

Chemistry Alumni News



Oregon State University Department of Chemistry www.chem.orst.edu Volume 21 - Fall 2001



Professors Joseph Nibler and Tom Plant assist graduate student Stephanie Mélin in a nonlinear laser experiment for an interdisciplinary course offered by the Chemistry, Electrical and Computer Engineering, and Physics departments. The graduate course “Nonlinear Optical Interactions in Materials” was given for the first time last Winter Term. New experiments for the class that use optics, lasers, and electronics are being developed under a \$50,000 Intel Faculty Award to Nibler, Plant, and Physics Professor William Hetherington.

Nibler Named Intel Faculty Fellow for 2001

Develops New Advanced Laser/Optical Laboratory Experiments

In May 2001 Intel named Professor **Joseph Nibler** an Intel Faculty Fellow for 2001. Nibler, along with his OSU collaborators, Professors Thomas Plant of the Department of Electrical and Computer Engineering and William Hetherington of the Department of Physics, is one of 20 top research faculty in Oregon universities to be so honored. The award provides \$50,000 in support of a new project to develop advanced laser/optical laboratory experiments for instructional use and to enhance instructional facilities in the department. This interdisciplinary project was one of 7 selected from 30 competitive proposals submitted to Intel. The 2001 Intel Fellows Program Awards provided \$290,000 to improve engineering and science education in Oregon. This is one of the ways Intel invests in new ideas for Oregon’s future.

With the funds, Nibler and his colleagues will develop new laser-based experiments that will give advanced laboratory training to upper-division students and to graduate students in engineering and science. The project involves a collaboration with one of the world’s experts on diode lasers, optical fibers, and optical parametric oscillators and their applications, Professor Brian Orr of MacQuarie University in Sydney, Australia. Dr. Orr spent two weeks at OSU on this project during the summer and gave two public lectures at OSU on “Recent

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Applications of Lasers and Optics.” The impetus for this project came in part from the success of a new interdisciplinary course that Nibler, Plant, and Hetherington team-taught in winter, 2001. Nibler designed the course **Nonlinear Optical Interactions with Matter** to provide students with a deeper theoretical and practical understanding of the nonlinear interaction of intense laser light with materials. He indicates that such light-matter coupling has important applications in science and in industry. Examples include applications in opto-electronics and communications, deep UV photolithography, engraving/trimming applications, chemical analysis/spectroscopy, and biological imaging. There is clearly a demand for such high-level instruction: 19 senior/graduate-level students from ECE, Chemistry and Physics took the pilot course last winter.

Some hands-on experience was included during two laboratory sessions involving the characterization of nonlinear optical materials and the generation of new wavelengths by doubling and stimulated Raman methods. The course also provided demonstration experiments with fast electro-optic and acousto-optic modulators. For these experiments, existing equipment and facilities in Chemistry and in Engineering were used, and other resources were obtained using NSF and other grants, along with some university support. By the end of the course, the group had established the Instructional Laser Laboratory in Chemistry, a dedicated air-conditioned room with optical table, several high-power lasers, a spectrometer, detection electronics, etc. This laboratory plays a key role in the senior lab sequence in chemistry and in graduate level courses in molecular spectroscopy.

“The Intel project is unique in that it brings together knowledge in physics, chemistry and electrical engineering and promotes interdisciplinary interac-
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tions to develop advanced laboratory experiments. It will allow them to generate new experiments that take advantage of specialized research knowledge of OSU scientists,” according to Nibler. An example is the study and optical characterization of new non-linear optical crystals being synthesized in the chemistry laboratory of Professor Doug Keszler. These and other crystals such as Li_3BO_3 and $\text{CsLiB}_6\text{O}_{10}$ offer improved efficiency and economy in the generation of new ultraviolet wavelengths used in many applications such as photolithography. Another experiment under development involves the use of nonlinear optical interactions to probe the structures of molecules in and on surface layers such as those involved in semiconductor processes. At high intensities, laser beams can be used to generate grating patterns in optical fibers and in another experiment students prepare and use these fibers as ultra-sensitive probes of temperature or stress changes, which cause easily detected shifts in the wavelengths transmitted by fibers.



Nibler characterizes the project as “extremely satisfying since it illustrates how much overlap there is in the way people in different disciplines think

about problems. The language and emphasis is often different but the fundamental concepts are the same.” He notes that high technology industries such as Intel are now the dominant force that drives the Oregon economy and it is important that the research and educational emphasis of the university recognize this. He says “we are proud of the role our science and engineering graduates play in many Oregon companies and we are grateful for the support Intel provides to enhance the educational and employment opportunities for our students.”

Letter from the Chair

It is a pleasure to report on highlights of the past year. Provost Tim White, in recognition of the importance of science as the heart of our Land Grant, Sea Grant, and Space Grant university, has announced a major investment in the College of Science. The provost's plan includes a \$2 million investment in Science over the next few years. This plan, and the healthy financial situation of the Chemistry Department, should help us fill one or two new faculty positions in the coming year. While this support from the University is very good news, there is still considerable uncertainty about the effects of the current economic recession on funding for higher education.



Chemistry Department faculty members distinguished themselves at this year's College of Science awards day by winning five of the seven major awards. **Wei Kong** won the Sugihara Award for outstanding research accomplishments by a faculty member within 10 years of receipt of PhD. **Doug Keszler** won the Gilfillan Award for exceptional and sustained scholarly accomplishments. **Jim Ingle** won the Boedtger Outstanding Advisor Award. **Mike Schuyler** won the Horne award for outstanding teaching over a period of at least 5 years and **David Horne** won the Carter Award for outstanding undergraduate teaching. We are proud to see our faculty's exceptional achievements recognized in this way.

A highlight of the past year was the hiring of new tenure-track faculty member **Staci Simonich**. Dr. Simonich holds a joint appointment in Chemistry and in Environmental and Molecular Toxicology. Staci received her PhD from Indiana University and worked for Procter and Gamble before joining OSU. Her research interests are in analytical and environmental chemistry with emphasis on atmospheric transport and deposition of organic pollutants. She complements our Environmental Chemistry research focus area. Dr. **Cindy Hauser** joined us this year as an instructor in general chemistry after receiving her PhD in analytical chemistry from the University of North Carolina at Chapel Hill.

Year after year our faculty have been very successful

in bringing in large grants to keep our research facilities equipped with modern instrumentation. **Max Deinzer** was recently awarded more than \$550,000 for a new quadrupole time-of-flight mass spectrometer. This acquisition helps our efforts to expand research in areas of chemistry important to biology. **Wei Kong's** lab now houses a new broadly-tunable solid-state laser system. Other major equipment acquisitions still pending include a tandem time-of-flight mass spectrometer based on ion optics developed in **Doug Barofsky's** lab, and an area detector for x-ray diffraction.

Our new undergraduate curriculum, **Chemistry with Options!**, continues to attract new undergraduate students to chemistry. Head advisor Jim Ingle notes (see p.11) that the number of chemistry majors has risen by about 35% since the new majors became available. We acknowledge our Advisory Board for its encouragement to make these curricular changes.

Our external Advisory Board has provided valuable perspective and advice to the Department. In 2001 Casey Bennett (Intel Corporation) took over Karen Nickel's seat on the board. We thank Karen Nickel for her service as a member of the board for four years. The next meeting is planned for October, 2002.

February 28, 2001 marked the Centenary celebration of the Department's most famous alumnus, Linus Pauling. The occasion was marked by an OSU Alumni Association reception at the opening of the Pauling Exhibition at OMSI in Portland and a day-long symposium featuring Nobel prize winner and Pauling Professor at Caltech Ahmed Zewail, biographers, and members of Pauling's family.

I am especially pleased to announce a fund and a new award in honor of **Jim Krueger**. This award was established on Jim's 65th birthday in recognition of many years of dedication and service to the students of OSU. Thanks to increased donations this past year, the department was able to provide 20% more undergraduate and graduate scholarship awards.

I am proud of our faculty and our tradition of providing the best possible education to our students. The generosity of our alumni and friends helps make it possible for us to carry out this mission.

John C. Westfall

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Keszler Research Group Looks at New Optical and Electro-optical Materials

For many years, **Doug Keszler's research group** has been pursuing the synthesis and study of new inorganic solids. Much of this effort has centered on new borates and their properties, examining their structures and making correlations to their nonlinear optical response. Simple models have been developed that provide structural insights into the nonlinear process, materials have been produced that have been used to realize a 10-fold increase in the power capabilities of UV solid-state lasers. Such lasers are widely used in manufacturing industries for cutting and drilling applications, replacing conventional tooling.

Their current effort in this area is directed to the development of nonlinear crystals that will provide direct second-harmonic generation of laser light to wavelengths shorter than 200 nm. Such crystals do not currently exist, and their development is a welcome challenge that requires a team effort. They currently work with Wei Kong in this department, Gerard Aka of ENSC, Paris, and ReyTech Corp. in Bend, OR, on various aspects of the crystal growth and optical characterization of new materials that have been identified in this lab.

In the area of phosphor research, they continue to be involved in the study and development of materials for high-field AC electroluminescent (EL) displays. In this work, they have been highly engaged with the group of John Wager in the Department of Electrical and Computer Engineering. In addition to unraveling several complex emission characteristics and providing means for specific color control in some common phosphors, we have been able to demonstrate the highest energy efficiency reported to date for a green-emitting EL device.

They are also attempting to demonstrate a new type of solid-state light source operating on the basis of charge injection. In principle, such a source should provide an opportunity to realize an overall energy efficiency that exceeds any other known source of light for display and general-lighting applications.

In the area of inorganic synthesis, they recently described a simple low-temperature synthesis method for oxides on the basis of hydrothermal dehydration of precipitates. The method is quite general, providing a means to produce *crystalline* products at temperatures near 150°C or lower. During the past few months, the method has been extended to the production of thin-film materials. For the first time, both low-temperature *deposition* and low-temperature *crystallization* have been achieved in the production of refractory oxide thin films. The

method provides unique capabilities in the production of thin films for electronic, optical, and corrosion-barrier applications, and it also provides a means to grow crystalline oxide films on plastics.

They are also involved with Art Sleight, Janet Tate (Physics,) and John Wager on a collaborative program involving the synthesis, study, and development

of *p*-type transparent conductors (see next page). Considerable progress has been made in affecting the conductivity and transparency of new *p*-type materials, but much work remains to be done. This effort is certainly providing new and interesting opportunities in understanding and controlling electronic structure, optical properties, and self-compensation processes in wide-gap semiconductors, materials of considerable fundamental and technological interest.



P-type Semiconductors Offer Practical New Applications



Graduate student Jun Li discusses a sputtering reaction with Arthur Sleight.

The research team in **Arthur Sleight's** laboratories has made significant advances in the emerging science of transparent electronics, creating p-type semiconductors that have more than 200 times the conductivity of the best materials available a few years ago. This discovery opens the door to new types of electronic circuitry that, when deposited onto glass, are literally invisible. Potential applications for transparent circuitry have yet to be invented. Art Sleight presented his findings at the American Chemical Society meetings in San Diego and was later quoted, "We think these basic advances are very important and are nearing the stage of commercial usefulness. Our engineers will now take some of these findings and see what type of devices could be created from the new materials. Transparent electronics is an important new field of technology and should become a growing industry." Sleight collaborated with principal investigator Janet Tate, Associate Professor of Physics at OSU.

Most materials used to conduct electricity are opaque, but some invisible conductors of electricity are already in fairly common use. More complex types of transparent electronic devices present a different challenge; they require the conduction of electricity via both electrons and "holes," which are positively charged entities that can be thought of as missing electrons. These p-type materials will be necessary for the diodes and transistors that are essential to more complex electronic devices.

As recently as 1997, the best p-type transparent conductive materials could only conduct one siemens/cm, a measure of electrical conductivity. The most sophisticated materials recently developed at OSU now conduct 220 siemens/cm. The most successful are copper oxide-based compounds, with copper chromium oxide showing the most promise. Professor Janet Tate, who is collaborating with Sleight and Keszler, was quoted in June, "We'll continue to work with these materials to achieve higher transparency and even greater conductivity." Their work is supported by a grant from the National Science Foundation.

Only a few laboratories in the world are working in this area, mostly in Japan. In November, Professors Sleight and Tate presented the results of their research at the 2nd International Symposium on Transparent Oxide Thin Films for Electronics and Optics at Waseda University in Tokyo.



Faculty News



Kevin Gable's research led him to collaborate with one of last year's chemistry Nobel Laureates, Barry Sharpless, on a study of the reaction mechanism of

osmium-catalyzed dihydroxylation of olefins. The paper he co-authored, *J. Am. Chem. Soc.*, 1997, **119**, 1840, investigated the impact of electronic variation in both the ligands and the substrate for the reaction. Gable's major research area deals with similar reactions involving rhenium, and in 1996 he had published a study of substituent effects on the rhenium system.

Gable's role in the collaboration was to help interpret results that Sharpless and his students had accumulated over a 10-year period, looking at pyridine-OsO₄ complexation and the rates of osmylation for a collection of substituted styrenes. The primary finding was that, for both ligands and substrate, there were multiple means by which an electron donor or acceptor could influence the rate of reaction, and this pointed to a reaction mechanism that was more complex than the simple [3+2] cyclo-addition that was favored by many organic chemists.

Recent work in Gable's group has provided further support for a mechanism that is kinetically concerted but capable of substantial variation in transition state structure to accommodate the specific electronic and steric demands of the substrate. Gable's group took part in the June Northwest Regional Meeting of ACS in Seattle where Gable and graduate students **Eric Brown** and **Pitak Chuawong** presented their work.



In May **Joe Nibler** participated in a special Alexander von Humboldt Symposium held at the German Embassy in Washington D.C. to honor Professor Edward Schlag on his retirement as Professor of Physical Chemistry at the Technical University of Munich. Over the years, Schlag served as host for Nibler and 23 other recipients of the Humboldt Senior U.S. Scientist Award, including three Nobel Laureates, for one-year sabbaticals spent in Munich.

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In June Nibler gave an invited lecture on his group's research in high-resolution molecular spectroscopy at the Northwest Regional ACS meeting in Seattle. Some of this work was also presented in posters at this meeting by graduate students **Jeff Barber** and **Tony Masiello** and in a talk by **Engelene Chrysostom** at the Molecular Spectroscopy Symposium at Ohio State University.

Several visitors spent periods in the Nibler lab on collaborative research projects. They include Professor Brian Orr of Macquarie University in Sydney, Australia, Dr. Alfons Weber, on leave from NSF and NIST, and Dr. Art Maki, retired from NIST. Professor Kyung Hee Lee (OSU PhD 1990) arrived in August to conduct research in the Nibler lab while on a year's sabbatical from the Andong Institute of Information Technology in South Korea.



In June **Professor Emeritus Ken Hedberg**, wife **Lise**, and post-doctoral assistant **Alan Richardson** attended the 8th European Electron Diffraction Symposium in Blaubeuren, Germany. Ken gave a paper on recent work in his laboratory, and later, presented a talk at the banquet. After the meeting Ken and Lise visited friends at the University of Oslo, and then took a cruise along the Norwegian coast to North Cape, during which they saw the midnight sun on several occasions.



In October Ken was invited to Cornell University to give a talk at a symposium honoring the 90th birthday of an old friend and colleague, who is still active in research. The address was titled "Molecular Structure Measurements by Gas-Phase Electron Diffraction - A

Faculty News

Vince Remcho reports from a busy 2000-2001 academic year for his group. **Angela Doneanu** gave an invited student talk at the Frederick Conference on Capillary Electrophoresis. Vince and/or his students traveled to the following meetings to present their work: Eastern Analytical Symposium in Atlantic City, NJ, Federation of Analytical Chemistry & Spectroscopy Societies [FACSS] in Detroit, MI, HPLC Kyoto 2001 in Japan, 24th International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC 2000), Seattle, WA. Invited talks were also given at the University of Alberta, Virginia Tech, University of Alaska in Fairbanks, R.W. Johnson Pharmaceutical Research Institute in Somerset, NJ, and Latin American Conference on Capillary Electrophoresis in Santiago, Chile. **Angela Doneanu** and **Stacey Clark** have received scholarships to give presentations at the International Symposium on Capillary Chromatography in Riva del Garda, Italy. Stacey will give the Keynote Lecture! The group published three book chapters and a total of 9 papers in peer-reviewed journals in the 2000-2001 academic year.



Patrick Vallano completed his PhD in March 2001. He is now employed as a research chemist at Merck Pharmaceutical Company in West Point, PA. **Gabriela Chirica** finished her PhD in May 2001. She is now a research chemist at Sandia Livermore National Laboratory in Livermore, CA. Both Pat and Gabriela are settling into their new jobs and homes comfortably, and report that they have been warmly welcomed. We miss their good company, and look forward to staying in touch with them. The 2000-2001 AY was a good one for us, and we look forward to more good science and fun in 2001-2002.

John Westall spent three weeks in Tunisia in February, 2001, as part of an exchange program between OSU and several universities in Tunisia. The program is sponsored by the U.S. Department of State. At universities and engineering schools in the cities of Tunis and Gabes he gave short courses and seminars on environmental chemistry and led discussions about chemistry curriculum and opportunities for graduate study at OSU. A final seminar celebrating the 100th birthday of Linus Pauling and Pauling's connection to Oregon and OSU was a particular hit.

On the research front, Westall has been notified that one of his papers has been selected by the American Chemical Society as one of the ten most widely cited papers in the 35-year publication history of the ACS journal, *Environmental Science and Technology* (ES&T). ES&T will publish a feature article on these "citation classics" in the near future. The paper is the first that Westall published after his arrival at OSU (*Environ. Sci. Technol.* 1981, **15**, 1360-1367) and deals with physical processes affecting the transport of organic compounds in groundwater. Westall attributes the success of the paper to the fact that he and co-author Rene Schwarzenbach introduced fundamental chemical principles to complex environmental problems, and that he and Schwarzenbach picked the right problem at the right time in the development of this area of environmental chemistry.

Westall is continuing to pursue a number of collaborative research projects in order to keep his research program active while dealing with the day-to-day demands of departmental chairmanship. Current projects include analytical aspects of the transport of selenium through a wetland ecosystem food chain, in collaboration with Paul Jepson of the OSU Entomology Department; the elimination of chlorinated solvents in ground water through the use of "permeable reactive barriers" filled with elemental iron, in collaboration with Paul Tratnyek at the Oregon Graduate Institute; and the retardation of corrosion of reinforcing steel in concrete, in collaboration with Milo Koretsky of OSU Chemical Engineering. The latter two seemingly different applications are actually quite similar at the level of fundamental electrochemistry.



Hybrid LC/MS/MS Mass Spectrometer New to Chemistry

The Chemistry Department received funding from the National Institutes of Health to acquire a new mass spectrometer hybrid system (Hybrid LC/MS/MS), an instrument that leverages the power of quadrupole and time-of-flight (TOF) analyzers to set a new standard for qualitative mass spectrometry. The instrument, purchased from Micromass at a cost of \$575K, changes a basic design used in proteomics research, i.e. the science of protein regulation, by replacing a third quadrupole of a triple quadrupole mass spectrometer with a high resolution reflectron TOF analyzer that allows accurate measurement of the masses of both the molecular and product ions. In proteomics research, these systems guarantee exceptional resolution, mass accuracy, and the ability to accurately determine charge states of multiply-charged compounds. Thus, the instruments have the sensitivity (low femtomole level) to detect proteins in spots from 2-D gels, the resolution to distinguish among peptides of very similar molecular weights, and a wide mass range to examine non-covalent interactions. For metabolite identification or natural products discovery projects, the hybrid LC/MS/MS systems can determine elemental composition and find fragmentation pathways that greatly simplify structural elucidation and compound identification.



Because of a resolving power in excess of 7000, these instruments help the investigators to differentiate between isobaric compounds and interferences, and unambiguously isolate modification sites. The determination of the exact mass of a protein or peptide with very high mass accuracy narrows down database search parameters and facilitates protein identification. For proteins not in a database, the instrument provides enough amino acid sequence information through fragmentation and high mass accuracy to facilitate *de novo* sequencing.

The instrument, which is being installed in Max Deinzer's Mass Spectrometry Laboratory, will benefit faculty in the Departments of Chemistry, Biochemistry/Biophysics, Toxicology, Pharmacy, Food Science, Microbiology and Forestry, and the research programs in the Environmental Health Sciences Center, the Linus Pauling Institute, the Center for Gene Research and Biotechnology, and the Marine Freshwater Biomedical Center. In addition, this instrument and associated equipment in the Department of Chemistry's Mass Spectrometry Facility supports the mass spectrometry needs of the University of Oregon, the Oregon Health Sciences University and, to a lesser extent, other statewide universities and colleges and the biotechnology industry.



New Instructor Cindy Hauser was hired this year to help carry the load of increased undergraduate enrollment. Cindy earned her BS at Washington and Lee University in Lexington, VA, her MS from University of North Carolina, Wilmington, and her PhD from U.N.C., Chapel Hill. When Cindy's husband Bryan accepted a post-doctoral position in James White's laboratory, Cindy chose to apply to teach at OSU. Her ultimate career goal is a faculty position at a small liberal arts college. Cindy comments, "The teaching experience that I am gaining at OSU is very useful for preparing me to hold a position in a teaching-focused university." When asked about life in Oregon, Cindy noted, "The countryside is beautiful. As the absolute pace of life is a little slower, Bryan and I have had more time to spend with each other and our two dogs, Jack and Lily."

Department News and Notes

During the past year, **Doug Keszler** was invited to speak at the National Meeting of the American Chemical Society, San Diego, CA, American Conference on Crystal Growth and Epitaxy in Vail, CO, International Conference on Solid-State Crystals: Materials Science and Applications in Zakopane, Poland, Second International Conference on Inorganic Materials, Santa Barbara, CA, National Meeting of the Materials Research Society, Boston, MA, 10th International Workshop on Inorganic and Organic Electroluminescence in Hamamatsu, Japan, and at the Northwest Regional Meeting of the American Chemical Society, Seattle, WA.

He also attended the Advanced Solid State Laser Conference in Seattle, where he enjoyed interactions with former students Ted Alekel, Tom Reynolds, and Kathleen Schaffers. Doug is currently serving as the Materials Director for the National Project on Multiphoton Phosphors, an effort supported by the Department of Energy and Osram-Sylvania for developing new materials that can lead to dramatic improvements in the efficiency of fluorescent lighting.

As part of a collaborative program with Prof. Gerard Aka of the Ecole Nationale Supérieure de Chimie, Keszler's graduate student

Jennifer Stone spent a productive term doing research - and enjoying the pleasures - in Paris. In addition, she was awarded a 2001 Ludo Frevel Crystallography Scholarship, an international award sponsored by the International Centre for Diffraction Data recognizing her research accomplishments. As this is an international award, the competition is intense. The award amounts to \$2250 for support of travel and other activities



Warm Welcomes to new staff members....

Linda Adams has joined the department as the new Accountant. Linda earned her BS in Business at OSU and comes to us from Entek in Lebanon.



Joe Magner joined the department as Development Engineer in the Electronics Shop. He replaces Jim Swyrczinski who has returned to Eugene to work in the private sector. Joe shares his time equally with the Physics Department.



Gonzalo Leon, who has a BS in Science with a chemistry minor from OSU, is the Lab Assistant in the Gilbert Addition teaching labs. Gonzalo, a native of Mexico, worked previously for the Home Economics Department.



Fond Farewells....

Sue Brown, Accounting Technician for the past 3 years, has accepted a position in the College of Pharmacy at OSU. We hear that she is finding new challenges and enjoys the new job.

Gary Nolan, Lab Preparator in the teaching labs, has accepted a similar position in the new green chemistry program at the University of Oregon. Gary's laughter is already missed, but we wish him well in duck country.



Honors and Awards

College of Science Scholarships for 2001/2002

Ralph Bosworth Memorial Medical Scholarship

David Volkov

Peter Culter Memorial Scholarship

Cristian Ion

Jason Schindler

Emily Simpson

Carroll DeKock Scholarship

Michinao Hashimoto

Colleen Spurgeon Scholarship

Jeffrey Bilyeu

Excellence in Science Scholarship

William Beck

Heath Lampee

Nicholas Sabrowski

Jesse Hanson Scholarship

David Camoriano-Nolasco

Milton Harris Scholarship

Matthew Reeves

Chemistry Department Awards, June 2001

OUS Committee for International Trade and Development Graduate Fellowship Program funded by the Nippon Foundation of Japan

Heidi Zhang

Ludo Frevel Crystallography Scholarship, sponsored by International Centre for Diffraction Data

Jennifer Stone

Ingram First Year Graduate Fellowship

Yonggang He

Benedict 2nd Year Graduate Fellowship

Guoqiang Wang

Fall 2000 Laboratory TA Awards

Jim Abbott Karen Radakovich

Michael Hruschka

Winter 2001 Laboratory TA Awards

Aleksandr Oblezov Helmars Smits

Jeffrey Barber

Spring Laboratory TA Awards

Stephanie Melin George Law

Candis Pike

Shirley Kuse Fellowship

Kim Hageman

David Shoemaker Fellowship

Jeff Barber Christopher Lincoln

Eric Brown

N.L.Tartar Summer Research Fellowships

Robert Killin

Scott Allen

Eric Brown

Stacey Clark

Martha Stapels

Josh Hansen

Eric Korf

Chris Lincoln

Jennifer Stone

Kurt Sundermann

CRC Press Freshman Chemistry Awards

Jeremy Gregory

Shari Ultman

man

Phi Lambda Upsilon Outstanding Sophomore

Michinao Hashimoto

Outstanding Analytical Student

Matthew Reeves

American Institute of Chemists-Graduating Senior

David Camoriano-Nolasco

Merck Index Award for Outstanding Senior

Pavel Nagornyy

Chemistry Department Awards, September 2001

2000-2001 Harris Graduate Teaching Awards

Robert Killin

Jeff Barber

Martha Stapels

2000-2001 Harris Teacher-of-the-Year

Michael Schuyler

2000-2001 Employee-of-the-Year

Carolyn Brumley

Faculty Awards, June 2001

Olaf Boedtker Award

Jim Ingle, Professor

Lloyd Carter Award

David Horne, Associate Professor

T.T. Sugihara Award

Wei Kong, Associate Professor

F.H. Horne Award

Michael Schuyler, Professor

F.A. Gilfillan Award

Douglas Keszler, Professor

OSU Lifetime Achievement Award

James Krueger, Professor Emeritus

Undergraduate Research Internships, Summer 2001

Shari Ultmann - with Philip Watson

Emily Simpson - with John Loeser

Sara Breitenbach - at AVI Biopharma, Inc.

Rebecca Medina - with Bill Gerwick, Pharmacy

Bachelor's Degree

Rigel Barlow (Business Option) is working temporarily on his family's new ranch.

Matthew Cranswick (Pre-Medicine Option)

Nicole Hayes (Biochemistry Option) is working at AVI BioPharma, Inc in Corvallis.

Peter Hersch is an oil quality analyst at North Creek Analytical in Beaverton.

Jeff Hunker is a QC Supervisor for Norpac in Salem, OR.

Rebecca Medina (Biochemistry Option) is a graduate student in pharmacy at OSU.

Joshua Moentenich works at AVI BioPharma, Inc in Corvallis.

Pavel Nagorny attends graduate school at Harvard.

Adi Hartono Saputra attends graduate school in Environmental Engineering at OSU.

David Volkov (Pre-Medicine) attends medical school at Loma Linda University in California.

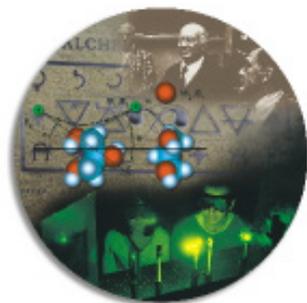
The Impact of New Chemistry Option Program

For the first time in more than 10 years, the number of students majoring in chemistry at OSU has climbed over 100, an increase of about 35%. This increased enthusiasm for chemistry is attributed to the new curriculum providing options. An option is 9 or 10 selected courses that allow students to gain additional expertise in a specific area such as biochemistry, materials science or environmental chemistry, and still earn a BS in chemistry. Approximately a third of chemistry majors are enrolled in one of the nine options other than the traditional advanced chemistry option. In particular, the number of "pre-meds" pursuing a chemistry major has increased from one or two to about fifteen. These students will graduate with a degree in chemistry, but will have also taken courses in biology, bioethics, genetics, and statistics that are important for medical school applications.

The Chemical Education option has attracted students who plan to teach chemistry at the high school level. Besides taking education courses, they receive "internship" credits for their role as teaching assis-

tants in a general chemistry course. They are enjoying that experience and are learning valuable skills that will prepare them for their teaching masters program and teaching practicums. Both the business option, which is a stepping stone for an MBA, and the forensic science option have proven to be popular. Some students have chosen to complete more than one option.

Head Advisor Jim Ingle reports that some students claim that they would not have studied chemistry if their option had not been available. When curriculum changes were first discussed, goals included increasing the appeal of chemistry to the best students, enhancing employment opportunities for chemistry students, and increasing enrollment in chemistry. It has been a success in all of these areas. This is the third year of the program and is the second year that students have graduated with the new options. Of the ten chemistry majors graduating this past year, five completed the traditional advanced chemistry degree, two finished the business option, and two earned an option in pre-medicine.



What Else is New at OSU Chemistry?

Check us out online at www.chem.orst.edu





Master's Degree

Pitak Chuawong *Thermal Stability of Tris-(3,5-Dimethylpyrazolyl)hydridoboratorhenium(V)(Oxo) (1,2-Dithiolate) and (1,2-Monothiodiolate) Complexes and DFT Studies of C-S Bond Cleavage.* (K. Gable) Pitak continues his graduate studies in the PhD program at Johns Hopkins University.

Candis Pike Non-thesis. (D. Keszler)

Dominik Reusser *In Situ Transformation of Toluene and Xylene to Benzylsuccinic Acid Analogs in Contaminated Groundwater.* (J. Field) Dominik is now studying Applied System Science at the University of Osnabrück, Germany.

Bill Rice *Development and Application of an Analytical Technique for the Determination of Methylmercury Compounds in Environmental Samples Based on Isolation by Distillation, Followed by Purge-and-Trap Sample Concentration and GC/MS Separation and Detection, After Aqueous Phase Ethylation with Sodium Tetraethylborate.* (J. Westall) Bill works for the Sunnyside Irrigation District in Yakima, WA.

Doctor of Philosophy

Tammy Amos *Negative Thermal Expansion in the AOMO₄ Family.* (A. Sleight) Tammy completed a Post-Doctoral appointment at NIST in Gaithersburg, MD and now has an R&D position at DuPont.

Ana Barrios *Studies on Nitrogen Containing Secondary Metabolites from Terrestrial and Marine Origin.* (D. Horne) Ana works at Wyeth-Ayerst, NY.

Rebecca Bliesner *Synthesis and Structural Determination of Alkali and Alkaline Earth Metal Containing Bismuth Vanadates.* (A. Sleight) Rebecca is an assistant professor at Buckhannon College in West Virginia.

Kevin Cantrell *The Development and Characterization of Miniature Spectrometers For Measuring*

the Redox Status of Environmental Samples. (J. Ingle) Kevin is assistant professor at University of Portland.

Gabriela Chirica *Novel Monolithic Columns for Microscale Liquid Chromatography and Capillary Electrochromatography.* (V. Remcho) Gabriela has a new son and a post-doctoral position at Sandia Livermore Laboratories.

Engelene ter Heersch Chrysostom *Applications of High Resolution CARS Spectroscopy.* (J. Nibler) Engelene has a post-doctoral position at Sandia Livermore Laboratories.

Benjamin Clark *Electroluminescent Materials.* (D. Keszler) Ben now works for Hewlett-Packard in Corvallis.

Patrick Vallano *Novel Approaches to Enhancing Selectivity and Efficiency in Microscale Liquid Chromatography.* (V. Remcho) Pat is doing drug metabolism research at Merck Research Labs in West Point, PA.

Jelena Dacres *Delocalization in Cationic, Carbene and Radical Intermediates in Some Bridged Polycyclic Systems.* (P. Freeman) Jelena holds a post-doctoral position at University of Minneapolis, MN.

Lonnie Robarge *Synthesis of Marine Natural Products: Part I. Cryptophycins-1,-3,-4,-24, and -29. Part II Polycavernoside A.* (J. White) Lonnie works at Chiron in Seattle.

Moo Young Kim *Conformations of E. coli Thioredoxin and its Alkylated Adducts Studied by H/D Exchange and HPLC-Electrospray Ionization Mass Spectrometry.* (M. Deinzer) Moo Young works as a post-doctoral assistant to Dr. Deinzer.

Michael Tassotto *Time-of-Flight Direct Recoil Spectrometry: Application to Liquid Surfaces and Steps toward Quantification.* (P. Watson) Michael is a hospital radiation physicist in Thunder Bay, Ontario.

Jungchul Kim *Natural Product Synthesis via Cyclobutanes* (J. White). Jungchul has a post-doctoral position in Dr. Paquette's group at Ohio State University.

Michael D. Jackson *Advanced Studies on the Biosynthesis of the Streptolidine Moiety of Streptothricin F.* (M. Zabriskie) Mike has a research position at Oregon Health Sciences University.

Staci Simonich Joins Chemistry Faculty

Dr. Staci Simonich joined OSU in August 2001 as an Assistant Professor with a joint appointment in the Chemistry Department and the Department of Environmental and Molecular Toxicology. Staci received her BS from University of Wisconsin, Green Bay, and earned her PhD under Distinguished Professor Ronald Hites at Indiana University in 1995. Staci's graduate research focused on the role natural vegetation plays in removing hydrophobic pollutants from the atmosphere and on the global transport and deposition of semi-volatile organic pollutants (such as organochlorine pesticides) to remote locations of the world.

She worked for The Procter & Gamble Company in Cincinnati as a senior scientist from 1995 until June 2001. While at Procter & Gamble, she conducted research on the removal of fragrance materials (used in large volume in laundry detergents) during wastewater treatment and on the fate of these compounds in the atmosphere. Her research has been published in *Science*, *Nature*, *Environmental Science & Technology*, and *Environmental Toxicology and Chemistry* and she was an invited speaker at the 2000 Gordon Conference on Environmental Science. In October 2001, Staci was awarded the Society of Environmental Toxicology and Chemistry's "Environmental Chemistry Award" for her contributions to the field of environmental chemistry as a young scientist (under the age of 40).

At OSU Dr. Simonich will target the global and regional atmospheric fate, transport, and deposition of semi-volatile organic compounds. This research will include: 1) studying the atmospheric transport of these pollutants from Asia to the Pacific Northwest Coast of the United States; 2) studying the deposition of these compounds to high elevation ecosystems in National Parks located in Western North America;

and 3) studying the atmospheric lifetimes of these compounds by measuring their gas-phase reaction rates with OH radical in a bench-top photochemical reactor. Source region identification and 'age' are determined using air trajectories and the enantiomer ratios of chiral semi-volatile organic compounds. She takes research samples from sites near the Cheeka Peak Observatory (in collaboration with University of Washington), the Pacific Ocean, and Mt. Ashland, Oregon.

Staci will also teach various analytical chemistry courses and a graduate level course in organic, environmental chemistry. When asked about the switch from industry to academia, Staci replied, "I was looking for a new scientific challenge and the opportunity to mentor the next generation of environmental and analytical chemists. I also thought my experience in industry could be a real asset to a university and its students." Among the challenges of making such a move, she responds, "The transition from industry to academia has been remarkably easy

so far. Having 6 years of industrial experience under my belt has helped me get a fast start at OSU. The biggest challenge so far has been finding the time to work directly in the lab between grant writing, giving talks at local and international meetings, and setting up sampling equipment.

Staci and her husband, Mike Simonich, are the proud owners of three house rabbits, as well as a two acre mini-farm southwest of Corvallis. Her comments about the Willamette Valley: "The air is clean, the scenery is beautiful, and the people are friendly - what more could I ask for?"



Alumni Notes

John W. Daly, BS '54, MA '55, Chief of Pharmacodynamics at the National Institute of Diabetes & Digestive & Kidney Diseases, was honored with the Ernest Guenther Award in the Chemistry of Natural Products by the ACS this year. Daly's work in isolating and determining the structures of over 500 alkaloids from the skins of frogs has contributed to the understanding of ecology and biodiversity of tropical rainforests and has provided hundreds of new leads for therapeutic agents.

Ramon Barnes, BS '62, Professor Emeritus, retired from the University of Massachusetts after 31 years of teaching, research, and service in analytical chemistry, is now the Director of the University Research Institute for Analytical Chemistry (URIAC) in Amherst, MA and editor of the *ICP Information Newsletter*. His e-mail is rmbarnes@chem.umass.edu

Ronald H. Engebrecht, PhD '64, retired in 1991 as Senior Research Chemist at Eastman Kodak Co., now splits his time between homes in Bradenton, FL, Naples, NY, and Crested Butte, CO.

Alan T. Yeates, BS '76, is a Research Chemist doing theoretical modeling of materials at the Air Force Research Laboratory, Materials and Manufacturing Directorate, Polymer Branch, at Wright-Patterson Air Force Base in Ohio.

Wen-Shu Hwang, PhD '79 (J.Yoke), has added to his teaching and research efforts by becoming President of the National Dong Hwa University in eastern Taiwan. This new University opened its doors in 1994. Dr. Hwang succeeds the founding President.

Larry Bass, PhD '80 (G. Gleicher/S. Wilson), is director of the polymer/catalysts section at Ciba Specialty Chemicals in McIntosh, Alabama. Larry visited the department during the summer and told us that he thoroughly enjoys his work and travel. One of the projects that Larry supervises includes development of light stabilizers (in plastics, paints, coatings, and photographic paper) used to inhibit deterioration from exposure to sunlight.



Dennis Guthals, PhD '81 (J. Nibler), was promoted to full Technology Fellow adjunct to his work in lasers with Boeing Co. in Thousand Oaks, CA. Dennis is attempting to populate his local neighborhood with friendly snakes and chameleons along with raising two sons.

Duane Friesen, PhD '81, Director of Research at Bend Research, gave an interesting departmental presentation in October on some of the research programs and opportunities at Bend Research.

Casey Bennett, PhD '85, **Scott Mokler**, PhD '90, and **Pooya Tadayon**, PhD '98, presented some of their current development activities at Intel Corporation as a recruitment seminar in the department in January 2001.

Brian Bozlee, PhD '87, has taken a position as Professor of Chemistry at Hawaii Pacific University. He, his wife Sena, and two sons are adjusting to a major climate change after leaving the University of Great Falls in Montana. His e-mail address is bbozlee@hpu.edu.

Karen Wooley, BS '88, is professor of chemistry at Washington University in St. Louis. She was awarded an Arthur C. Cope Young Scholar Award for her work in polymers. Karen and her graduate students are using their knowledge of polymer chemistry to perfect molecular carriers called "knedels" by hollowing out their interiors and designing them to deliver drugs or withdraw cholesterol from blood. Karen's work was featured in the Spring issue of the *Washington University Magazine* and the February issue of *C & E News*.

James G. Pavlovich, PhD '93 (D. Barofsky), visited OSU last spring. Jim is the Manager of the Mass Spectrometry Facility at the UC Santa Barbara Department of Chemistry. He enjoys working with graduate students and was getting ready to bring a new spectrometer on line. Jim's e-mail is: pavlovich@sbmml.ucsb.edu.

Bill Fitts, BS '93, completed his PhD in chemistry at the University of Texas in May, 2001. He and his wife Irene have returned to Oregon where he has taken a position with Intel in Gresham.

Alumni Notes

Greg-Stephen Hassard, BA '96, left Synthetech, Inc. in Albany, OR, to pursue a degree in dentistry.

Michael Orlov, PhD '98, has a new position at Maxim Integrated Products in Beaverton. His e-mail address is orlov@home.com

Gregory Less, BA '99, attends graduate school in inorganic/materials science at University of Michigan. Greg is a recipient of a prestigious NSF-IGERT fellowship. IGERT projects afford graduate students an in-depth education through coursework and research experience in emerging areas of science and engineering, areas that transcend traditional disciplinary boundaries and involve a diverse group of faculty members. The awards place a high priority on students' communication and teamwork skills, international awareness, experience with modern instrumentation, and responsible conduct of research.

Regina Atoigue, BA '94, who works for FSE-Tyco Electronics in Plano, TX, is attending the University of Texas, Dallas, to pursue an MBA in International Management.

Anthony Diaz, PhD '97, has moved from Osram-Sylvania in Towanda, PA to the University of Central Washington as an Assistant Professor of Chemistry.

Pat Woodward, PhD '97 (A. Sleight) received an NSF Young Career Award to fund research for five years. He is an Assistant Professor at Ohio State University.

Nick Drapela, PhD '98 (J. White) is teaching at St. Martin's College in Olympia, WA.

Darren Williams, PhD '98 (J. Nibler) is doing computational chemistry and spectroscopy at the BWXT Pantex Plant in Amarillo, TX. Darren says, "If you have a few minutes to waste, check out www.dwilliamsconsulting.com." Darren's and Jennifer's second child was born in January 2002.

Karen Castle, PhD '00 (W. Kong), is in her second year of her associateship with the Air Force Research Laboratory. She writes "They pay well, the program is very organized, professional travel is encouraged, and many labs (like mine) give you a lot of freedom to pursue your own research interest." Karen encourages others to apply for NRC associateships. Karen's email is karenjcastle@hotmail.com. Karen and fellow OSU graduate Tammy Amos were recently featured in an issue of *C & E News*, 2002, **80**, no.6, 45-53.

Kezia Emerald, MS '00 (W. Loveland) is an Applications Specialist at CTI, Inc in Knoxville, TN.

Tammy Amos, PhD '01 (A. Sleight), completed her Post-Doc at NIST in Gaithersburg and accepted a position with DuPont Chemical in Hockessin, DE.

Engelene Chrysostom, PhD '01 (J. Nibler), who is from Trinidad & Tobago, married Georg Oberdorfer (OSU Forestry MS '01) of Austria in July and started a post-doctoral position at Sandia Livermore Laboratories in August. Her e-mail address is ehchrys@california.sandia.gov

IN MEMORIAM

Harry W. Culbertson, BS '43, MS '49, PhD '51, passed away in July 1998. He had been a research scientist with Monsanto Chemical Co. and had retired in 1982.

Arthur Tomisek, PhD '47, passed away last February in Birmingham, AL.

Laurids Ross, MS '46, passed away in October in Naperville, IL.



First Shirley R. Kuse Fellowship Awarded to Kim Hageman



A very generous donation by Shirley Kuse was received in July 2000 to establish a scholarship fund. Mrs. Kuse's intent was to contribute to the support of women pursuing higher education in science and engineering. She is a 1953 graduate of the University of Oregon, School of Clinical Pathology. Her late husband Jim was a 1955 OSU graduate in Chemical Engineering. This gift will fund graduate fellowships of \$5,000 annually to outstanding female graduate students in chemistry.

This year the first Shirley Kuse Fellowship was awarded to Kimberly Hageman, an analytical chemistry graduate student in Jennifer Field's laboratory. Kim holds a Certificate of French Studies from University of Neuchâtel, Switzerland, and a BA in Chemistry from Kenyon College in Gambier, Ohio. She has held research assistantships at the Center for Separation Technology, University of Potchefstroom, South Africa, at the Energy and Environmental Research Center, University of North Dakota, Grand Forks, at the Marine Biological Laboratory Ecosystems Center, Woods Hole, and at Ohio State University, Columbus. She has co-authored four publications.

Kim has corresponded with Mrs. Kuse and learned of the donor's early career. Shirley, who was raised in Oregon, was able to put her chemistry training to good use after college as one of the rare "girls" in hospital labs in Portland during the early 1950's. Shirley explains that her interest in women and chemistry was revived a few years ago when she joined a group in Atlanta called ARCS - 'Achievement Rewards for College Scientists.' This group provides opportunities for both men and women working on advanced degrees in the sciences. Shirley continues, "We are working on getting the program going at OSU and U of O."

The initial objective of Kim's PhD research at OSU was to develop a method to determine *in situ* biodegradation rates of trichloroethene (TCE) in contaminated groundwater using trichlorofluoro-ethene (TCFE) as a TCE-surrogate. Once developed, the method was used to determine that TCE biodegradation rates increased when fumarate, an electron-accepting organic acid, was added to TCE-contaminated groundwater at the selected site. The project was conducted at a former chemical manufacturing plant in Richmond, California. Kim presented her most recent results at the Society for Environmental Toxicology Annual Meeting in Baltimore (November 2001), the American Geophysical Union Meeting (December 2001), and at UC Berkeley (December 2001).

Generous donations from the people and companies listed on the following page allow the Chemistry Department to continue an outstanding seminar program, to help students attend conferences, to bestow awards for academic and teaching excellence, to fund graduate fellowships and undergraduate scholarships and to provide countless other academic opportunities. We thank you all for your tremendous support and for over \$115,000 in donations. We truly could not have a successful program without you.



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^{SS} Donation of \$500 or more.



The department was greatly saddened by the loss of **Nicu Vulpanovici**, who died at age 32 on May 2, 2001 after a two-year bout with cancer. He is survived by his wife Alexandra, an OSU PhD student in Biochemistry and Pharmacy, by his mother Nadejda in Bucharest, and by several relatives in Portland.

Born and raised in Romania, Nicu graduated at the top of his class with a BS in Optical Physics from the University of Bucharest. He began graduate work at Oregon State University in 1996, working in the area of molecular spectroscopy with Joe Nibler. He had made good progress on his thesis work, "Synthesis and Molecular Spectroscopy of $^{32}\text{S}^{18}\text{O}_3$ " and, despite the discovery of his cancer, he continued to work on his project. Three weeks before his death, he finished a draft of a paper on his work. He also co-authored two papers that have been accepted for publication in the *Journal of Molecular Spectroscopy*. He was judged by the Graduate School at OSU to have completed the requirements for a PhD in physical chemistry at the time of his death and this was awarded posthumously at the University graduation ceremonies in June.

During his graduate career, Nicu received numerous awards for teaching and research, including the Chemistry Department Harris Teaching Award and Harris Research Award, and a 1999 National Coblenz Society Student Research Award. He was presented a "Top Prof" award by the Mortar Board Senior Class Honorary in 1999, an unusual honor for a graduate student since this usually goes to professors.

Nicu had a unique way of connecting with people and a delightful, almost elfin, sense of humor. He had a wonderful smile and wit, his presence brightened every occasion. He will be missed, but not forgotten.



Nicolae Vulpanovici
Sept 29, 1968
- May 2, 2001



Jim Krueger's wife Bonnie and daughter Carolyn joined in honoring him for a remarkable career as teacher, mentor, and researcher at OSU.

The Department of Chemistry at Oregon State University and friends and family of **Professor Jim Krueger** have established the James H. Krueger Excellence Fund through the OSU Foundation. This fund was created on June 6, 2001 on the occasion of his 65th birthday to honor him and his dedication to excellence in chemistry education at the Oregon State University Chemistry Department. Jim Krueger, highly regarded teacher and researcher, and emeritus chemistry professor, earned his BS in 1958 from the University of Wisconsin and his PhD in 1961 from UC Berkeley. He taught at OSU for 36 years prior to his retirement. He continues to teach Honors Chemistry in the Honors College at OSU.

This Fund will support the James H. Krueger Excellence in Education Award, given to recognize and benefit the members of the faculty and student members of the Department of Chemistry who share his commitment to excellence in education. The annual James Krueger Award of \$1000 will be given to a faculty or student member of the Chemistry Department who has made an outstanding contribution to chemistry education.



We would like to hear from you. Please send us your personal or professional news or comments to be included in a future issue of Chemistry Alumni News. You may send e-mail to *chemadm@chem.orst.edu* or mail this form to the department address on the back page.

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When **Gerald Christensen**, '57, wrote to us after last year's issue of this newsletter, he reflected on the sad news of the deaths of former professors Max Williams and Al Scott. He relates,

I remember the Williams family, as they were always very kind to me when I was their paper-boy in the late 1940's. As I recall they lived on Grant Street, at that time an area of town where the streets had not yet been paved. On rainy days when navigating my bicycle through the mud puddles, they would frequently invite me inside to dry off. This was most appreciated.

The Scotts took the paper from one of my competitors, however I experienced my first ski trip under Al's guidance. Around 1948, Al took four or five members of our scout troop on a trip to Mary's Peak. The road was drifted in and we had to hike the last three miles to the top. Naturally, Al was able to both out-hike and out-ski all of us, a feat we thought amazing in view of his age. This was the beginning of my lifelong enthusiasm for skiing which still continues today. Another boy with us on the trip was OSU grad Bob Jensen who also continues to ski. Much better than me, I might add.

Do You Remember????

- Iota Sigma Pi on our campus in 1960?
- Who taught chemistry on TV in 1957?
- When Gilbert Addition was built?
- Who presided at the American Chemical Society National Meeting in April of 1956?
- When we received funds to research tin can corrosion from the American Can Company?
- When we received our first liquid air machine?

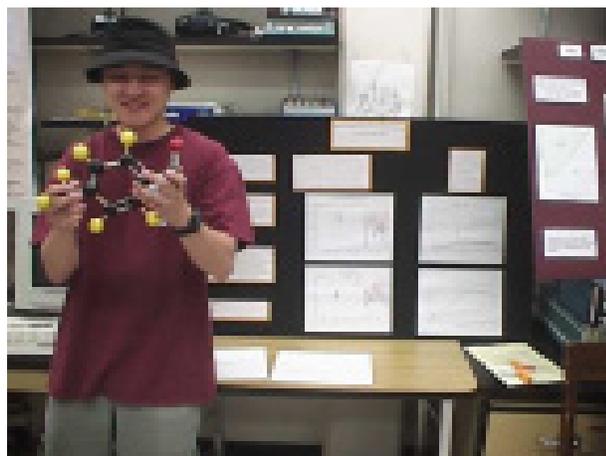




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Chun Park (Mr. Enthusiasm) uses a model to help explain the challenge posed in his Chemistry 463 project during the undergraduate poster session.



Lindsey Bader kept a sample of the product she synthesized during her Chem 463 project. Behind her is the poster presentation showing her results.

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