



Mudd In Your Eye

Newsletter of the Department of Chemistry, Lehigh University

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“Great importance is given to chemistry as an elementary branch of learning.” — *Lehigh Register 1866*

DEPARTMENT WELCOMES NEW FACULTY

Three new faculty members will join the department during the next year. **Bruce E. Koel** (B.S., M.S. Emporia State University, Ph.D. University of Texas at Austin, Post-doc CalTech), begins in August. He comes to



Lehigh from the University of Southern California, where he has been since 1990 and was most recently professor of chemistry and material science. Prior to USC he was associate professor of chemistry and a fellow

of the Cooperative Institute for Research in Environmental Sciences at the University of Colorado at Boulder starting in 1983.

Collaborating with peers and visiting scientists from all over the world, he has been engaged in cutting-edge research projects in surface science, nanomanipulation and catalysis. He was a cofounder of the Laboratory for Molecular Robotics at USC in 1994. He describes his work as “life at the edge” because “surfaces are where the action is.” His research program is aimed at characterizing and understanding chemical reactions at surfaces. Surface chemistry and interfacial processes lie at the heart of technologies associated with the chemical and petroleum industries, production of electronic materials (growth, device fabrication, and processing), sensors and diagnostic devices, and environmental and atmospheric chemistry.



Kai Landskron (University of Bayreuth, Ph.D. *summa cum laude* Ludwig Maximilians University Munich) is currently a post-doctoral fellow in the chemistry department at the University of Toronto with Professor Geoffrey Ozin and will come to Lehigh in January 2006. His research is focused on organic-inorganic hybrid solid

state materials and is interdisciplinary in nature compris-

ing synthetic inorganic, organic, and solid state chemistry. Materials' properties characterization and optimization also involves physical chemistry, materials science, and materials engineering. He believes that materials chemistry provides an excellent opportunity to integrate fundamental and application-oriented science. Landskron is particularly interested in hierarchically ordered materials with a well defined structure at multiple length scales ranging from the nanometer, micrometer to the millimeter level. Potential technological uses include catalysis, sensing, separation, gas storage, chemical delivery, and microelectronics.

His work at Toronto with Professor Ozin received considerable attention in late 2004 when they reported the synthesis of a new class of materials called periodic mesoporous dendisilicas (*Science* **2004**, *306*, 1529–1532). These materials have the potential for drug delivery when used as patches placed on the skin, providing controlled delivery of small amounts over a long period of time to the blood stream and thus eliminating the inconsistencies of delivery by injection.

Dmitri Vezenov (B.S. *cum laude* Moscow State Univer-



sity, M.S. Case Western Reserve University, Ph.D. Harvard University) is currently a post-doctoral fellow in the chemistry department at Harvard with Professor George M. Whitesides and will come to Lehigh in January 2006. His research interests include intermolecular interactions in soft matter; chemical force mi-

croscopy; bio-nano-photonics; analytical microdevices; controlled synthesis and assembly of materials at meso-scale. Describing his research as interdisciplinary, where approaches of chemistry, physics and engineering converge, he has set the goal of understanding and controlling interactions in chemical systems at small scale (microns to nanometers). His work in meso-scale assembly of functional nanomaterials is aimed at providing reproducible and practical routes to assembling these materials into functional devices—a problem which involves making interconnects between the macro scale (mm to microns) and the nanometer scale.

ALUMNI NEWS

Kelly Bombach (B.S. 2001, M.S. Pharmaceutical chemistry 2003) is a research assistant in the biomedical laboratories of the University of Pittsburgh working on lung cancer. Her project is to understand the transcriptional regulation of fibrosis through chromatin immunoprecipitation and promoter arrays.

Russell P. (Rip) Carter, Jr. (B.S. 1952, M.S. University of Akron 1972) started his career at The Goodyear Tire & Rubber Company as a research chemist working on rubbers and plastics. Drafted into the army in 1957, he was stationed at Rocky Mountain Arsenal near Denver, where his Chemical Corps team converted the production of Sarin from a batch to a continuous process. After being discharged he returned to Goodyear Aerospace Co. and joined Mobay Chemical Co. (now Bayer) in 1975. When he retired he had 52 patents. He is listed in *Who's Who in America* and was named as one of 2000 outstanding scientists of the twentieth century by the International Biographical Institute in Cambridge, England. He writes fondly of his Lehigh days, recalling professors Fornoff, Zettlemoyer, Amstutz, Surfass, Billinger and Easton, for whom he did research on Hershey Chocolate.

Jim Frazee (B.S. 1968) is a Senior Research Investigator at GlaxoSmithKline Pharmaceuticals, where he has been for 35 years (through many company name changes!). Fortunately, he is still actively involved in research "at the bench," in addition to his other responsibilities. He is enjoying splitting his time between his organic synthesis research, his three-year-old grandson Benjamin, and outreach mission work with his church.

Gina R. Gencarelli (B.S. 2000; M.S., University of Wisconsin 2002) recently graduated from Seton Hall University School of Law and has accepted a position as a patent attorney at the law firm of Kenyon & Kenyon in New York, NY.

Robert J. Gill (B.A. 1944, M.D. University of Rochester 1948) is a physician in Philadelphia. He writes that his days as a chemistry major in the early 1940s "seem primitive" after reading the department newsletter.

Brian Hwang (B.S. 2002) was a biochemistry major with a minor in music. A Dean's and College Scholar, he also played violin in the Lehigh Philharmonic as a Baker's Scholar, sitting as concertmaster for 2 years. After graduating in three years he was a Presidential Scholar for his fourth year and studied basic business classes. He received an M.S. in applied physiology at the Chicago Medical School/Rosalind Franklin University of Health Sciences, and was admitted in 2004 to the Chicago Medical School. Currently he is finishing up his first year there and will be doing orthopaedic surgery clinical research

this summer on distal radius fractures.

Kristi Lenz (M.S. Pharmaceutical Chemistry 2004) was recently promoted to Group Leader at QS Pharma. Kristi just returned to work following the birth of her second child Kacey Elizabeth on March 15.

Elyse MacDonald (nee Lobach) (M.S. Pharmaceutical Chemistry 2004) is Project Leader in Clinical Trial Supplies for Glaxo-SmithKline. She did her Lehigh M.S. by distance ed and is now enrolled in Creighton University's PharmD distance ed program.

David E. Nadig (M.S. 1989, Ph.D. 1992) is Director of Global Analytical Development at Johnson and Johnson Pharmaceutical Research and Development. After completing his Lehigh doctorate, David worked for the McNeill Division and the Raritan (NJ) Divisions of J&J and is now at the Spring House (PA) site.

Lakeisha O'Keiffe (M.S. 2002) is currently serving as lecturer in organic chemistry at Baltimore County Community College and will join the faculty of Loyola Blakefield Academy, an all-male Jesuit-sponsored institution in Baltimore.

Steven L. Richheimer (B.S. 1968; Ph.D. Stanford 1975) is Director of Research and Development at Paxis Pharmaceuticals in Boulder, Colorado. Richheimer is an author on a dozen papers and four patents chiefly concerning pharmaceuticals and nutraceuticals.

Herbert Silber (B.S. 1962, M.S. 1964, Ph.D. University of California – Davis, 1967) has been appointed Treasurer of the Santa Clara Valley ACS Local Section to replace the elected officer who was unable to serve. Herb is Professor of Chemistry at San Jose State.

Brian R. Strohmeier (M.S. 1980, Ph.D. University of Pittsburgh) was named General Manager of ION-TOF USA, Inc. in February 2005. ION-TOF USA, located in Chestnut Ridge, NY, is a subsidiary of ION-TOF GmbH, a leading European manufacturer of high performance time-of-flight secondary ion mass spectrometers (TOF-SIMS) used for surface analysis.

Julie Yimoyines nee Dickensheets (B.A. 2002, M.S. Sec. Ed. 2003) was married recently. Since leaving Lehigh, she has been teaching high school chemistry and earth science at Morris Hills High School in Rockaway, New Jersey. She keeps in contact with Lehigh by serving on her sorority's (Pi Beta Phi) Alumnae Advisory Council (AAC). She has spent a few summers as a teaching assistant for Johns Hopkins Center for Talented Youth for their Fast-Paced High School Chemistry Course, both at Franklin & Marshall College in Lancaster, PA and at Hawaii Pacific University in Kaneohe, HI.

NEW ALUMNI – CLASS OF 2005

PH.D. CHEMISTRY

Lou Ann Miller Tom – *Dissertation:* Development of a Molecularly Imprinted Polymer (MIP) for the Analysis of Avermectin.

Jonathan Charles Zeszotarski – *Dissertation:* Molecular Structure at Aqueous Solution/Silica Interfaces and Nanoindentation Atomic Force Microscopy Studies of Kerogen.

PH.D. POLYMER SCIENCE AND ENGINEERING

Orasa Khayankarn – *Dissertation:* The Strength of Epoxy/Glass Interfaces After Hygrothermal Aging.

M.S. CHEMISTRY

Michelle Renae Batz, Peter W. Dematteo, Eric Allen Kemp, Gabriel C. Kuklis, Xing Xin Liu, Matthew Allen Ray, Lauren Michelle Williams, Chunli Zhao.

M.S. PHARMACEUTICAL CHEMISTRY

Sarah M. Abdulla, Keith Harry Burlew, Brian Michael Kozlowski, H. Marie Langford, Rebecca R. Lombard, Phung Le Ngo, Paul D. Rearden III.

M.S. AND M. ENG., POLYMER SCIENCE AND ENGINEERING

Thomas Michael Apse, Karl Allen Bromm, Yu-Lin Chang, Lisa Marie Fine, Daniel Joseph Martenak, Sang Huck Park, Saeid Zerafati.

B.A. CHEMISTRY

John Appel, Wai-Sing Chew.

B.S. CHEMISTRY

Sajid Sean Hasan, Hasnain A. Malik, James Lee McHale, James Halley McNeely.

B.S. BIOCHEMISTRY

Theresa Louise Carboni, Beth Ann Careyva, Jonathan Joseph Havel, Lori Elizabeth Hopkins, Li-Jen Huang, Philip Andrew Kish, David Robert Lowery, Shirley N.

Masand, Martin Robert Misiura, Robert Marc Moskowitz, Brendan Haley Oakes, Esther Nicole Pesciotta, Jessica Nicole Simons, Lauren Rebecca Smith, Andrea Lynn Stanus, Daniel John Stieh, Bentley Johnson Varghese, Tracy Lynn Vrablik.



STUDENT HONORS - 2005

Jonathan J. Havel — American Chemical Society Award presented to an outstanding senior major in chemistry or chemical engineering.

Esther N. Pesciotta — American Institute of Chemists Award presented to an outstanding senior majoring in chemistry, chemical engineering or biochemistry.

Beth A. Careyva — Merck Index Award presented to an outstanding senior chemistry major who has been active in student affairs.

Jessica N. Simons — Harry M. Ullman Chemistry Prize presented to a high ranking senior in the chemistry department.

Jonathan J. Havel — William H. Chandler Senior Chemistry Prize, established in 1920 by Mrs. Chandler, presented to a high ranking senior in the chemistry department. The Chandler Prize is also awarded to a high ranking chemistry major in the freshman, sophomore and junior classes.

Kevin E. Tempest — Alpha A. Diefenderfer Award presented to the highest-ranking junior in analytical chemistry. It is sponsored by the American Chemical Society Division of Analytical Chemistry.

Yang Zhang — The Roy R. Hornor (B.S. 1899) Fellowship, established in 1937, is presented to a graduate student at Lehigh with a research focus in inorganic chemistry.

Jingliang (Jason) Jiao — The Newton W. (B.S. 1901) and Constance N. Buch Graduate Student Fellowship, established in 1972 by the estate of Constance N. Buch for graduate students pursuing an advanced degree in chemistry.

Joseph Labukas — The William L. Heim Graduate Student Fellowship, established in 1935 for the promotion of research in the chemistry department.

Matthew Ray — The Chemistry Department Graduate Student Fellowship, established in 1927 as the first research scholarship in the department of chemistry.

NEWS FROM ALPHA CHI SIGMA: THERMITE THURSDAY

What chemist does not enjoy a good chemistry demonstration? Then Lehigh's Alpha Chi Sigma (AXΣ) Chapter has one for you—the thermite reaction. Hans Goldschmidt developed the Thermite process for welding rail sections together in 1893 and this method is still used today. Goldschmidt studied aluminothermic reactions in which aluminum metal was oxidized by an oxide of another metal, to show what happened when applied to carbon-free metals, such as chromium and manganese. He just happened to discover that this created first-class molten steel in small quantities that could be used to precision-weld two pieces of metal end to end, including rails. This welding compound was called Thermit[®]. The thermite process today uses a sand mold mounted around the two rail ends. A prebagged quantity of thermite powder is set in an extension ring container above the mold and ignited. The exothermic reaction of the ignited powder produces sufficient heat and welds metal to make a full fusion joint.

In the thermite reaction iron oxide (Fe₂O₃) and aluminum metal powder undergoes a reduction-oxidation reaction to form iron metal and aluminum oxide (Al₂O₃) in a thermodynamically spontaneous process:

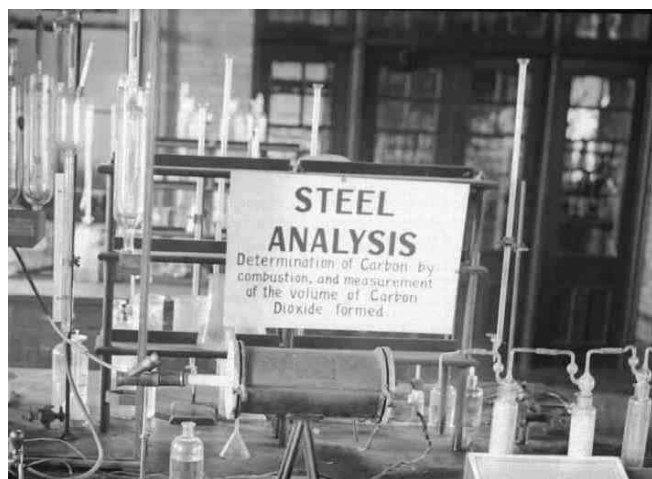


The products emerge as liquids due to the high temperatures reached (commonly 3000°C). Thermite contains its own supply of oxygen, and does not require any external source (such as air). Consequently, *it cannot be smothered and may ignite in any environment*, given sufficient initial heat. In fact, it has been used for underwater welding; igniting solid fuel rocket motors, and Thermite grenades and bombs were used in combat as incendiary devices, able to burn through heavy armor or other fireproof barriers.



AXΣ's method for showing this process is to run it in two small clay flower pots suspended from a ring stand. The hole in the bottom of the pots permits the molten iron to drip down, much to the delight of the audience. A bucket of sand is positioned under the pots to catch the molten iron as it falls. A piece of filter paper is placed in the pots to prevent the iron oxide and aluminum from falling out. To initiate the reaction between the rust and aluminum a starter reaction is required. Typically initiators include potassium permanganate (KMnO₄) and glycerine, potassium chlorate, sugar, and concentrated sulfuric acid, magnesium ribbon (or sparklers), some of which have been used by AXΣ. The demo was held outside on a concrete surface with the audience being kept at least 50 feet away. The demonstration has been done twice now, with more than 30 people attending each session. The demonstration has affectionately been named "Thermite Thursday" since it is always run late on a Thursday afternoon.

For more information see the following web sites:
www.degussa-history.com/geschichte/en/inventions/thermite.html
www.ccb.org/docs/ufgshome/pdf/05652N.pdf
www.chymist.com/Thermite%20reaction.pdf
—*Jeanne Berk*



For many years, chemical demonstrations were an integral part of several chemistry courses, and some universities even employed full-time demonstrators to assist the professor in their preparation. This photograph was taken at a chemistry open house in the Chandler Chemical Laboratory on April 20, 1934. Laboratories were filled with demonstrations of all kinds, including this one to demonstrate the "state of the art" steel analysis in which carbon was determined by combustion in the tube furnace (foreground) and the liberated carbon dioxide determined by absorption in one of the cylinders to the right. Students in coats and ties were present to talk to visitors and explain the demonstrations (See *Mudd in Your Eye* No, 27, July 2004, p. 3).

IN THE SPOTLIGHT: SAM NIEDBALA

The chemistry department has added its second Professor of Practice [see *Mudd in Your Eye* No. 27, p. 7, 2004]. **R. Sam Niedbala** is a department alumnus [M.S. 1983, Ph.D. 1986] who has spent the last eighteen years in industry before returning to his alma mater in 2004.



After completing his Ph.D. degree at Lehigh, Niedbala and three others founded Solar Care Technologies (which later became STC Technologies, Inc.) to develop consumer products. This successful venture was sold to Schering Plough, forcing the

group “to start over.”

The result was Orasure Technologies, Inc. Given his background in diagnostics, Niedbala, as chief science officer, lead the development of assays that were used in testing applicants for life insurance as well as human forensics. One “off the wall” product was a cryogenic treatment for warts.

“In my seventeen years with the company,” Niedbala says, “I was responsible for R&D, regulatory affairs, and sales and marketing for certain industries. I had the chance to try everything, and I especially enjoyed bringing new products to market. You learn that it is a combination of technologies that helps create success.” He especially found managing chemists and chemical engineers to be rewarding. Today Orasure is a publicly traded diagnostic company with headquarters in Bethlehem. It develops, manufactures, and markets proprietary immunodiagnostic tests capable of detecting substances in different body fluids including saliva. During his tenure there, Niedbala received over 60 approvals from the Food and Drug Administration for new medical device products and technologies. He received thirteen patents and published over forty papers during that time. Niedbala left Orasure in May, 2004, because of a personal mission statement that challenged him to change careers when he reached a certain age.

Within days of announcing his pending retirement from Orasure, Niedbala was contacted by several universities, but he found the idea of establishing a regulatory affairs program at Lehigh very attractive. He is now responsible for that program. To date he has developed and taught two new courses—“Drug Discovery to Approval” and “Medical Devices and Combination Technologies.” (The other three courses are “Analytical Methods, Valida-

tion and Data Manipulation, “Commercial Production, Validation and Process Qualification,” and “Pharmaceutics. Students select four of the five.)

“This program is a very interesting undertaking by the chemistry department,” Niedbala explains. “It signifies that there are non-core curriculum that can enhance the effectiveness of our graduates as they begin their industrial jobs. Today’s world is heavily influenced by agencies such as the FDA. They dictate how our science must be managed and documented if it is to be used to justify the introduction of new medical devices and pharmaceuticals. I see those taking these courses as electives towards their degree as enhancing their employability.” After completing the selected courses in the program, students receive a certificate indicating that they have been exposed to and learned all of the areas of science that are covered by FDA regulations.

As a Lehigh graduate student Niedbala did his M.S. in clinical chemistry with Ned Heindel and then worked with Keith J. Schray for his Ph.D. “We worked hard and produced a number of peer-reviewed articles before I graduated,” Niedbala recalls. “My interest in clinical biochemistry set the stage for my future work in industry. I look back at my time at Lehigh with satisfaction and learned a lot that helped me throughout my career.”

Not only is Niedbala teaching courses in distance ed, he is a distant ed student himself, working on a doctorate in religious studies at Trinity College of the Bible. It was another goal he set for himself as he left Orasure, driven by a strong personal faith and a desire to understand Biblical roots at a deeper level. “We never stop learning,” Niedbala says emphatically.



NEW GRADUATE CERTIFICATE PROGRAMS IN CHEMISTRY

Regulatory Affairs in a Technical Environment is just one of three new certificate programs now in place in the chemistry department. The other programs are Analytical Principles of Pharmaceutical Science and Bio-Organic Principles of Pharmaceutical Science. These programs are available on-line and both credit and non-credit options are available. Students pursuing the non-credit option will receive a certificate upon completion. Students taking the courses for credit will receive a certificate and the credits will be noted on a transcript. All courses may be completed entirely online. The first time a course is offered, it will be broadcast live on LESN and in delayed format through LESN-Online. All subsequent offerings will only be through LESN-Online. Complete details for all three programs can be found at:

http://www.distance.lehigh.edu/new_certificates.htm

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WE WANT TO HEAR FROM YOU

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