.

www.foundation.iastate.edu

REMEMBERING GERALD SMALL

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Gerry has also introduced some remarkable new methods for chemical carcinogenesis and laser bioanalysis that are again based on the use of nonlinear optical processes to simplify complex spectra. In these examples the simplifications arise from line-narrowed fluorescence, which Gerry has used to detect tiny quantities of DNA-carcinogen adducts [Heisig et al. 1984]. He and his colleagues were the first to show that the radical cation metabolic pathway of polycyclic aromatic hydrocarbons leads to *in vivo* formation of DNA adducts [Rogan et al. 1990; Jankowiak et al. 2004]. His discovery of methods to distinguish between normal and cancerous cells using Stark effects in hole burning and his research on fluorescence line narrowing combined with capillary electrophoresis earned him a Research and Development 100 Award in 1998 [U.S. Patent, Serial No. 5,898,493; Jankowiak et al. 1996; Jankowiak et al. 2000]. In each of these areas he introduced new techniques and concepts to attack important questions.

Gerry's almost 40 years of truly outstanding research resulted in 287 publications. His research contributions were celebrated in a special issue of the *Journal of Physical Chemistry* (July 22, 2004) that was completely dedicated to him. More important to Gerry were the six M.S. and 31 Ph.D. students who received their degrees working under his direction and the 15 postdoctoral associates who also benefited tremendously from exposure to his infectious and unbounded enthusiasm for science.

Gerry Small had many interests outside the lab; he enjoyed road biking, pets, motorcycles, and good restaurants. He loved good literature, classical music and jazz. He used to go with his two sons (Eric and Adam) on ski trips nearly every winter to Colorado; he loved water skiing and camping/fishing at the Lake of the Woods in Ontario. But some of the best memories, as his sons told us, are from the time when the family drove up to Stony Lake in Minnesota to their cabin during the summers. Gerry was very frugal – Adam remembers – and used to buy old cars and old boats. "One time we were hauling a boat way too large for the car and the engine gave out. As a result we were stuck in some small town in Minnesota but not for too long because (Gerry) would always find a solution." Gerry also loved hockey and got one of his sons (Adam) into the sport and would travel with his team to many cities. Adam remembers: "I would often get embarrassed because he was one of the loudest parents during the games." Gerry's cousin and friend (Garry Lauk) told one of us (RJ) recently "Gerry was a unique human being but still very much typical of our generation; he knew from his mother as I did from mine that we could achieve whatever we decided to achieve as long as we put our mind and spirit into it." Then he added "Gerry's belief in science almost but never did eclipse his faith in a higher power and his love of family and community." But the greatest passion of Gerry was chemistry; he has had an exceptional impact in such diverse research areas as physical chemistry, medical diagnostics, biophysics, and analytical chemistry and education. Ames Laboratory Director and Gerry's friend, Tom Barton, stated recently, "Iowa State, Ames Lab and science were indeed fortunate to have had the services of this remarkable individual, who tackled everything in life with an intense and enviable passion." We will remember Gerry as an exemplary scientist, a fine colleague, and an excellent teacher. He is survived by his sons Eric, of Cincinnati, Ohio, and Adam, of Denver, Colorado, and his former wife, Sharon, of San Francisco, to whom we extend our deepest feelings of sorrow and sympathy.

A Farewell To:

Margaret Albert, B.S., 1947
James Bann, B.S., 1948
George Bollenback, Ph.D., 1949
Harvey Burkholder, Staff
Susan Louise Cafferty, Staff
Orville L. Chapman, Professor
Roy Craig, Ph.D., 1952
Clarence Engel, B.S.
Susan Helzer, M.S., 1968
John Kesling, B.S., 1971
William Manley, B.S., 1943
Robert Multhauf, B.S., 1941
Daniel Nagy, Ph.D., 1940
Winston Ogilvy, B.S., 1941
Helen Oldham, B.S., 1925
Arthur Tevebaugh, Ph.D., 1947
John Thirtle, Ph.D., 1943

MARK GORDON ELECTED INTO INTERNATIONAL ACADEMY OF QUANTUM MOLECULAR SCIENCE

Mark Gordon
Distinguished Professor
of Chemistry

Mark Gordon, director of Applied Mathematics and Computational Sciences and an Iowa State University distinguished professor of chemistry, was elected a member of the International Academy of Quantum Molecular Science at its 41st annual meeting, July 3-4, in Menton, France. The members are chosen among the scientists of all countries who have distinguished themselves by the value of their scientific work, their role of pioneer or leader of a school in the broad field of the application of quantum mechanics to the study of molecules and macromolecules. Gordon was nominated for membership in the International Academy of Quantum Molecular Science by Klaus Ruedenberg, an Ames Lab associate and an ISU distinguished professor of chemistry, who is also an Academy member.

The American Chemical Society has also honored Gordon with its Midwest Regional Award for his many contributions to the advancement of chemistry during the course of his career. The St. Louis Section of the ACS established the Midwest Award in 1944 to encourage public recognition of outstanding achievement in chemistry in the Midwest Area. The award is conferred annually on a scientist who, while a resident of the Midwest, has made a meritorious contribution to the advancement of pure or applied chemistry or chemical education. Gordon received the award at the Midwest Regional Meeting, Oct. 20-22, in Manhattan, Kansas.

Gordon's research interests include the development and application of new methods in scalable electronic structure theory, especially for correlated and multi-determinant wavefunctions, and methods for studying environmental effects on reaction mechanisms, all in the electronic structure code GAMESS - General Atomic and Molecular Electronic Structure System. The common motivation throughout all of Gordon's research is to develop an understanding of the mechanisms of chemical reactions in ground and excited electronic states

2004 ZAFFARANO PRIZE WINNER

Pramit Chowdhury, chemistry, was named the winner of the 2004 Zaffarano Prize for Graduate Student Research. He received a plaque and cash award of $1,500. John Orrock, ecology and evolutionary biology, and John Hitchcock, computer science, were also honored with each receiving an honorable mention certificate and a cash award of $500. All three were recognized at the annual Sigma Xi Research Society Initiation Banquet on April 22. Daniel Zaffarano, former Vice President for Research and dean of the Graduate College, established the award in 1988 to recognize superior performance in producing publishable research by a graduate student. Pramit Chowdhury currently has 16 publications in peer-reviewed journals, of which 13 are in print. He is first author on seven papers. His work has been published in prestigious chemistry journals like the *Journal of Physical Chemistry* and *Photochemistry and Photobiology*. He would have more publications but he is also active in much of the food-safety research that has publication restraints owing to patent concerns and the requirements of industrial partners.

Pramit Chowdhury and
Daniel Zaffarano

His research accomplishments include understanding the photophysics of hypericin, protein dynamics and motion in solution, and heme-protein activity.

In addition, Mr. Chowdhury has been recognized as an outstanding teacher in his department. He also received the Henry Gilman Prize, the highest honor the Department of Chemistry can bestow to a graduate student.

Chowdhury received his Ph.D. this May, with Jacob Petrich as his major professor.

He accepted a postdoctoral research position under Prof. Feng Gai (a former winner of the Zaffarano Prize) at the University of Pennsylvania where he will be working on protein

PROPONENT OF CLEAN BURGERS

His pedigree is impeccable – Yale undergrad, a chemistry Ph.D. from the University of Chicago, a four-year postdoc in France. His work is nationally acclaimed; he was a full professor by age 40.

So one doesn't expect this renowned scientist to summarize his research in quite these terms:

"Nobody wants doo-doo on their burgers." Right.

Thanks to Jacob Petrich and collaborators Thomas Casey and Mark Rasmussen, such food contamination may in time be eradicated. The men have created the technology for VerifEye, a handheld device that detects the presence of feces on beef carcasses. Used in three U.S. packing plants so far, the device helps identify meat that contains harmful bacteria not seen by the human eye.

Casey and Rasmussen, both scientists with the National Animal Disease Center in Ames, contacted Petrich in the late 1990s after hearing of *E. Coli* outbreaks at fast food restaurants in the Pacific Northwest. Knowing of Petrich's work in photochemistry (studying how light interacts with matter), the microbiologists wanted to pursue whether light-based technology could hone in on bacteria.

"We basically put cow doo-doo in my machines, and found out that it glowed," Petrich said. "Actually, it fluoresced, which was pretty cool, because we never thought it would do that."

The scientists then had to determine why the feces glowed.

"We knew that cows eat grass, so we had to determine what's in grass to cause this," Petrich continued. "We realized it was the chlorophyll, which is really what we're detecting with the device."

- **The technology spots chlorophyll**

The scientists devised a prototype detector that involved a thin fiber optic cable equipped with a laser and attached to a small handheld box. The prototype used specific wavelengths or colors of light to illuminate the carcass. The collected light returned from the carcass was electronically analyzed for the presence of fecal matter.

Today, the prototype has evolved into a seven-foot scanner and a smaller, handheld version, both of which are used in meat-packing plants in the United States. The technology is licensed by eMerge Interactive Inc., a small company based in Florida.

Though the devices detect chlorophyll, not salmonella or *E. coli* bacteria specifically, "even if there is no bacteria present in the feces, you don't want to eat feces," Petrich said.

Currently, he is pursuing the creation of a similar technology to study the factors contributing to bovine spongiform encephalopathy, more commonly known as Mad Cow Disease. With the aid of a $545,000 U.S. Department of Defense grant, Petrich stresses that his research is "very experimental" at this stage, but he's excited to pursue this line of study.

"Light is a great way to look at all this," he explained. "You don't have to touch anything, there's no additional contamination from poking around the subject, and light-based measurements are fast because you don't need to take samples for further investigation."

This technology has landed its inventors numerous prestigious citations, including an R&D 100 Award, the Agricultural Research Services Technology Transfer Award and the USDA's Secretary's Honor Award for Enhancing Protection and Safety of the Nation's Agriculture and Food Supply.

The awards were made somewhat sweeter by the fact that the scientific community initially scoffed at Petrich's idea for the detection system.

"People didn't think it would work," he explained with a slight smile. "It was considered just too simple."

The Chicago native also hopes to adapt the technology for organizations in which hand washing is crucial to preventing bacteria and virus dissemination. These hand-held bacteria detectors could be used in hospitals, fast-food restaurants and daycare centers, for example.

- **Other options for light research**

Petrich's light-based research may have other health-related implications. For several years, Petrich has conducted studies on hypericin, a molecule found in the herb St. John's Wort.

This herb often is used to treat mild depression.

In the early 1990s, ISU scientists Susan Carpenter, professor of veterinary microbiology and preventative medicine, and George Kraus, University professor of chemistry, discovered that shining light on a mixture of hypericin and some viruses killed the viruses. Carpenter and Kraus turned to Petrich to find out why. Since then, he has been researching hypericin and light interactions, and studying how hypericin interacts with other molecules in the body to modify their behavior.

Jacob Petrich

Professor of Chemistry

> "Nobody wants doo-doo on their burgers"

While this research ultimately could have implications for the treatments of the HIV virus and some cancers, Petrich is quick to rule out an impending announcement.

"We are certainly making progress, but we are nowhere near a cure or a drug," he said. This work has received funding from the National Institutes of Health, and Petrich also collaborates on it with other scientists at ISU's Center for Research on Botanical Dietary Supplements.

When he's not in the lab, Petrich teaches physical chemistry courses, coaches his young children's soccer teams and reads. And he continues the never-ending pursuit for research funding, a process he finds "a very competitive business."

Continued on page 13

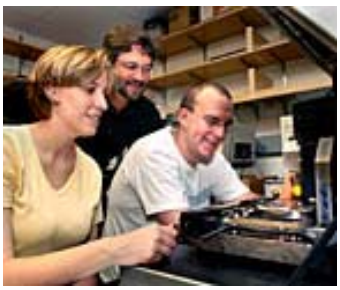
FAST TRACK TO MATERIALS DISCOVERIES

Consider it the Martha Stewart method of conducting scientific experiments – an exceedingly efficient system of analyzing materials that reaps tens, if not hundreds, more results than a typical test, and in a fraction of the time.

Researchers prefer to call it combinatorial science, a university initiative that has distinguished itself among the top priorities at Iowa State and has spawned the Institute for Combinatorial Discovery (ICD). Under the direction of Marc Porter, chemistry professor, the institute encompasses 34 faculty members across campus, representing 12 departments, five colleges and several centers.

Their disparate specialties notwithstanding, the scientists all share the same long-range vision: to elevate the combinatorial science program at Iowa State to eminent international stature.

All are involved in a science methodology that, at its simplest, accelerates discoveries. Experiments to test and screen thousands of materials are run in a parallel fashion, rather than the more traditional "one at a time" approach.



Professor Marc Porter (center) checks out the work of graduate students Amy Sywassink and Grant Edwards

"We want insights into how materials work," Porter explained, "how to design these materials and make them run better. Blending two different metals may not result in anything, but if you mix them in different proportions, maybe they will. So you have these areas of vast search space, and you mix A and B in infinite proportions, and then take a look at the combinations that are the hottest."

The pharmaceutical industry has utilized this protocol for several years in developing new drugs, creating countless chemical combinations at one time to determine successful molecular arrangements.

"The pharmaceutical industry already is spending billions for this type of research," Porter explained, "so for us, that train has left the station. We kept asking what it is that Iowa State can do for industry in combinatorial science research that isn't already being done."

Eventually, the areas of specialization were narrowed to:

Catalytic materials, or the search for new catalysts, like fuel cells. "Catalysts make reactions go faster and more selectively," Porter explained, "accomplishing more with less energy and at a lower cost." To get energy, he continued, "fuel cells have to run at high temperatures and pressures, using platinum as an electrode. This is very expensive."

ISU scientists are combining liquids and solids, for instance, to determine which blends might work better as more affordable fuel cells.

Biomaterials, or biocompatibility. Combinatorial science is applied to both biomaterial-biomolecule interactions and biomaterial-cell interactions. Applications might include the use of polymers for drug delivery (like insulin or chemotherapy), protein functions and enzyme activities, gene therapy, neuronal interactions, disease detection and the growth and differentiation of stem cells. This would include tissue integration, or how the fibers in the body will bind to and incorporate a material like an implant (such as in hip replacement) before infection or rejection sets in.

Nanomaterials. To save time and money in creating new high-performance materials, it makes sense to pursue combinations of materials with known properties. Combinatorial science helps researchers determine where, along the molecules' length scales, the "hot spots" for a merger are located. Research in this area involves implications for adhesives, microelectronic devices, fuel cell design and lubricant design.

Library design. As compounds are tested and analyzed, they are stored in flasks in lockers, organized by compatibilities. Scientists can continue to refer to these collections of possibilities, or compound "libraries," as they pursue new combinatorial tests. Likewise, by pursuing thousands of combinations via parallel testing, a problem also can be more quickly identified.

Scientists will depend heavily on many research tools to accomplish these projects, including informatics, robotics and high throughput instrumentation. They also rely on access to such cutting-edge campus facilities as the Roy J. Carver Laboratory for Ultrahigh Resolution Biological Microscopy and the W.M. Keck Laboratory for the Fabrication of Microminiaturized Analytical Instrumentation.

Funding for the initiative has come from the university (for four full-time faculty positions), and from such organizations as the National Institutes of Standards and Technology. However, it is the hope of Porter and his colleagues that the institute be awarded the prestigious National Science Foundation Science and Technology Centers grant, which would provide $20 million over five years beginning next year.

For the first time, ISU has been invited to submit a full proposal for this award, becoming one of 38 institutions chosen from more than 160 applicants.

Until then, Porter and his colleagues continue to pursue partnerships with industries hungry for the university's combinatorial research results. And the Iowa State scientists take seriously their role in including students in their research efforts to better prepare them for industrial careers. To further this mission, the institute is working closely with U.S. historically black colleges and universities in diversity, recruitment and knowledge transfer efforts.

"What we're doing here has implications for many," Porter said. "Our research is important to industry, but companies can't afford to invest in doing the research themselves. We can tackle the work with our graduate students, giving them growth experiences and advancing science, all at the same time."

HIGH TEMPERATURES

When most organic compounds are heated to temperatures of greater than 300 degrees Celsius they undergo significant decomposition and give rise to very low yields of useful compounds.

But Walter Trahanovsky, professor of chemistry, and his research group typically work with simple organic compounds at temperatures several hundreds of degrees higher and obtain significant yields of useful products.

"The reason we can get away with this is short contact times," he said. "The molecules are heated only a fraction of a second and in a vacuum."

The result is that unique chemical reactions occur under these conditions. Some of the products of these reactions are very reactive and can be studied only at low temperatures, but some of the products are quite stable at room temperature.

And the result has been numerous publications over the years by Trahanovsky and his research group.

All of which has led to Trahanovsky recently being awarded fellowship status by the American Association for the Advancement of Science (AAAS). He will be officially recognized during the Fellows Forum Saturday, Feb. 14 in Seattle, as part of the 2004 AAAS annual meeting. He was one of 348 scientists and engineers so honored, including two other Iowa State faculty members -— Harley Moon, professor emeritus of veterinary pathology, and Colin Scanes, professor of animal science.

Their selection was based upon their efforts to advance science or applications that are deemed scientifically or socially distinguished. The AAAS is the world's largest federation of scientists.

Trahanovsky feels his selection was due primarily to his work with pyrolysis, or thermal reactions, of organic compounds.

"I'm sure that the award is based on my publication record and contributions in this area," he said. "I was surprised, but honored with my selection."

His first publication in this area came in 1967, shortly after he arrived at Iowa State.

In addition to research on thermal reactions of organic compounds, Trahanovsky also studies how these reactions can be used in the synthesis of complex organic materials. Part of that work involves understanding fundamental thermal reactions of coal, coal-derived liquids, and biomass, and how those findings can be adapted to create more affordable fuels and chemicals.

And while pyrolysis of organic compounds was the main area of his research efforts, it is not his only focus in the laboratory. Specifically he is looking at how to convert cellulose and other components of plant biomass to useful small molecules. "Cellulose is a cheap material," he says. "The idea is that the production of high-value compounds from renewable resources is more likely to be economically feasible than the production of fuels."

But pyrolysis of organic compounds is still his first love in the laboratory.

"Working with organic compounds at high temperatures still holds a lot of surprises and it's still not fully explored," he said. "While we will continue to push biomass in our research efforts in the near future, I would like to get back to the high temperature chemical reactions.

"We are moving into directions that could see some potential use in the synthesis of complex organic compounds."

Walt Trahanovsky
Professor of Chemistry

THIEL HONORED FOR PROGRAM SERVICE

Pat Thiel was honored on June 28th by colleagues, family and friends for her contributions to Ames Laboratory as program director for Materials Chemistry. At her reception, Ames Lab Director Tom Barton thanked her for 16 years as program director, priding himself on being the one who hired her for the job in 1988. Barton presented Pat a plaque from her friends in Materials Chemistry. Pat said, "I've really had fun working with all of you. Luckily, I'm not retiring so I still will." Pat's replacement is Surya Mallapragada, who assumed the program director duties July 1.

ACS AWARD FOR CREATIVE INVENTION

Few scientists are responsible for creating a single product that brings their employers more than $7.5 billion in annual sales. But **Bruce D. Roth**, 48, can make that claim as the synthetic chemist and sole inventor behind the compound [R-(R*,R*)]-2-(4-fluorophenyl)-b,d-dihydroxy-5-(1-methylethyl-3-phenyl-4-[(phenylamino)carbonyl]-$_1$H-pyrrole-1-heptanoic acid.

In short, atorvastatin–the lactone form, also known as the cholesterol-lowering drug Lipitor–has become the world's fastest growing and top-selling pharmaceutical since its launch in 1997. Roth, now vice president for chemistry at Pfizer Global Research & Development, synthesized the drug in 1985 while a senior scientist at Warner-Lambert, which was acquired by Pfizer in 2001.

"Roth's invention of atorvastatin is an important medical advance because it improves the treatment of high blood cholesterol levels and will soon be used by tens of millions of people," a colleague says. "If studies turn out as expected, millions of years will be added to the total life expectancy of people in Western societies in which cholesterol is a major problem."

Roth led a research group that was investigating several parallel approaches to lipid regulation. Among these was the pursuit of an effective inhibitor of 3-hydroxy-3-methylglutaryl coenzyme A reductase (HMG CoA), a crucial enzyme in the cholesterol biosynthetic pathway. Roth conceived of a pharmacophore model and began working on atorvastatin.

Although he first synthesized a series of compounds, Roth recognized that only one stereoisomer was active and focused on making it. The resultant compound, its lactone form, and salts were extremely potent and preferentially inhibited HMG CoA reductase in the liver where one-third of the body's cholesterol is made.

Unlike all previously successful HMG CoA reductase inhibitors, which are chiral by virtue of being produced by microorganisms, atorvastatin is not a natural product. Instead, points outs Nobel Laureate Michael S. Brown, professor at the University of Texas Southwestern Medical Center, "it is a pure invention of Bruce Roth and a tribute to his skill as a synthetic chemist."

The initial "elegant chemistry" of Roth's synthetic route has been modified to afford commercially viable production, another colleague adds. And, when tested in humans, Lipitor produced the most profound cholesterol lowering yet observed, along with a beneficial safety profile. Following its commercial launch, Lipitor quickly became the most widely prescribed cholesterol-lowering drug.

Roth has also been recognized by the New York Intellectual Property Law Association when he won its inventor of the year award in 1999. He started his career as a research chemist at Warner-Lambert in 1982 and then received a series of promotions to his current position. Roth also serves as an adjunct associate professor in the department of medicinal chemistry at the University of Michigan, Ann Arbor.

Roth received a B.S. in chemistry from St. Joseph's College in Philadelphia. He then moved to Iowa State University and completed a Ph.D. in organic chemistry, followed by a postdoctoral fellowship at the University of Rochester.

The award address will be presented before the Division of Medicinal Chemistry.

TOP ALUMNI:
LAS RECOGNIZES ALUMNI FOR OUTSTANDING ACHIEVEMENTS

Stephanie A. Burns
PhD 1982,
Organic Chemistry
Midland, Michigan

Burns is president and CEO of Dow Corning Corporation. She joined Dow Corning in 1983 as a researcher, working on water-based and high-temperature elastomers. In subsequent years she has held several positions with Dow Corning including product development, marketing, and business management. For three years she served as director of women's health issues and was a member of the company's bankruptcy management team when it filed for reorganization in 1995.

Her first assignment outside the U.S. began in 1997 in Brussels, Belgium, as science and technology director for Europe. Two years later she became business director for life sciences and electronics, and in December 2000 she was named executive vice president and elected to Dow Corning's board of directors.

The Citation of Merit Honors LAS distinguished alumni who have demonstrated outstanding achievement and received national or international recognition.

ACS PIMENTAL AWARD

Congratulations to James N. Spencer, the 2005 recipient of the George C. Pimental Award in Chemical Education, sponsored by The Dow Chemical Company.

The award recognizes outstanding contributions to chemical education.

The award consists of $5,000 and a certificate. Travel expenses to the meeting at which the award will be presented will be reimbursed.

In 2001, The Dow Chemical Company continued the sponsorship of this award upon the merger with Union Carbide Corporation (1978-2000). The award was established as the ACS Award in Chemical Education in 1950 by Scientific Apparatus Makers Association and financed by its Laboratory Apparatus and Optical Sections through 1976. The ACS Board of Directors voted that the Society sponsor the award for presentation in 1977 and 2002.

GOLDWATER SCHOLARSHIP AWARD

Mrs. Peggy Goldwater Clay, Chair of the Board of Trustees of the Barry M. Goldwater Scholarship and Excellence in Education Foundation, announced that the Trustees awarded 310 scholarships for the 2004-2005 academic year to undergraduate sophomores and juniors from the United States.

Congratulations to Tessa Calhoun who is ISU's only recipient this year.

The one and two year scholarships will cover the cost of tuition, fees, books and room and board up to a maximum of $7,500 per year.

The Scholarship Program honoring Senator Barry M. Goldwater was designed to foster and encourage outstanding students to pursue careers in the fields of mathematics, the natural sciences, and engineering. The Goldwater Scholarship is the premier undergraduate award of its type in these fields.

INVENTOR OF THE YEAR *Continued from cover...*

He has received numerous awards for outstanding achievements in analytical chemistry, including the American Chemical Society's Awards in Analytical Chemistry (1994) and Chromatography (2002). In 2002, he received the International Prize of the Belgian Society of Pharmaceutical Sciences. Most recently, the Pittsburgh Conference named Yeung the first recipient of the Ralph N. Adams Award in Bioanalytical Chemistry. Yeung is a fellow of the American Association for the Advancement of Science.

Yeung has received four R&D 100 Awards for his inventions. The awards have been called the "Oscars of applied science" by the *Chicago Tribune*. They are presented by R&D Magazine to the year's top 100 products of technological significance. Yeung won R&D Awards in 1989, 1991, 1997 and 2001.

In 2002, ISU animal scientist Max Rothschild was named Iowa Inventor of the Year. Horticulture professor Nick Christians received the honor in 1998.

THE R&D AWARDS HAVE BEEN CALLED "THE OSCARS OF APPLIED SCIENCES"

CLEAN BURGERS *Continued from page 9*

"You have to be very aggressive these days to get money for your projects, and sometimes you really have to fight for your ideas," he said. "People have certainly thought we were off-base with our proposals, but I think we're doing a pretty good job of proving people wrong so far."

Faculty member Jacob Petrich was formerly recognized at the LAS Faculty/Staff Convocation . He was among the 14 faculty members who The College of Liberal Arts and Sciences honored with awards for their accomplishments.

The LAS Mid-Career Award for Excellence in Research/ Artistic Creativity recognizes faculty members who have a national or international reputation for contributions in research and/or artistic creativity, and who have influenced the research activities of students.

Dr. Petrich received his B.S. in Chemistry, *cum laude*, from Yale University in 1980 and his Ph.D. in Physical Chemistry from The University of Chicago in 1985. Dr. Petrich joined the Iowa State University faculty as an assistant professor in 1989. Other recognitions in the past few years include: Award Honoring Iowa State University Inventors, 2002; Federal Laboratory Consortium Award for Excellence in Technology Transfer for work in Laser Detection in Food Safety, 2002; Recognition of Food Safety Technology by the Iowa Department of Economic Development, 2002; Iowa da Vinci Celebration and Conference, 2001; R&D 100 Award, "Method and System for Detecting Fecal and Ingesta Contamination on the Carcasses of Meat Animals", 2000; Finsen Award Lectureship (Presented by the Association Internationale de Photobiologie and the American Society for Photobiology to an Outstanding Photobiology Researcher), 2000.

DISTINGUISHED SERVICE

AMERICAN CHEMICAL SOCIETY RECOGNIZES JAMES ESPENSON FOR HIS WORK IN INORGANIC CHEMISTRY

Each year, the American Chemical Society (ACS) hands out two awards to inorganic chemists.

James Espenson, distinguished professor of liberal arts and sciences and professor of chemistry, received the ACS Award for Distinguished Service in the Advancement of Inorganic Chemistry in March at the organization's national meeting.

It's an award he refers to as "the old man's award." It recognizes individuals who advance inorganic chemistry by significant service in addition to performance of outstanding research.

"This is a career award that is a vote of confidence in me and my contributions to the community of inorganic chemists," he said. "The award is 40 years old and when I look over the names of the previous winners, it's a mighty distinguished group to be included in."

Ironically Espenson started at Iowa State almost at the same time that ACS created the award. For the past 40 years, he has been a member of the Department of Chemistry faculty and a chemist in the U.S. Department of Energy (DOE) Ames Laboratory.

His research looks at transition metal catalysts and mechanisms and applications.

"We conduct studies of how inorganic compounds come together and undergo chemical reactions to make new products," Espenson said. "Transition metal complexes afford endless excitement and novelty."

In Espenson's research, transition metal complexes serve as catalysts for chemical reactions, as participants in atom-transfer mechanisms, as reagents in new reactions, and as templates for coordination phenomena offering new structural and electronic insights.

"We've worked on many different aspects of this subject but transition metal complexes is the underlying theme of our research," he said. "There's always something fresh. The subject never goes stale.

"On occasion we stumble onto something new, but generally we plan our work in advance and through our studies move it towards completion."

For the past dozen years, Espenson has turned his research group's efforts to compounds of the element Rhenium (Re). This element in high oxidation state compounds is best for the purposes he requires.

"A tiny bit of this compound will make a reaction take place," he said. "But if you leave out Rhenium, there is no reaction at all."

Espenson's research has led to the publication of 375 refereed journal articles and a book, *Chemical Kinetics and Reaction Mechanisms*, published by McGraw-Hill. The book is now in its second edition and has been translated into both Japanese and Korean.

He is also the founding chair of a new professional conference in his research specialty.

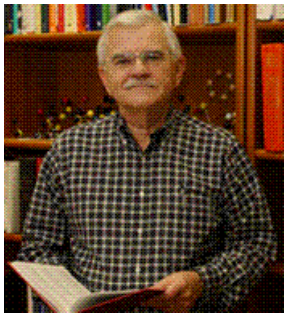
"There was a major gap about ten years ago in inorganic reaction mechanisms," Espenson said. "Now there is a week-long conference in this area held every two years."

The book, journal articles, conference and research all have led to his receiving the ACS award. They were also instrumental in his selection previously as a fellow of the American Association for the Advancement of Science.

Espenson credits his success to the joint appointment he holds with Iowa State and the Ames Laboratory.

"This is a marvelous opportunity for a scientist," he said. "The arrangement between the Ames Lab and Iowa State should be the envy of most universities and national labs. "

> "The DOE has taken a very enlightened attitude to scientists like myself who follow their noses to where the hot research leads them."



James Espenson

Distinguished Professor

2004 PAUL N. RYLANDER AWARD

The Organic Reaction Catalysis Society presented the 2004 Paul N. Rylander Award to Professor Richard C. Larock at their 20th conference, March 21-25, 2004 in Hilton Head, South Carolina. Prof. Larock was recognized for his outstanding contributions to the development of catalytic reactions in organic synthesis especially with respect to his pioneering studies of palladium-catalyzed reactions which are of great fundamental and practical interest. Several Larock methodologies are currently utilized in large-scale pharmaceutical manufacturing processes including his variation of the Heck reaction in Merck's synthesis of Singulair and Larock's annulation chemistry for the synthesis of indole based migraine drugs produced by Merck and Bristol-Myers-Squibb. Prof. Larock's award address entitled "Palladium-Catalyzed Annulation and Migration Reactions" will appear in the forthcoming conference proceedings published by Marcel Dekker.

Iowa State was well represented at the ORCS conference as shown in the photograph to the right.

Reading counterclockwise from upper right:
Prof. Larock and the following ISU graduates: Steve Schmidt (Chair ORCS 2006, from W. R. Grace, Davison Catalysts, Ph.D., Chemistry, Franzen), Tom Moser (from Umicore, Ph.D., Chemical Engineering, Schrader), John Sowa (from Seton Hall University, Chair ORCS 2004, Ph.D., Chemistry, Angelici), Sonia Hartunian-Sowa (consultant, B.S., M.S., Food Science, White), Steve Jacobson (from DuPont, ORCS Director, B.S., Chemistry, Angelici).

NEW FACE IN CHEMISTRY

There is a new face in the Chemistry Graduate Office and her name is Lynette Edsall. She is the new Graduate Admissions Specialist. Lynette replaces Pat Dobelis who moved on to the Agricultural Experiment Station last December.

Lynette Joined the Chemistry Department in May of 2004 but has been around Iowa State since 1995. She completed her Master's degree in August and is looking forward to a great year.

She enjoys working with students because they have such great energy. "Iowa State is a great school. I received a great education here and I am looking forward to telling prospective students that this is a great place to be!"

Lynette believes that recruiting can be especially challenging work because there is so much competition for the best students. Her goals for the year include going back to the basics and getting everyone involved in the process. Faculty members will be giving seminars at schools around the area, she will be attending Graduate School Fairs and American Chemical Society meetings, and the department will work harder to get the word out that Chemistry at ISU is world class!

Lynette Edsall

Student Services Specialist
Graduate Recruiting

CSI, AMES

Interest in forensic science has spread from television sets across the country to Iowa State University.

A new academic program in forensic science has been developed under the leadership of faculty and staff members in three academic departments in the College of Liberal Arts and Sciences.

"The program is different than any other that we know of in the United States, in the sense that it seeks to prepare students to contribute to forensic science primarily by doing research," said Patricia Thiel, distinguished professor in liberal arts and sciences and professor of chemistry. "Other programs all seek to train people to work in crime labs. Our goal is much different and has been greeted warmly by the forensic science community."

Thiel coordinates the program along with Lynn Clark, professor of ecology, development and organismal biology, and Linda Wild, program coordinator in genetics, development and cell biology.

The program, which was approved by the Graduate College and the Faculty Senate last fall, offers students a graduate certificate. Thiel describes the graduate certificate as sort of a "graduate minor."

The program requires students to take three graduate-level forensic science-related courses outside of their major area of study. There are also other requirements that are designed to bring students into close contact with the forensic science community.

"The program is highly interdisciplinary in a number of respects," Thiel says, "including the coursework required, the faculty who participated in formulating the program, and the students it is drawing."

Disciplines represented in courses offered for the graduate certificate range from anthropology to computer engineering, from veterinary pathology to statistics, and from chemistry to sociology, to name just a few.

In its first semester, about a half dozen students have already signed up for the forensic science graduate certificate. Thiel says she is averaging at least one inquiry per week from someone who wants to enroll in the program.

"We think this program will be a great tool for recruiting excellent graduate students to Iowa State," she said. "For the students, it is important to go from being casual curiosity seekers, to deciding if forensic science is an area they want to incorporate somehow into their careers."

But it is the seminar course, which participants in the graduate certificate program must take on two separate occasions, that is drawing the most attention.

This spring more than 60 students are enrolled in the two-credit course, of whom two-thirds are undergraduates. The undergraduate enrollment is limited to juniors and seniors who have a declared major in one of the physical, biological,

mathematical, or social sciences, or in an engineering discipline.

The course meets every Wednesday at noon and is highlighted by guest presentations. Thiel says that one group of speakers consists of Iowa State faculty such as Wayne Rowley, professor of entomology, who discussed establishing the time of death by using insects found on corpses, and Doug Jacobson, associate professor of electrical and computer engineering, who described aspects of cyberforensics, such as recovering electronic data that might be evidence of criminal activities.

Another speaker was Gary Wells, distinguished professor of liberal arts and sciences and professor of psychology, and a world-famous expert on eyewitness identification. Wells' talk provided a strong illustration of how basic research can impact the interpretation of forensic evidence and, in turn, how this can impact the criminal justice system.

Presentations by outside experts have also been a staple of the seminar. An Iowa prosecuting attorney and a district court judge gave their views of the use of forensic science in the courtroom, while the head of the Iowa Criminalistics Laboratory talked on "scientific sleuthing." An FBI examiner and the Story County Sheriff will also address the class before the end of the semester.

"The off-campus people bring in real world expertise," Thiel said. "For instance, Sandy Stoltenow (supervisor of the Controlled Substance Identification Section in the Iowa Criminalistics Laboratory) talked about how a state crime lab is organized, what types of work it does, and what types of new developments she and her colleagues would like to see. This is a perspective that no one on campus could have provided."

Thiel also had praise for her faculty colleagues. "The faculty have shown the students how research contributes to forensic science," she said. "We want the students to understand that research is necessary in this field, so that they can seize opportunities to fill this need during their careers, if they wish."

To emphasize that point, students must write a four-to-ten page research proposal for the seminar course.

Not only is the class full, but also every class period a number of people drop in to hear that week's discussion.

"It's clear that students are really intrigued by this area," Thiel said.

The TV show "CSI" and related programs have clearly been major influences on students. Thiel estimates that nearly half of prospective Department of Chemistry undergraduate students, and a significant number of graduate students as well, are saying they want to explore being a forensic chemist.

She suspects that the numbers are similar in related academic areas.

"Television has played a large part in the interest," she said. "But I suspect that homeland security is also a factor.

"I know there are students who are curious about forensic science, and hopefully this program will satisfy some of their interest," Thiel continued.

CONTRIBUTIONS

Are you contributing gifts annually in support of a program or project in the Department of Chemistry? Do you want to make a gift that will make a significant difference in the future of the department? If so, you may want to make plans through your estate for the future of the department.

The most common method of planning for future support is through one's estate and is a provision in your will for the Iowa state University Foundation. Through such a provision, you may designate how you eventually want the bequest used in the Department of Chemistry.

These bequests may be for a percentage of an estate, specific assets, a dollar amount, or the residue in your estate. A bequest to the ISU Foundation is completely deductible as an unlimited federal estate tax charitable deduction is allowed for such gifts. You should check your state laws as to tax applicability regarding charitable bequests.

Once the will provision is in place please notify the ISU Foundation. This allows the ISU Foundation and the department to use the information to recognize your thoughtfulness and generosity and to make long-range plans.

You or your attorney may want to contact us for suggested language that may be helpful in preparing your will provision that will benefit the Department of Chemistry. Call or write to: Alsatia Mellecker, Senior Director of Development in the College of Liberal Arts and Sciences, at 1-866-419-6768 or amelleck@iastate.edu.

Alsatia Mellecker

Senior Director of Development

A NOTE FROM THE CHAIR

Gordon J. Miller

Dear Friends,

Best wishes to you and your family for a happy, healthy and prosperous 2005! I hope you take a few minutes to reacquaint yourself with our department through some of the articles in this newsletter. We continue to make strides in our research and instructional activities. During the past year we hosted the 18th Biennial Conference on Chemical Education, thanks to the efforts of Tom Greenbowe, Keith Woo, Kathy Trahanovsky and Joe Burnett; Ed Yeung received "Inventor of the Year" for his research in single molecule detection, and Deb Zorn attended the Lindau Meeting of Nobel Laureates for students, sponsored by the Department of Energy.

The department family did face some sad times in 2004, with the passing of three friends and former colleagues: Harvey Burkholder, Sue Cafferty and Prof. Gerry Small. All three will be missed, but their positive impacts to our department live on.

In 2005, we will be working on a feasibility study for undertaking a new Chemistry Building project – such a building would be located next to Gilman Hall. We are also purchasing new 600 and 700 MHz NMR spectrometers, thanks to a successful grant to the National Science Foundation by Mei Hong and Amy Andreotti. Also, we hope to add to our faculty ranks in the coming year.

In summary, the Department remains energetic and active. If you have an opportunity to visit Ames, please drop by our Department – I look forward to meeting you and showing you our activities first-hand.

Best wishes… Gord J Miller

IOWA STATE UNIVERSITY

Chemistry Department
1605 Gilman Hall
Ames, IA 50011-3111

GILMAN HALL