

Experience.
Explore.
Discover.
Achieve.

Departments
and Programs
in the College
of Science

Biochemistry &
Biophysics

Biology

Chemistry

Mathematics

Microbiology

Molecular &
Cellular Biology

Physics

Pre-professional
Programs in the
Health Sciences

Professional
Science Masters

Statistics

Zoology

<http://www.chemistry.oregonstate.edu/>

OSU
Oregon State
UNIVERSITY

Chemistry

Spring, 2012

Linus Pauling Science Center

By Professor Kevin P. Gable (Department Chair 2006-2011)

INSIDE:

page 2

Letter from the
Chair

page 3

NMR Facility
Services Entire
OSU Scientific
Community and
State of Oregon

page 3

Fool's Gold Could
Shine in Solar
Cells

page 4

Science Pub
Programs

page 5

POWGEN
Workshop Nets
Ph.D. Student
a Paper in
Scientific Journal

page 6

Undergraduate
Research
Launches
Student to New
Heights

Page 7-8

Awards in
Chemistry

Page 9

Featured
Alumnus

Page 10-13

Welcome to
Chemistry

Page 14-15

Chemistry
Programs and
Facilities

Last fall, the University held a celebration of all the work and the significant sacrifices many of our friends have made to make the Linus Pauling Science Center come into being. We in the Department take immense pride in being part of this project: this is the first new space for the Department in 30 years, and the first state-of-the-art research lab space we have occupied since construction of Weniger Hall in the 1950s. It stands now as a milestone. It marks where we are, it brings the history of where we have been, and it sets us up for where we are headed.

We engaged in two years of planning, and endured challenges imposed by the clash between our dreams and the realities of budget and space. We adopted a maxim early on that helped a lot: since we could not do everything we might hope with the space we were getting, we were going to choose carefully *what we did* and make sure *we did it extremely well*. We designed a modern lecture theater that could adapt to new pedagogy. We designed new instructional lab space that would allow us (or even force us) to employ green chemistry principles—and use those as a teaching tool. We designed open, modular research labs, and designed in the cooperative use of support space and facilities. We created facilities to support Nuclear Magnetic Resonance spectroscopy and Electron Microscopy that now house several million dollars of state-of-the-art instruments—and place these on display for the hundreds of students that move through the building every day.

It is the biggest academic construction project ever on the OSU campus. It shows—and it helps us raise our sights even that much further. If you have made a donation to OSU since the beginning of the Campaign for OSU, I want to thank you particularly, because you helped us meet the goals that were set in order to get the funding to build LPSC. We are looking ahead to the next building, but doing so by showcasing our work in the one we have.



Chemistry

Letter From the Chair

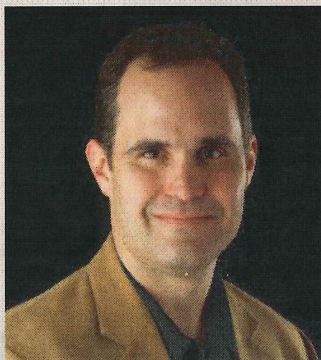
Dear Alumni,

There is a great deal of excitement surrounding OSU Chemistry. In September 2011, the new Linus Pauling Science Center opened on the OSU campus (see page 1). This state-of-the-art space accommodates seven research labs for our faculty, the General Chemistry laboratory sequence, the Natural Products and Small Molecule Nuclear Magnetic Resonance (NPSM NMR) Facility (see page 3), the OSU Electron Microscopy Facility (see page 14) and a 180-seat lecture hall for many of our Chemistry lecture courses (including General Chemistry). In addition, multiple new faculty members and support staff have joined our Department (see pages 10-13). Over the past decade, the student population has grown dramatically. We as a University are approaching 25,000 students. This enrollment growth has led to wonderful opportunities to increase and expand programs through the University – including within Chemistry. We have benefited in numerous ways from this expansion – including multiple tenure-track faculty searches during this current academic year. Oregon State University is also in the midst of a highly successful capital campaign, which stimulated our amazing alumni to give back to the University in meaningful ways (see page 16).

Our faculty continue to pave the way with innovative research including the new NSF Supported Center for Sustainable Materials Chemistry led by Distinguished Professor **Douglas Keszler** (see page 14) to Professor **Wei Kong's** new insights into the Evolution of Life to Harris Chair and Professor **Mas Subramanian's** discovery of new blue pigments (see page 7) which may revolutionize the dye industry to Professor **Staci Simonich's** studies of pollution in the Western US (see page 4) to Professor and Interim Dean **Vince Remcho** who has co-founded GeneSpace Inc., and Trillium FiberFuels Inc. to Distinguished Emeritus Professor **Jim White** who is a pioneer in synthetic organic chemistry and a 2011 Fellow of the American Chemical Society (see page 8).

Chemistry is also leading the way in education including Emeritus Professor **Joe Nibler's** textbook *Experiments in Physical Chemistry* and our innovative eCampus programs designed and taught by our faculty (see page 15). In fact, Professor **Mike Lerner** and Senior Instructor **Richard Nafshun** have recently founded a company to facilitate on-line chemistry labs called OnlineChemLabs (see page 14). Our Department faculty have won numerous awards for teaching including recent Lyod Carter Awards (the top teaching award in the College) for Senior Instructor **Jeff Walker** in 2009 and Associate Professor **Paul Blakemore** in 2011.

None of what is mentioned above would be possible without our amazing students and alumni. Graduates of OSU have gone on to become leaders in their fields. To recognize some of our top graduates, we have created the Chemistry Department Featured Alumnus which honors a graduate of OSU Chemistry that has gone to a successful career in his or her chosen field. We recognize Professor **Karen Wooley** (1988, BS) as the inaugural Featured Alumnus (see page 9). In addition, we want to recognize the current generation of talented students in our program as OSU Chem Majors of the Quarter. The Winter 2012 honorees are **Corey Wright** and **Mai Doung** (see page 8).



In closing, I succeeded Professor **Kevin Gable** as Department Chair as of January 1, 2012. I want to thank Kevin for his leadership of the Department over the past five+ years and that I am honored that the Department has entrusted me with this role. With the support of faculty, staff, students and alumni, I hope that we can continue to innovate in research and education while training the next generation of chemists.

Sincerely,

Rich G. Carter
Professor and Chair

Chemistry

NMR Facility Services entire OSU Scientific Community and State of Oregon

The Natural Products and Small Molecule Nuclear Magnetic Resonance (NPSM NMR) Facility provides state-of-the-art instrumentation for chemistry-related researchers throughout the OSU campus and the State of Oregon. The National Science Foundation (Award Number: CHE-0722319), the Murdock Charitable Trust (Award Number: 2005265) and Oregon State University provided over 1.5 million dollars in generous

financial support. Over 50 users from multiple departments throughout the campus and beyond utilize this facility.

The centerpiece is a Bruker Avance III 700 MHz NMR - a 2-channel spectrometer with a 5mm proton/carbon cryo-probe with z-axis gradient (this spectrometer is currently running Topspin 2.1 software). A 5mm Broadband Observe and a 5mm Broadband Inverse probe both with z-axis gradient are also available for use on this spectrometer. This instrument is one of the most sensitive carbon-detecting magnets in the world - capable of measuring a high quality carbon spectrum on 1000+ molecular weight samples as small as 0.1 mg.



Additionally, two new 400 MHz NMR's were purchased for more routine spectroscopic needs. (1) Bruker DPX-400, a 2-channel spectrometer with a 5mm Broadband Observe (including 19F) probe with z-axis gradient. This spectrometer is currently running Topspin 2.1 software. (2) Bruker DPX-400, a 2 channel spectrometer with both 5mm Broadband Observe and a 5mm Broadband Inverse probe both with z-axis gradient. This spectrometer is currently running Topspin 1.3 software.



Fool's Gold Could Shine in Solar Cells

Photonics: Although iron pyrite, otherwise known as iron sulfide or fool's gold, was tossed aside by miners more than a century ago, it may prove to be worth its weight in gold as a thin-film solar cell material.

Researchers at Oregon State University have found that iron pyrite, which contains two of the most abundant elements on Earth, is an excellent absorber of solar energy and can be made into extremely thin layers. Unfortunately, the substantial heat required to create solar cells causes

the pyrite to decompose. So the researchers tried an inverse design approach. "We identified the failure mechanism of pyrite, formulated a few design rules that preserved the favorable aspects of pyrite, and identified [iron silicon sulfide] and [iron germanium sulfide] as new absorber candidates," said **Douglas Keszler**, coauthor of a paper published in *Advanced Energy Materials*.

Much more work remains to be done. It could take at least 10 more years to fine-tune a marketable alternative to traditional solar cell materials.



Chemistry

Science Pub

Two of our faculty presented recently at Science Pub - a public event where leading experts discuss science and technology in an interactive, informal atmosphere.

Regional and International Sources of Pollution in the Western United States (Staci Simonich - Professor)

Despite their protected status, national parks are not immune from the effects of modern life. Pollution in the form of pesticides, PBDEs (polybrominated diphenyl ether flame retardants) and PAHs (polycyclic aromatic hydrocarbons released by forest fires and fossil fuel combustion) show up in parks across the country. In the West, **Staci Simonich**, professor in the Oregon State University College of Agricultural Sciences, has been tracking sources of such contamination in high-elevation parks such as Sequoia in the Sierras, Washington's Olympic and Denali in Alaska.

At the April 9 Corvallis Science Pub, Simonich, an environmental chemist, presented her research on regional and international sources of pollution in the western United States. Using facilities in Oregon and other western states to track air movement, she and her colleagues have correlated the results of air and soil sampling in parks with events such as forest fires and pesticide use. She discussed the factors that influence pollutant transport to and distribution in soils, plants and animals.

Simonich received her Ph.D. in 1995 from Indiana University and, as a professor in Environmental and Molecular Toxicology and Department of Chemistry, leads a research team to understand how people in the United States and China are exposed to PAHs through OSU's NIH funded Superfund Research Center

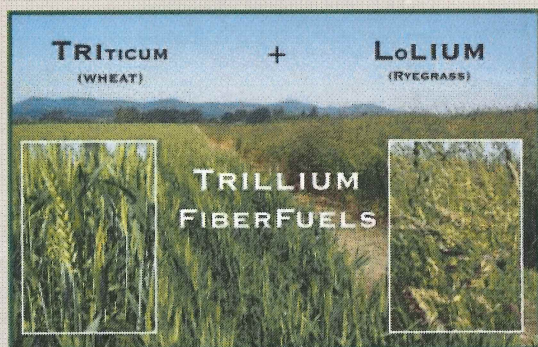
Focus on Biofuels (Vince Remcho - Professor)

In the search for new local energy sources, a young Corvallis company is betting on two of the Willamette Valley's most abundant crops – wheat and ryegrass.

At the March 12 Corvallis Science Pub, **Chris Beatty**, president of Trillium FiberFuels, and **Vince Remcho**, an Oregon State University chemist, discuss Trillium's collaboration with OSU to develop ethanol and other products from agricultural waste products.

According to the Renewable Fuels Association, the nation produced more than 13 billion gallons of ethanol in 2010, mostly from corn. The 2007 federal energy act set a national target of 36 billion gallons by 2022. Much of the gap is expected to be filled by ethanol from cellulose.

Yeast is typically used to ferment biomass sugars into ethanol. One challenge is that xylose, the second most common sugar, does not ferment. Trillium's technology uses an enzyme to convert xylose to a form that yeast can ferment.



In their presentation, Beatty and Remcho discussed the potential for this technology to expand the nation's biofuel industry. In addition, they outlined "some interesting opportunities in the biomass sugar world that have emerged during Trillium's journey," Beatty said.

Chemistry

POWGEN Workshop Nets Ph.D. Student a Paper in Scientific Journal

Oregon State's Rosa Grajczyk sees neutron science exposure and new contacts as 'assets throughout my career.'

A young Oregon State University graduate student, working for **Mas Subramanian**, has successfully turned her participation in a two-day POWGEN Neutron Diffraction workshop at ORNL's Spallation Neutron Source (SNS) into a published paper in the *Journal of Solid State Chemistry*.

Participants at the workshop last September were invited to bring along their own samples for analysis on the time of flight diffractometer. They received training on the instrument and then were taught how to collect and analyze the data, said POWGEN lead instrument scientist Ashfia Huq. "We used the sample changer, which can hold up to 24 samples, and everyone was given two and a half hours worth of time," Huq said. News of a second paper to emerge from the workshop recently reached her, as well.

Rosa Grajczyk, a second-year doctoral student in chemistry who is working on structural properties of new materials, brought a sample from the solid solution of indium-gallium-magnesium-oxide to the workshop. "The indium-gallium-magnesium-oxide study is a part of my thesis, which is based on the structure-property relationships of the trigonal bipyramidal site in layered oxide compounds," Grajczyk explained. Trigonal bipyramid formation refers to a molecular geometry in chemistry, featuring one atom at the center and 5 more at the corners. In this structure, the

bond angles surrounding an atom are not identical, as no geometrical arrangement can result in five equally-sized bond angles in three dimensions.

"The Powgen workshop was a great experience that I would highly recommend for other scientists to participate in," the young researcher said. "The amount of detail that went into the workshop was incredible, which was facilitated by the helpfulness of everyone at the ORNL facility. I feel that the amount of knowledge that I received during the workshop has been extremely helpful to my research. And the contacts that I was able to make during that time will continue to be an asset throughout my career."

Before coming to the workshop at SNS, Grajczyk had already accomplished an extensive part of her research on the material, using X-ray diffraction. But neutron diffraction was also necessary, to determine how much of each element was in the TBP site, in addition to the other structural parameters of the material. "The use of neutrons is necessary because of the increased detection of the lighter magnesium and oxygen atoms, compared with what can be observed with X-ray diffraction. "POWGEN was useful for collecting this data because of the high intensities that can be achieved by this instrument, while still maintaining the high amount of resolution that is required for our analysis."

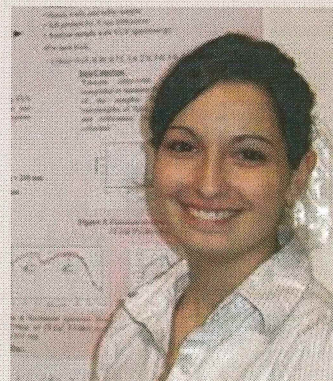
Their initial X-ray diffraction data showed that when they added

magnesium into the material's structure, the c-parameter, which is relative to the height of the structure, increased. The neutron diffraction data then allowed them to determine the bond lengths of the trigonal bipyramidal site in their sample, and to compare these lengths to those of the InGaCuO_4 and InGaMgO_4 end members.

Their findings were accepted for publication in the *Journal of Solid State Chemistry*. Huq said the workshop included lectures on the basics of TOF neutron diffraction and on the software packages GSAS (General Structure Analysis System) and Fullprof, routinely used for powder diffraction data analysis.

Other lectures included analysis of magnetic structures by Vasile O. Garlea of the HB2A diffractometer at HFIR and by Jülich scientist Olivier Gourdon titled, "From Disorder to Long range order, Jana2006 as a new software tool."

Funding for this work was from the National Science Foundation. Research at ORNL's Spallation Neutron Source sponsored by the Scientific User Facilities Division, DOE Office of Science.



Chemistry

Undergraduate Research Launches Student to New Heights

When **Sam Bartlett**, an Oregon State University senior in chemistry, put on his lab coat, goggles and latex gloves in the summer of 2010, he didn't expect to wind up helping organic chemists around the world.

OSU undergraduate Sam Bartlett, right, used the tools of organic chemistry — reflux condenser, thin-layer chromatography, nuclear magnetic resonance — to develop a new synthetic chemistry method. He works with Assistant Professor **Chris Beaudry** in the new Linus Pauling Science Center. (Photo: Karl Maasdam)

With guidance from Professor Beaudry, he developed the most efficient and productive method yet reported for a fundamental step commonly used to synthesize new molecules.

Bartlett and Beaudry published their findings in October in the *Journal of Organic Chemistry*. The research has already drawn the attention of pharmaceutical scientists and has potential in fields from nanotechnology to biochemistry.

"If you're a synthetic chemist and you want to build complicated molecular architectures — a pharmaceutical, a new material for nanotechnology, a new probe for a biological system — you need to make new chemical bonds," Beaudry said. "This oxidation is convenient to do, very mild, operationally simple and high yielding. It is the solution to this problem."



(Photo: Karl Maasdam)

Bartlett's discovery started with a chance meeting. The student from Corvallis, Oregon, was taking an advanced chemistry course from Beaudry and happened to meet the professor in the Interzone, an off-campus coffee shop. "I asked him if he had any research opportunities in his lab," Bartlett said. "I suggested that Sam look into this problem," Beaudry recalled. "There was some indication that we had a lead hit on how to solve it. Sam took it and ran with it."

The problem was to convert one commonly used compound (beta-hydroxyketone) to another (beta-diketone). Both are fundamental starting points in the synthesis of more complex organic molecules. Previous methods produced unwanted byproducts and only 30 to 35 percent of the desirable molecule, says Beaudry.

Bartlett found that an oxidant called IBX (o-iodoxybenzoic acid) converts nearly 100 percent of the beta-hydroxyketone to the beta-diketone, thus saving chemists time — and simplifying the synthesis process.

Bartlett, who graduated from Crescent Valley High School, is applying for graduate school, where he intends to focus on synthetic organic chemistry. "I just like the search for new knowledge," said Bartlett. "There's a lot we still don't know. There are problems out there we still need to solve. Even if I don't find a solution, I'm contributing to the scientific community."

Bartlett had support for his research from two programs: the Undergraduate Research, Innovation, Scholarship & Creativity program sponsored by the OSU Research Office, and a Howard Hughes Medical Institute fellowship. He is continuing to work in Beaudry's lab in the new Linus Pauling Science Center on steps to make a natural plant compound that has potential anti-fungal and anti-inflammatory properties.

Chemistry

Awards in Chemistry

Mas Subramanian receives Chemical Research Society of India (CRSI) Medal



Dr. Mas Subramanian, Milton Harris Professor of Materials Science at the Department of Chemistry, Oregon State University, is being honored with the 2012 Chemical Research Society of India (CRSI) Medal. This medal is awarded exclusively to outstanding chemists of Indian origin who work outside of India. The medal was presented to him during the 2012 CRSI 14th National Symposium in Chemistry held in early February in Trivandrum, India.

Mas Subramanian, is an internationally recognized expert on designing inorganic solid state functional materials, also a Signature Faculty Fellow in the Oregon Nanoscience and Microtechnology Institute.

Before joining OSU in 2006, Subramanian was a scientist at DuPont Central Research and Development. He has published 300 papers in professional journals, which in turn received over 12,000 citations. His work yielded 54 patents that are in place or pending. In recognizing his outstanding contributions to science and various technologies, DuPont Company awarded him with prestigious Charles Pedersen Medal (named after Chemistry Nobel Laureate from DuPont) in 2004.

An expert in such fields as high temperature superconductivity, thermoelectrics, magnetoresistive

materials, catalysis and solid-state dielectrics, Subramanian is continuing his work in the discovery and development of new materials. Recently Subramanian's group discovery of new intense color pigments at OSU received worldwide attention and is featured in popular press all over the world including New York Times.

Subramanian received a doctoral degree from Indian Institute of Technology, Madras, India in 1982 and master's and bachelor's degree with honors at the University of Madras in India in 1977 and 1975 respectively.

Walter Loveland, APS Outstanding Referee Faculty



Walter Loveland was designated one of the 149 Outstanding Referees of the *Physical Review* and *Physical Review Letters*

journals, as chosen by the journal editors for 2012.

Initiated in 2008, the Outstanding Referee program expresses appreciation for the essential work that anonymous peer reviewers do for our journals. Each year a small percentage of our 60,000 active referees are selected and honored with the Outstanding Referee designation. Selections are made based on the number, quality, and timeliness of referee reports as collected in a database over the last 25 years. The program recognizes about 150 referees each year, although larger groups were selected in 2008 and 2009.

A full listing and further details on the program are available here: <http://publish.aps.org/OutstandingReferees>

Vince Remcho, Interim Dean

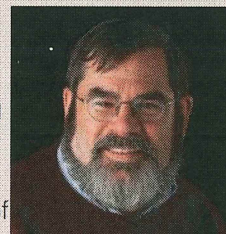
Vince Remcho, Professor of Materials Science, took on the role of Interim



Dean of the College of Science in April of 2012. Formerly the Associate Dean for Research, Graduate Studies & Administration, Vince has a strong background in administrative processes on the College of level where he will continue to support research throughout the College. Vince will maintain the same high level of administration as his predecessor, Sherm Bloomer, while the search for a permanent dean is performed.

Kevin Gable, Faculty Senate Chair

Kevin Gable was selected by the OSU faculty to serve as President of the Faculty



Senate in 2013. While his core focus in the position is faculty as a whole, he does see this as a benefit to the Department by maintaining the connection between our missions in instruction, research and outreach with activities across the University.

Chemistry

Awards in Chemistry (continued from page 7)

Subham Mahapatra – 2012-13 Bayley Graduate Fellow
Subham Mahapatra, a senior graduate student in **Rich Carter's** lab, has been awarded a \$4,000 Bayley Graduate Fellowship for the 2012-13 academic year. Congratulations on Subham's selection in this prestigious university-wide fellowship competition. Selection for this award is certainly an honor for which Subham may be justifiably proud.

Carlos Manzano selected as a winner of one of the 2012 Graduate Student Paper Awards from the Division of Environmental Chemistry of the American Chemical Society
This is the highest award given to students by the Division of Environmental Chemistry. Carlos will be presenting his paper at the Fall

ACS Meeting in Philadelphia at the special C. Ellen Gonter Environmental Chemistry Awards Symposium.

The Research Office is pleased to announce the awards for the Undergraduate Research, Innovation, Scholarship and Creativity (URISC) Winter/Spring 2011-12 solicitation. There were a total of 40 submissions. Based on the recommendation of the URISC Advisory Panel, the Vice President for Research awarded 11 proposals totaling \$12,474.

The following proposal from many has been selected for funding: **Glaus, Matt** [Major: General Science] (Faculty Project Advisor: **Daniel Myles**, Dept. of Chemistry, College of Science): "*Rational Synthetic Routes to Dioxadiazinyl Radicals*"

Paul Blakemore was promoted to Associate Professor with tenure in 2011.

Staci Simonich was promoted to Professor in 2011.

Glenn Evans retired in 2011.

Jim White named Fellow by ACS
The American Chemical Society (ACS) inducted 213 distinguished scientists as ACS Fellows during the Society's recent national meeting in Denver. Selection is based on outstanding accomplishments in chemistry and important contributions to ACS, the world's largest scientific society. James White, who has an emeritus appointment in chemistry at OSU, was among those selected.

Undergraduates of the Winter 2012 Term



Corey Wright Winter 2012 Undergraduate of the Term

Corey Wright is a senior undergraduate student in the Chemistry Department at Oregon State University and has been selected a Winter 2012 Chem Major of the Term. Corey grew up in Dallas, OR on a small farm. His interest in chemistry started during high school and he has had a long standing desire to become a medical doctor. He hopes to enroll in medical school in Fall 2013. Corey has excelled in his courses with his favorite chemistry classes to date being "Organic chemistry lab with Emile" and Quantum Theory with Professor **Wei Kong**. This unusual combination of favorite courses likely contributed to his current research project which is a collaboration between emeritus faculty members **Joe Nibler** (a physical chemist) and **Jim White** (an organic chemist).

In his spare time, Corey likes to play soccer and music as well as interact with new international students. He has been to Mozambique twice to do charitable work – once with an orphanage and once with street boys. Corey feels he is blessed to have the education and opportunities he has had at OSU and we are honored to have such high achieving students amongst our ranks!



Mai Duong Winter 2012 Undergraduate of the Term

Mai Duong is a senior undergraduate student in the Chemistry Department at Oregon State University and has been selected a Winter 2012 Chem Major of the Term. Mai grew up in Portland, OR and graduated from David Douglas High School. When applying for college, she selected

OSU after having been awarded the first Sally Runes-Hicks Scholarship (<http://osufoundation.org/campaign/update/2010/apr/impact.htm>). Her interest in chemistry was sparked by her high school chemistry teacher **Renee Gibb**. Since her time at OSU, her favorite chemistry courses have been in the area of organic chemistry because, as Mai is quick to point out, "it made the most sense to me." She is currently conducting research in **Claudia Maier's** laboratory where she works with mass spectrometry instruments. For fun, Mai enjoys hiking and hanging out with her friends. She is a chemistry major with an education option and hopes to become a high school chemistry teacher when she graduates. Students like Mai will help to inspire the next generation to focus on the sciences and we are honored to have her as a Chemistry major in our Department and a student at OSU!

Chemistry

Featured Alumnus



Professor **Karen Wooley** has been selected as our Featured Alumnus for the Spring 2012 Departmental Newsletter. She currently holds the W. T. Doherty-Welch Chair in the Department of Chemistry at Texas A&M University with a joint appointment in the Department of Chemical Engineering. Dr. Wooley received her B.S. in Chemistry at Oregon State University in 1988, and her Ph.D. under the direction of Professor Jean M. J. Fréchet from Cornell University in 1993. She then began an academic career as an Assistant Professor of Chemistry at Washington University in St. Louis, Missouri, was promoted in 1999 to Full Professor with tenure, was installed as a James S. McDonnell Distinguished University Professor in Arts & Sciences in 2006, and in 2007, received an appointment in the School of Medicine, Department of Radiology. In July 2009, Dr. Wooley undertook her professorship at Texas A&M University and in 2011 was awarded the title of University Distinguished Professor.

The reputation of strengths in the sciences, the new teaching laboratory facilities and honors program in chemistry initially drew her to OSU (1984-1988). She remembers the dedication of the faculty as remarkable – specifically she commented on Professors **John Yoke** and **Gerry Gleicher**, who co-taught parts of the integrated laboratory course. She joined Professor **Steve Gould's** group as a freshman and it was through interactions with him and his students that she became committed to chemical research. She still remembered working with John Wityak who was her primary mentor – teaching her synthetic organic chemistry techniques that prepared her well for graduate study at Cornell University and starting up her own laboratory, ultimately, at Washington University. Professor **Jim White** also has been an inspiration for the past twenty-five years. Although she did not have a formal course with Jim, he reinforced chemical concepts and reaction mechanisms during independent study sessions during her senior year. He also encouraged her to read the literature carefully and critically, to solve problems, to question everything that she did not understand, and to think creatively beyond the work described in a particular article. Finally, she comments that the greatest impact has come from Dean Richard Thies, who had spent a sabbatical at Dow and returned to teach a course on polymer chemistry. Polymer chemistry then became her passion, and motivated her Ph.D. study at Cornell University to conduct dissertation research under the direction of Professor Jean Fréchet.

There were teaching, leadership, and networking opportunities at OSU that also had impact. As president of the Student Affiliates of the American Chemical Society at OSU, the Department of Chemistry supported her attendance at the 193rd American Chemical Society National Meeting in Denver in 1987, where Linus Pauling delivered a lecture on the topic of the nature of the chemical bond, the same year that he was awarded the ACS Award in Chemical Education. He later visited OSU and treated several of the students to lunch, during which he advised everyone to eat as much vitamin C daily as possible.

Overall, she credits the accomplishments that have come in her research program to her desire to extend the level of precision that synthetic organic chemists exert over the construction of molecules, which she was exposed to as an undergraduate research student at OSU, to macromolecular and nanostructured materials. This research requires rigorous integration of synthesis with physical and analytical studies, with which she gained experience through the integrated laboratory courses at OSU, to accurately characterize the compositions, structures and properties.

We congratulate Karen on all her successes and hope to see her in Corvallis again soon!

Get all the latest news from the College of Science, Chemistry Department.
Visit our Blog: The Erlenmeyer Flask...where REAL chemistry happens!
<http://blogs.oregonstate.edu/erlenmeyer/>



Chemistry

Welcome to Chemistry



Dr. Christopher Beaudry joined September 2009

Christopher Beaudry grew up outside of Milwaukee, Wisconsin. He excelled at school at a young age and was awarded a scholarship to attend the University of Wisconsin, Madison; he was one of the first people in his family to go to college. At Madison, he discovered a love of organic chemistry in an advanced course taught by Prof. Steven D. Burke. As a result of this experience he began working in the research laboratory of Prof. Burke and decided to pursue graduate study in synthetic organic chemistry. He moved on to the University of California, Berkeley and was one of the first students to join the group of Prof. Dirk Trauner. At Berkeley, Chris investigated a class of reactions known as electrocyclizations. Long appreciated on a theoretical level, these reactions were not recognized for their full biological relevance. It was the work of Chris and others that contributed to the realization that these reactions are more prevalent in biosynthesis than previously thought. His investigations resulted in the enantioselective synthesis of SNF4435C and SNF4435D, two compounds that selectively suppress proliferation of B-lymphocytes over T-lymphocytes. Since the activity of the SNF compounds is complementary to the blockbuster pharmaceuticals cyclosporin A and FK506, the SNF compounds represent lead compounds in the search for new immunosuppressants.

After Berkeley, Chris was fortunate to receive an NIH postdoctoral fellowship working with Prof. Larry Overman at the University of California, Irvine. Chris worked on the synthesis of macfarlandin E, a molecule that causes the irreversible fragmentation of the Golgi apparatus in mammalian cells. The phenotype of macfarlandin E is unique in that Golgi fragments remain localized in the pericentriolar region surrounding the nucleus. Furthermore, only a few milligrams of macfarlandin E were isolated from natural sources, making chemical synthesis the only access to this molecule. Since the Golgi is increasingly recognized as a cell-cycle checkpoint (e.g. proper Golgi fragmentation is required prior to mitosis), this research could have profound implications in cellular biology. As a result of Chris's efforts, investigations on the structural requirements of macfarlandin E (and related spongian diterpenes) for irreversible fragmentation of the Golgi are underway.

Chris's interests of the ability of molecules found in nature to cure disease continues at Oregon State University. His group works on the development of new chemical reactions that will allow expeditious preparation of molecules with important biological activities. He is particularly interested in nitrogen-rich molecules, using transition metal catalysts for the preparation of molecules that display non-central chirality, and the formation of benzylic stereocenters. The ability to efficiently build molecular architectures of high complexity is central to all of these interests. Once prepared, the Beaudry group will use these synthetic compounds to find their cellular targets, test for medicinal applications, and investigate biological mechanisms.

When not trying to solve big problems in science, Chris tries to dip deep into the soup bowl of life. Music has always been important to him, and he has been seeing live music in the Corvallis area, discovering new recorded music, reading about it, and he may even dust off those old guitars he's been moving around the country since his college days. Chris enjoys the taste of good food and drink, and so Oregon has been a good fit for him. He investigates the flavors in nearby restaurants, blackberry patches, cheeseboards, and local watering holes.



Paul Cheong joined in September 2009

Paul Ha-Yeon Cheong is a Vicki & Patrick F. Stone Scholar assistant professor of Chemistry. When Paul was born in a small town in South Korea, his family was living in poverty. It was his parent's life-long dream for their child to be able to settle in the United States. A great many things have happened since then to bring Paul to Corvallis, OR. Paul spent most of his youth in Indonesia and Thailand, before coming to the US for his post-secondary education. He was originally an English major in his undergraduate institution of Bowdoin College, before he switched to Chemistry to receive his AB in 2001. He received his Ph.D. in Organic Chemistry from UCLA in 2007 under the tutelage of Professor K. N. Houk. After a brief stint as postdoc in the same lab, he started his independent career at Oregon State in 2009.

In every part of his life, Paul always had great advisors around him who were accomplished professionally and were great mentors (Just to name a few: Professors Ellen E. Burns, Elizabeth Stemmler, and Faraj Hasanayn at Bowdoin College; Professor K. N. Houk at UCLA). In becoming professor of chemistry, he found an ideal match between his love of research and his commitments to pay it forward to the future generations.

Paul's research involves discovering and explaining fundamental and practical principles that underlie chemistry and nature. Towards this goal, he applies state-of-the-art computational chemistry techniques and tools to a wide array of chemical mysteries. Paul was the first person to design a stereoselective organocatalyst using computational predictions. For his research accomplishments during his Ph.D. and postdoc, he won every major research award given at UCLA.

Paul is known for his walking meetings with people and his wide-ranging interests in science, history, and literature. In his spare time, he loves spending time with his family and friends.

(continued on page 11)

Chemistry

Welcome to Chemistry (continued from page 10)



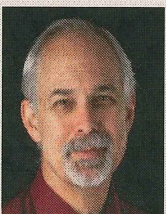
Chong Fang joined
September 2010

Chong Fang grew up in Wuxi (a scenic town near Taihu Lake and Shanghai), China and attended Wuxi No.1 High School that celebrated her 100th birthday in 2011. He received his B.S. in Chemistry and Computer Application (dual degree) from the University of Science and Technology of China (USTC) in 2001. He was awarded the Guo Moruo Scholarship, the highest undergraduate honor. Chong then flew across the Pacific and North American continent to settle in Philadelphia, pursued his graduate degree in the Department of Chemistry at the University of Pennsylvania (Penn) and received his Ph.D. in 2006 under the advisorship of Prof. Robin M. Hochstrasser, Donner Professor of Physical Sciences and Member of the National Academy of Sciences. His graduate work focused on the structure and dynamics of helices (a building block of proteins) in both water and membrane environments using the novel Two-Dimensional Infra-Red spectroscopy (2D IR). In one of his work he observed tertiary interactions within a transmembrane glycoprotein for the first time, and paved the way for studying the conformational dynamics of membrane-bound proteins. He was awarded the prestigious Dean's Scholarship in 2005. He stayed at Penn for a few months after graduation to complete a cool project concerning the ultrafast relaxation dynamics of a drug molecule in complex with its enzyme target, the HIV-1 reverse transcriptase (HIV-1 RT). This work unveiled the structural basis for the unusual potency of the drug, which received FDA approval on May 20, 2011.

After Penn, Chong moved across the US to the west coast in 2007, and did his postdoctoral research at the Department of Chemistry in UC Berkeley with Prof. Richard A. Mathies, G. N. Lewis Professor of Chemistry and Dean of the College of Chemistry at Cal. His work on the fluorescence mechanism especially in the ultrafast time regime showcased the resolving power of the newly developed Femtosecond Stimulated Raman Spectroscopy (FSRS) targeting photosensitive biomolecules such as the green fluorescent protein (GFP), and was featured on the cover of *Nature*. The two-ring wagging motion triggered by photoexcitation facilitates energy flow from the chromophore to the surrounding hydrogen-bonding network, and aligns it for efficient excited-state proton transfer on the picosecond (10-12 s) timescale. Subsequently the deprotonated chromophore releases green photons to go back to the ground state on the nanosecond (10-9 s) timescale, which is the famous green hue that GFP gets its name from.

In fall 2010, Chong found his new home in Corvallis, Oregon and started his independent career as Assistant Professor of Chemistry at Oregon State University. He remains interested in tackling modern biophysical and biochemical problems using state-of-the-art vibrational spectroscopies in the femtosecond to picosecond domain, resolving their intrinsic motions that are functional by taking structural snapshots (i.e. a molecular movie), and facilitating future bioengineering and biomedical advances through fruitful collaborations with leading scientists and researchers in relating fields. In his mind, life is beautiful and research is opportunistic in this exciting field where chemistry, physics meet biology, and real impact on human life can be expected.

In his spare time not concentrating on research in the Linus Pauling Science Center, Chong is passionate about music, writing, cooking, movies, theatre and travel.



Neal Sleszynski
joined in January
2009

Neal Sleszynski grew up in the Mohawk Valley of upstate New York. As an undergraduate he attended Clarkson University, a 100 year old private science and engineering institution, as a National Merit Scholarship winner. He was fortunate enough to be accepted in the research lab of Dr. Petr Zuman starting in the summer after his freshman year where he conducted research in physical organic chemistry using electroanalytical techniques. He worked in Dr. Zuman's lab for four years while earning his BS and MS. His thesis research examined the affects of substitution on the chemical equilibria and reduction of organic compounds. During his senior year he was a teaching assistant in the instrumental analysis lab.

He subsequently spent three years as the electroanalytical group leader in the analytical laboratories of Eastman Kodak, in Rochester, NY.

Returning to academia for his PhD, he went to work in the electroanalytical labs of Robert and Janet Osteryoung at the University of Buffalo. His thesis research involved the construction and characterization of microelectrodes and microelectrode arrays. As part of that thesis he used thin layer semi-conductor processing techniques to produce microelectrode arrays with dimensions as small as 10 μm . These arrays were characterized using square wave voltammetry to determine analytical figures of merit. As a graduate student Neal also supervised undergraduates conducting research in Dr. Janet Osteryoung's lab. During his time at the University of Buffalo he received fellowships from The Electrochemical Society, the ACS analytical division, and the University of Buffalo.

After finishing graduate school he spent a year as the laboratory manager of The Electrosynthesis Company, a privately held consulting and contract research firm, with expertise in designing and implementing large scale industrial electrolysis projects. The firm's owner, Dr. Norman Weinberg was an internationally known expert in electro-

(continued on page 12)

Chemistry

Welcome to Chemistry (continued from page 11)

organic synthesis. While there he was a Co-PI on a \$450,000 SBIR grant from DOD investigating the use of large scale electrolysis systems for the destruction of chemical and biological warfare agents.

He then went to work for the diagnostics division of Abbott Laboratories, a diversified health care company. During thirteen years at Abbott Neal was involved in the research and development of a variety of analytical sensors including ChemFETS, electrochemical gas sensors, optical and electrochemical biosensors for clinical metabolites, and optical and electrochemical immunoassays formats for a variety of bioanalytical applications. He also spent time in field quality monitoring compliance with FDA regulations.

In 1998 with several Abbott colleagues he left as a founding partner in the biotech startup Precision Research Incorporated (PRI), where he held the title of Vice President of Research and Development. While at PRI he was the principle investigator on a number of Small Business Innovative Research (SBIR) awards from the National Institutes of Health and the Department of Defense. Funded research included development of analytical techniques for the assessment of geriatric nutrition, the detection of bacterial biofilms, the detection of food and water borne pathogens, and novel techniques for the isolation and amplification of DNA.

In 2002 he accepted a teaching position at Carthage College, a small (2,200 student) liberal arts college where he discovered that teaching was much more fulfilling than industrial chemistry. At Carthage he taught a number of courses including general chemistry, organic chemistry, analytical chemistry, and senior thesis. Aside from the normal chemistry curriculum, he also taught Discovery – a science course for liberal arts students which covered topics from the Big Bang through Mad Cow Disease, Commercial Technologies – a special course in the Entrepreneurial Studies in the Natural Sciences program, and Heritage – a required freshman course which surveys topics in the history of western and non-western civilizations.

Neal joined OSU in January of 2009 with primary responsibility for Chemistry 324, Quantitative Analysis. He updated the course with new bioanalytical experiments and adapted the course for distance learners as a hybrid E-campus course. In rotation with other analytical faculty members he also teaches general chemistry, CH421 Analytical Chemistry (for majors) and CH662 Electroanalytical Chemistry.



*Paula Weiss joined
Fall 2010*

Paula Weiss grew up in the New River Valley in Virginia. After high school she took a break before earning her Associate's degree from New River Community College. She then earned a B.S. in Chemistry from Radford University. After that she pursued graduate work at Virginia Polytechnic Institute and State University (Virginia Tech) with Prof. Diego Troya. Her work focused on the use of reparametrized semiempirical Hamiltonians in direct dynamics studies. The use of semiempirical Hamiltonians in direct dynamics studies diminishes the computational cost of trajectory calculations and negates the need for an analytical potential energy surface when performing reaction dynamics studies. The reparametrization of semiempirical Hamiltonians increases their agreement with experiment and high level ab initio theory.

Paula then moved cross country in late 2007, never having been to the west coast before. She worked at Linn-Benton Community College for several years before joining Oregon State University in Fall 2010. She currently teaches 100-level General Chemistry courses. In her free time, she enjoys visiting the Oregon coast and the Oregon Shakespeare Festival.



*Paula Christie
joined August 2009*

Paula Christie has been working at OSU since 1997. She oversees the administrative office for the Chemistry Department, as well as coordinating employment for the department. She enjoys quilting in her spare time.

Kevin Alsip joined the Chemistry Department in June 2011 as a Lab Assistant. He makes sure that each class has the proper equipment, chemicals and set ups necessary for students to complete their required assignments. He monitors the issue room supplies, prepares chemical solutions and strives to maintain a safe laboratory. He graduated from Oregon State University in 2009. In his spare time he runs his personal Photo Booth business and enjoys spending time outdoors with his family.



*Kevin Alsip joined
June 2011*

Harold Anderson hails from Dallas, Oregon, he previously lived in Seal, Rock where he worked 19 years as a building inspector for Lincoln County. Harold has been working in home and grounds maintenance projects the past two years. He has many interests, he competed in sanddrag racing through the 70's and 80's. He is a self-taught automechanic. His latest passion is hiking the pacific crest trail with his buddies during the summer. Harold and his wife Tina enjoy camping, riding bikes or drifting a lazy river. He loves snowboarding and is always looking for someone to join him. He is very knowledgeable about classic rock n rollers and searches far and wide for a good concert every summer. Harold has two granddaughters and a grandson due this July, he very much enjoys time with family and friends and will not pass up a bold mocha espresso.

*Harold Anderson
joined March 2012*

(continued on page 13)

Chemistry

Welcome to Chemistry (continued from page 12)

Stan Burks joined in February 2011

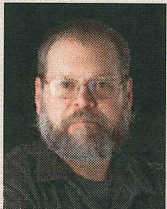


Luanne Johnson joined December 2009

Stan Burks works Monday and Friday in the small machine shop in the basement of Gilbert. His previous shop was at Hewlett-Packard where he worked as a Toolmaker for 28 years. This has been an interesting change for him. "It is rewarding to help the various customers with their projects and see them pleased when things come to completion." Tuesday thru Thursday Stan travels the states of Oregon and Washington delivering freight with a Semi-truck. He thinks it is nice to come back to the campus environment after being on the road for three days. "I do have to admit sometimes it is nice to get away, especially during good weather when the crops are in full swing. Delivering to Washington State in Pullman and down on the southern Oregon coast are two of my favorite trips."

Stan and his wife Judy, are blessed with 3 children and 1 Grandchild— so far! "I'm hoping for more. Two of our kids are graduates from O.S.U.!! I love to travel anywhere in the world, meet people and experience their lifestyle as much as possible in 2—4 week settings. I enjoy all types of outdoor activities. My favorite indoor activity is sampling different kinds of food, so if you need a guinea pig for a new recipe, I'm your man."

Luanne Johnson started as a temporary employee and officially joining the ranks of OSU as of April 2010. Luanne does her best to make sure the office runs smoothly for all. She helps students with class conflicts, instructors with scheduling, faculty with grants and maintains most of the department website. As a 2005 graduate of OSU, she says she "bleeds Black and Orange." In her off time, she blogs for a swiftly growing Stephen King website, reads and bakes.



Dan Keppinger in February 2010

Caitlin Lawrence joined January 2012



Michael Moses joined January 2012

Dan Keppinger started as a temp in Dec. '09 and became a full time employee in Feb. 2010 as the manager and chief purchaser for ChemStores. He worked previously for VWR International for 13 years as on-site customer service at Hewlett Packard. In his free time he enjoy working on his house, gardening and working on cars (the older the better).

Caitlin Lawrence joined the Chemistry Department in January 2012 as a Lab Assistant. She works primarily in the issue room in The Linus Pauling Science Center where she monitors supplies, prepares chemical solutions and strives to maintain a safe laboratory. She is responsible for ensuring the 200 level classes have the proper equipment, chemicals and set ups necessary for students to complete their required assignments. She graduated from McMaster University in Hamilton, Ontario with a degree in Biology and Environmental Sciences in 2010. In her spare time she enjoys participating in outdoor activities such as camping, hiking, swimming and sailing.

Michael Moses joined the Chemistry Department in January 2012 as a Lab Assistant. He is originally from Portland, but earned a B.S. in Biology in 2005 at a small university in Wisconsin. He promptly returned to the Pacific Northwest, eventually making his way to Corvallis in 2007 to further his education. In 2009, he earned a B.S. in Fisheries & Wildlife Science here at OSU. He has contributed to a wide variety of biological and ecological research, including: nutrient input and stream channel morphology in riparian zones, avian genetics and habitat selection, chemical communication in amphibians, marine biogeochemistry, ocean acidification, and trophic dynamics in the intertidal zone.



Talley Richardson joined April 2010



Kim Thackray joined January 2011

Besides science, Moses enjoys expanding his horizons through reading, learning, travel, and continually finding new ways to be happy and healthy. For recreation, he likes to hike, bike, backpack, camp, ski, and play guitar. He also enjoys experiencing quality foods, drinks, and music. In the future, he will earn a PhD, visit more countries and continents, hike the Pacific Crest Trail, and maybe one day settle down in British Columbia.

Talley Richardson's position is a split position between the Chemistry and Physics departments. As the Graduate Coordinator, she assists with recruiting, orientation, and serves as a resource for the graduate students. She has worked on campus since 1997.

In her personal life, her family likes to go camping and fishing. She has a large extended family in the area and enjoy spending time with them as well as gardening and running her children to their activities. Talley has two children (a teenage daughter and a son in preschool) and a teenage step-son.

Kim Thackray supports the instructors that teach online chemistry classes, assists current and potential Ecampus students, and works with Ecampus to market our course offerings. She is a graduate of Washington State University and the University of Portland, but loves being a Beaver now. In her free time, she loves to go biking with friends.

Chemistry

Chemistry Programs and Facilities

Center for Sustainable Materials Chemistry

is a Phase-II Center for Chemical Innovation sponsored by a \$20M, five-year grant from the National Science Foundation. The mission of the Center is to conduct curiosity-driven and use-inspired research to enhance the green chemistry toolbox with new methods and new techniques that will advance the scientific enterprise and transform the next generation of products.

OSU Distinguished Professor of Chemistry **Douglas A. Keszler**, Center Director, leads the efforts of five partner academic research institutions – University of Oregon, University of California Davis, University of California Berkeley, Washington University St Louis, and Rutgers University. Center research is focused on developing and understanding basic materials and green chemistry concepts that can pave the way for next-generation applications of a wide variety of high-performance electronic devices applicable in such fields as integrated-circuit manufacturing, solar energy, and medicine.

The Center is involved in numerous education and outreach activities. A graduate-level, three-week immersion course introduces green-chemistry concepts around a group research project that culminates in the submission and publication of a scientific article. A pre-first-year undergraduate immersion course is being designed to cover the concepts of general chemistry, providing an accelerated path to degree for high-achieving students. Through a partnership with Hermiston High School Center, graduate students are being placed in Hermiston on six-week internships, serving as near-peer mentors to improve student performance in chemistry. Center Outreach Days are being held in each county throughout Oregon with a purpose to build awareness of how chemistry creates the foundation for a healthy economy and contributes to

sustainability and societal well-being.

Through webinars and workshops, the Center educates in the area of innovation. Students, faculty, and partners learn how to recognize value in their research and how to translate that value to the market. Through these efforts, the Center has contributed to the founding of venture-backed Inpria Corp. and fledgling Amorphyx, Inc.

Online Chemlab

In 2005, Richard Nafshun taught the first OSU general chemistry online chemistry section for 4 students. Things have changed! This year, 30 online chemistry sections delivered by 7 instructors will have a combined enrollment of about 1500 students. Wait a minute, online chemistry... what about the labs? Many of these classes don't have labs (CH331 or CH411, for example), and some are taught as hybrids where students participate remotely and also visit OSU to perform labs. Four of the online gen chem classes, aimed at non-science majors, use an online chemistry lab program. Seeing the need for this capability three years ago, **Michael Lerner**, **Richard Nafshun**, and **Michael Schuyler** of OSU Chemistry teamed up with local software developers to create OnlineLabs, LLC.

The current program generation (demos at www.OnlineChemLabs.com) contains a set of 25 virtual labs that can support a full year of General Chemistry. The labs are based on real experiments and allow students to generate data that incorporate both random and systematic error. There are some advantages to online delivery – students can be exposed to modern techniques that don't work in on campus labs – they may be too costly, time consuming, dangerous, or resource-limited. Some examples include NMR, calorimetry, osmotic pressure, electroplating, nuclear chemistry, and combustion analysis.

Electron Microscopy Facility

(EMF) at Oregon State University (OSU) is a service facility providing faculty, staff, students, and collaborators access to electron microscopes and related instrumentation. EMF was created in 1967 in the College of Agricultural Sciences' Department of Botany and Plant Pathology to support life and materials sciences research programs, and is now affiliated to College of Science. EMF receives support from the Office of Vice-President for Research and the facility's client colleges, and is overseen by a steering committee whose members are from the client colleges. The Facility is located in the 145 EM Suite of the new Linus Pauling Science Center.

The EMF currently has three scanning electron microscopes (SEM). One is an FEI Quanta 3D Dual Beam SEM, which incorporates a focused ion beam (FIB) that may be used for micro-machining and sample preparation of specimens for study by transmission electron microscopy (TEM). The ion beam can also be profitably used to machine new surfaces on specimens, which if imaged and chemically analyzed, can be used to develop visual 3D image and (elemental) chemistry information about specimens. Our second SEM is an FEI Quanta 600F Environmental SEM, an instrument best suited for studies of specimens under different environmental conditions. In this microscope, humidity, temperature, and/or vacuum conditions can be maintained – or changed – during an examination, which expands the wealth of information that can be obtained from suitable samples subjected to different levels of humidity, temperature, and pressure. Our third SEM is the FEI Nova NanoSEM 230 Ultra-high Resolution SEM, required if the goal of your microscopy is to image nanostructured materials. With a Through-Lens Detector (TLD), it offers a better resolution at low voltage (1.6 nm) than that (2.9 nm) offered by Quanta SEMs. All SEMs have x-ray chemical analysis capability.

(continued on page 15)

Chemistry

Chemistry Programs and Facilities (continued from page 14)

In addition, the Quanta 3D SEM/FIB is enhanced by E-Beam Lithography, Electron Backscattered Diffraction (EBSD) and Orientation Imaging Microscopy (OIM) capabilities. A cathodoluminescence (CL) detector for imaging materials, which fluoresce at visible/near photon wavelengths under electron beam excitation, will be added soon. Complementing our SEMs, funds from the National Science Foundation (NSF MRI, award # 1040588), Murdock Charitable Trust, ONAMI, OSU Research Office and several OSU academic colleges, have provided us with an advanced high resolution transmission electron microscope, an FEI Titan 80-200 (TEM). This TEM incorporates the newest X-Ray chemical analysis (ChemiSTEM) and Electron Energy-Loss Spectrometry (EELS), augmented by an in-situ heating stage, a double-tilt sample holder, a cryo-stage for ultra-low temperature microscopy, and tomography for 3D specimen image reconstruction. The new TEM makes it possible to do chemical analysis with sub-nanometer resolution and is especially suited to investigating compounds at atomic levels.

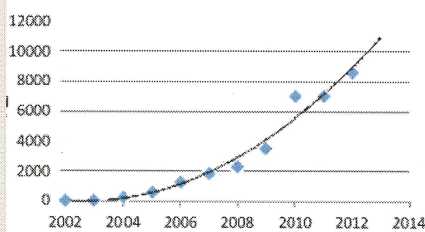
The EMF provides training sessions to students, staff, and faculty. Electronic card access allows authorized operators 24/7 access to the Facility. EMF seeks collaborations with faculty, students from OSU, other universities, and with researchers affiliated with national laboratories and industry. We anticipate increasingly important collaborative roles providing electron microscopy services to Pacific Northwest technical and research endeavors and explorations. More information about EMF can be found at website: <http://www.science.oregonstate.edu/emfacility>. (Provided by Dr. Yi Liu, Director of EMF)

ECAMPUS Chemistry 2012

The past year has been another period of growth for our department's online program. Each term, including summer, we have online (OSU Ecampus) enrollments of approximately 350-400 students. In 2011, about 12% of all our departmental instruction was

performed online. This percentage of online effort has approximately doubled in the past 4 years, reflecting a rapidly growing importance of online delivery. Meanwhile, our department's online student credit hours (SCH) totaled 8600 this year, and have increased 350% over the same time period. Many of our more astute general readers, and all our physical and computational colleagues, will thereby deduce that these differential growth rates require that total departmental SCH has increased significantly over the past 4 years. And indeed it has! Both on campus and online, our instructional program is in high demand, and this demand continues to increase every year.

OSU Ecampus Chemistry SCH



Chemistry offers full sequences in General and Organic Chemistry as online or blended courses. In our content area, blended courses usually indicate that the lecture and associated materials are delivered online, whereas the lab component is taught in a compressed version on campus. Our Inorganic Chemistry sequence offerings, CH411e and CH412e, have relatively small but growing enrollments, now totaling about 60 students per year. As far as the instructor knows, this is the only online inorganic sequence available, anywhere. Besides these full sequences, we have CH130 (General Chemistry of Living Systems) and several upper-level courses offered with online or blended delivery.

Growth in the program has its benefits. A major plus is our ability to add top-notch faculty and staff into the program. Dr. **Marita Barth** joined our department with a major task in online instruction. **Kim Thackray**

joined to serve as an admin for the online program. Many of our current and arriving faculty and staff will be increasingly involved in our online efforts over the coming years.

Growth provides opportunities. The department this year is using some Ecampus development funds to begin creating modular content that can provide online (and on-campus) students with multimedia learning resources. Towards this end, we initiated a partnership with our neighbor to the north, Portland Community College. It's early in the development, but we hope to place the first modular components in student hands, or more accurately on student computer screens, shortly.

All is not roses. Growth generates difficulties as well. Our increased online SCH strains our teaching capacity at times, and it always seems to be one of those times. Another issue is maintaining consistency in a sometimes bewilderingly diverse set of class offerings. Online delivery allows much greater

freedom in class schedules and timing, and we try to adapt to serve student needs. As an example, our department currently offers a 10-week CH121 course on campus three times per year, a 10-week CH121e online course every term including summer, and a compressed 3-week CH121e course in summer. Each class may involve more than one instructor, and the instructor set changes from term to term and year to year. Meanwhile, it's essential that all these sections provide consistent content and outcomes, and that they connect with our similarly distributed CH122 offerings. A departmental E-campus committee will meet periodically during the year to help achieve these outcomes.

In sum, we are enjoying the benefits, opportunities and challenges of a growing program. It's an exciting time for online chemistry at OSU.

Linus Pauling Science Center
(please see front cover)



Department of Chemistry
153 Gilbert Hall
Corvallis, OR 97331

Update on The Campaign for OSU

Propelled by an outpouring of support from over 60,000 households, OSU has raised the goal of its first comprehensive fundraising campaign to \$1 billion. The historic **Campaign for OSU** will continue through 2014, increasing support for Oregon State students, faculty, and programs.

Through contributions of over \$810 million, OSU alumni and friends have already advanced a wide range of opportunities for students and faculty through:

- 23 new or renovated facilities, including the Linus Pauling Science Center;
- 450 new scholarship funds, including support for over 250-300 students per year in the College of Science;
- 54 new endowed faculty positions, including a College of Science fund to advance faculty who are focused on technology innovation and commercialization.

University priorities for the final stage of the campaign include support for OSU's high-achieving students and world class faculty. A matching program through the Office of the OSU President aims to double the number of endowed Presidential Scholarships, the university's most prestigious undergraduate scholarship for in-state residents. In addition, building on the \$21 million success of the first matching program for faculty support, the Provost's Office will continue to match gifts that create new endowed faculty positions. Donors can increase the impact of their giving through these two initiatives as OSU makes progress toward the \$1 billion goal.

Hundreds of donors to the Department have made an impact through gifts to the Department of Chemistry Unrestricted Fund. With gifts of any size, donors enable us to send students to conferences, purchase new equipment, host visiting faculty from around the world, and hold events to celebrate the achievements of our students and faculty. All Chemistry Department alumni can make a difference with a contribution to this fund. For more information about The Campaign for OSU and how to make a gift of any size, please visit: www.campaignforosu.org.

We join the University and the OSU Foundation in thanking you for all of your support during the historic Campaign for OSU. Your philanthropy is making a positive difference in the department, the College, and the University. **Thank you.**

