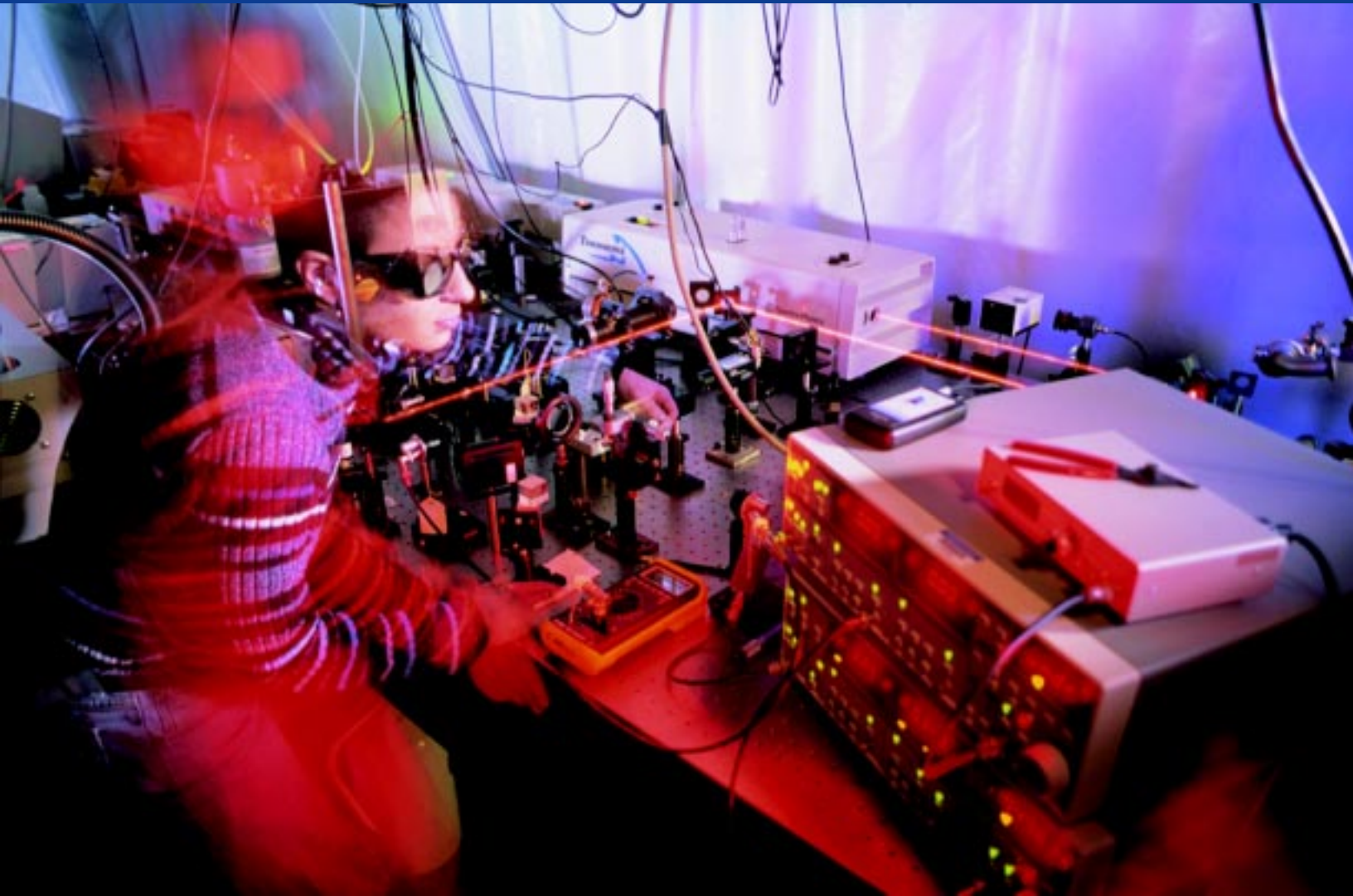


Department of Materials Science and
Engineering



SPRING 2004 ALUMNI NEWS

Ian Robertson named Department Head
Remembering Charlie Wert
Controlling material structure at nanoscale

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On the cover

Using a technique called time-domain thermoreflectance, graduate student Ruxandra Costescu is measuring the thermal conductivity of the thin-film nanolaminates synthesized in the University of Illinois laboratory of David Cahill. Photo by JasonLindsey.com.

Gear background photo on pg. 15 from budgetstockphoto.com

Editor's Note: Flashback 1940's

Thanks to metallurgy alumni who helped identify the photo on the back page of the Fall 2003 *MatSE Alumni News* as the metallurgy laboratory, circa 1945-46 (pictured at right). Dick Evanson wrote, "One of the jobs that helped put me through school was preparing samples for instructors and students in the room shown." Warren Schilke wrote, "I have been retired since 1986, having spent 34 years with General Motors, 4 years with ALCOA, and 1 year with Allis-Chalmers Corp. My metallurgical education was put to good use during those years and I am pleased to have followed that career." Glenn Goetsch reminisced, "I graduated in 1962 and spent many hours in that facility... many hours in the adjoining dark room as well. This class required much patience and could be frustrating at times but was responsible for 'hooking' my interest in metallurgy." Thanks again for writing. I enjoyed sharing your memories!



From the Head

I write this spring newsletter as the new Head of the Department. I am honored and excited at the opportunity to lead the top materials science and engineering program in the country. We face many challenges as we learn how to operate with a reduced budget without impacting the quality of our undergraduate and graduate programs. This task is made easier by our outstanding faculty, staff, and students, and I am confident that the changes we have had to introduce will be successful.

One of the major initiatives we will undertake in the next academic year is an examination of our undergraduate curriculum. One of the questions we will be asking is concerned with introducing more opportunities for our students to take business, entrepreneurship, leadership and management courses so they are better prepared to enter the workforce. We have introduced a senior design project for our students and are looking for partners and sponsors for this activity. To provide more students with experience, John Abelson has initiated an undergraduate research experience program. The response from students at Illinois and other universities has been ex-

cellent, and we will welcome twelve students into the program this summer. In addition to participating in a research program, the students will learn how to write a scientific paper and make a research presentation.

The senior design project and summer research experience programs are designed to enhance the undergraduate experience at Illinois, but, as you can imagine, these are costly programs to offer. I would like to ask for your help in supporting these new efforts—they will help keep our students as leaders in the field.

In this newsletter, you will learn about recent faculty and student awards, the current research of David Cahill, new alumni board members, families at Illinois, and revisit the undergraduate laboratory in the Kiln House.

I am also pleased to announce a new partnership with Intel Corporation for our graduate program. This year Intel will become a sponsor of the Racheff Graduate Student Award and will be providing a computer to



each winner. This is I hope just the beginning of our interactions with Intel.

On a sadder note I have to report the passing of Charlie Wert. Many of you will remember Charlie as the Head of the Department, a position he held from 1966 to 1985, while our younger alumni will remember him through the Charles and Lucille Wert Scholarship. Charlie was passionate about education and he and Lucy devoted much of their lives to giving students the opportunity to excel. We will miss Charlie especially at the annual student award banquet this year but will always remember him.

I would like to again extend an invitation to you to visit or to contact me. Thank you for your support.

Ian Robertson
Department Head

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Robertson named Head

Ian Robertson has been named Head of the MatSE Department after serving as Interim Head since March 2003. The appointment was formally approved by the University of Illinois Board of Trustees on January 15.

Robertson earned a bachelor's degree in applied physics from the University of Strathclyde, Scotland, in 1978 and a doctorate in metallurgy from the Oxford University, England, in 1982. He joined the College of Engineering faculty in 1983 and served as chair of the Metals Division from 1992 to 1995 and again in 2000. Robertson also served as Associate Head under Jim Economy from 1995 to 1999.

In 2001, he accepted the position of Assistant Dean for Continuing Engineering Education in the College of Engineering, where he was responsible for revitalizing the engineering online program and for expanding the office to include educational outreach programs. While serving in the Continuing Engineering Education office, he remained involved in the MatSE Department and maintained an active research group.

His research encompasses radiation effects in metals and semiconductors, structure and chemistry of vapor-deposited films, mechanisms of strain transfer across interfaces, and dynamics of deformation and fracture under extreme conditions.

His University of Illinois awards include the Burnett Teacher of the Year Award in 1992 and the Engineering Council Award for Excellence in Advising in 1996, 1997, and 1999.



Glass Conference held at the University of Illinois

The Conference on Glass Problems continues a long tradition started in June 1934 at the University of Illinois at Urbana-Champaign. The first conference had an attendance of 50 men, representing 8 states in the U.S. The conference was initiated by Prof. C. W. Parmelee, the then Head of the Department of Ceramic Engineering. The first meeting was so successful that a second meeting was held in November of the same year, with an attendance of 97 men and 1 woman. In 1948, the Conference on Glass Problems was first held at The Ohio State University, and the two universities have been alternately hosting it each year since then.

C. W. Parmelee envisioned the mission of the conference to be "for the benefit of the glass manufacturers...especially in attracting the operating men for whom they were arranged." Today, the Conference on Glass Problems attracts both U.S. and international attendees. It has a high level of technical content and it provides a forum for learning and new ideas as well as information exchange. Attendees represent the glass manufacturing industries, supplier companies, academia and government laboratories.

In October 2003, the 64th Conference on Glass Problems took place at Krannert Center for the Performing Arts on the University of Illinois campus. The conference encompassed four topic sessions: Refractories, Energy and Combustion, Process Control, and Emerging Areas. Prof. Trudy Kriven served as Director of the 64th Conference and edited the proceedings, which will appear as Ceramic Engineering and Science Proceedings, vol 25, issue 1 (2004).

Kent Studer new development officer for MatSE

Kent Studer, major gifts officer in the College of Engineering Development Office since October 2001, is the new development officer for the MatSE Department. Studer replaces Renee Mullen who is now Director of Public Relations for the College of Engineering.

He is responsible for raising funds, assisting the department in identifying support needs, and keeping alumni connected with the latest MatSE accomplishments and developments. Studer also serves as the major gifts officer for the departments of Aerospace Engineering, Physics, and Theoretical and Applied Mechanics.

Studer earned a B.S. in business administration from Illinois State University. A Champaign-Urbana area native, he has had a lifelong interest in the University of Illinois. He enjoys sports, travel and playing golf. He and his wife, Anne, (an Illinois alumna) stay busy keeping up with their 17-month old son, Jacob.

Charlie Wert (1919-2003)

Charlie Wert lost his valiant battle with cancer on November 4, 2003. He was surrounded by friends who had helped him in his final days, as he had for many others in previous years.

Charles A. Wert was born December 31, 1919, in Battle Creek, Iowa, the eldest of seven children. He graduated from Morningside College in Sioux City, where he met Lucy Methena. They were married in 1942. She died in 1995. He is survived by a son, John, of Copenhagen, Denmark, and a daughter, Sara Tyler, of Estes Park, Colorado.

He received his Ph.D. in physics from the University of Iowa in 1948, and had a two-year postdoc at the University of Chicago's Institute for the Study of Metals. Charlie joined the Metallurgy Department at the University of Illinois in 1950. He served as Head of the Department from 1967 to 1987. He retired in 1990 but remained professionally active.

Charlie was many things to many people:

He was a renowned scientist. He was honored as a Fellow of the American Physical Society, the American Society for Metals, the Metallurgical Society, the AAAS, the American Society for Engineering Education, and the von Humboldt Society in Bonn, Germany. He contributed to these societies with publications and service on boards and committees. He directed the Ph.D. theses of more than 30 students and published more than 200 scientific papers, not only on metals, but on other materials.

He was a premier educator and teacher. He was awarded the A.E. White Award from ASM for distinguished teaching, as well as many department, college and campus-wide awards in recognition of teaching excellence. Former students recall the personal interest he took in their careers, his counsel, patience, sense of humor, his enthusiasm and the ability to instill these traits in their lives. At one point, he volunteered to teach a course on materials to electrical engineers, and from this resulted a classic text, *Physics of Metals*, with Robb Thomson.

He was an exemplar administrator. Charlie was Department Head for 20 years—an exceptional record—and the “Dean” of the DEPTH committee, an association of heads of the nation's metals

and materials departments. He felt great concern for his faculty, offering them career advice and helping them gain recognition. The University Chancellor during his tenure expressed Charlie's contributions well, “He was truly an educational statesman and he had the capacity to take the broad view which transcends the boundaries of his own field of expertise. It is individuals like Charlie who make the University a worthwhile institution.”



Charles A. Wert

He was a humanitarian. Charlie gave generously of his time and resources for others. He was a member of his church's governing board and was deeply involved in charitable works. On one occasion, he bought a water pump, and with others, went to a Yucatan village to install it so the people could have a safe available water supply. He later led a drive to purchase additional pumps for other villages. He responded to the financial needs of students by establishing, with his wife, scholarships in the College of Engineering, School of Music, and campus YMCA at the University of Illinois; Simmons College in Boston; Morningside College; the Chicago Art Institute; and Carle Hospital Foundation in Urbana. When he learned that some students were sent abroad without spending money, he donated an amount to each participant. Later, he began regular sponsorship of groups of students who went to South America for summer study. He was known around campus as a source of advice and

funds when emergencies arose. He often recounted, with pleasure, his association with students that he had assisted.

Charlie's former students, colleagues, and friends will remember him with fondness and gratitude for the impact he had on their lives. A memorial service was held at the McKinley Foundation on the University of Illinois campus on March 6.

-Article courtesy of Prof. Emeritus Bob Bohl.

MatSE Alumni Board elects new members



Ken Cadien received his B.Eng. and M.Eng. degrees in metallurgy from McGill University in Montreal in 1974 and 1977, respectively. In 1981, he received his Ph.D. in materials science and engineering from the University of Illinois under the direction of Joe Greene. Cadien's Ph.D. work involved the deposition of metastable compound semiconductor thin films. Since graduating he has held thin film engineering and research positions at Eastman Kodak and Westaim Corporation, and he also served as Assistant Professor at Rensselaer Polytechnic Institute, Department of Materials Science and the Center for Integrated Electronics. Cadien joined Intel in 1990 as Group Leader for Thin Films, and has risen steadily in the group with increasing responsibilities. In 1997, he was promoted to Principal Engineer, responsible for groups working in copper technology and advanced polish. He was appointed Intel Fellow in January 1999. As the Director of Innovative Technology, Cadien directs pathfinding activities in advanced interconnects, focusing on chemical mechanical polish, metal deposition, and optical interconnects. His works have been published in numerous journals, and he more than twenty patents. Cadien resides with his family in Portland, Oregon.



Michael Daley received a B.S. degree in materials science and engineering from the University of Illinois in 1992. He conducted undergraduate research with Richard Wool and Sam Stupp in the area of biodegradable plastics and liquid crystalline polymers for non-linear optical applications. Daley interned at Kimberly-Clark Corporation in Neenah, Wisconsin, in 1991 and in Roswell, Georgia, in 1992, working on materials development and modeling for absorbency. He graduated with his Ph.D. degree in 1996, doing research for Jim Economy in the area of adsorbents for removal of contaminants from air and wastewater. Daley has worked at Kimberly-Clark for the past seven years as a project leader in both technology and business teams. The focus of his efforts has been to develop and commercialize new and improved products leveraging fundamental technology. Daley is currently the Research Manager of Skin Science Research and Technology at Kimberly-Clark. He and his wife, Sherry, live in Neenah, Wisconsin, with their two children (Morgan Ashley, 3 yrs., and Griffin Chandler, 1 yr.). Daley also serves as a Deacon at the Mason Street Church of Christ.



Rhonda Houston received a B.S. degree in ceramic engineering from the University of Illinois in 1998. As an undergraduate, she minored in Latin American Studies and studied abroad in Chile. From 1998-99, Houston interned at Argonne National Laboratory in the Energy and Technology Division. At Argonne she analyzed the microstructure of superconductor, ceramic membrane powders, and fibrous monoliths. Houston earned her M.B.A. in international business from the American Intercontinental University in London, England, in 2000. She then joined PPG Industries in Wichita Falls, Texas, as a Production Engineer in the Tank Department. Houston is presently a Production Engineer in the Wareroom Department, where she supervises the cutting and package of raw glass before shipping. She resides in Wichita Falls.



Susan Kent received a B.S. in chemical engineering from the University of Illinois in 1987, and a Ph.D. in material science and engineering from Illinois in 1992 under the direction of Phil Geil. Upon graduation, she accepted a position as a Senior Research Engineer with 3M Company within their Film Technology Center, later renamed the Film/Light Management Technology Center. While in the F/LMTC, she developed products based on polymer blend technology and filled polymer systems, receiving 6 patents in the area of polymer blends. In 2000, 3M Company adopted Six Sigma methodology, and Kent accepted a position as one of the first Six Sigma Black Belts. After completion of her 2 year Black Belt tour, she transitioned from research and development to manufacturing, becoming a Production and Technical Team Advisor with Manufacturing and Engineering supervisory responsibilities in 3M's Hutchinson, Minnesota, facility. Her current position is Manufacturing Technologies Manager within 3M's Specialty Film & Media Products Division. She is married to Dennis Boismier, fellow U of I alumnus, and resides with her husband and two children (Laura, 6 yrs, and Emily, 3 yrs) in Excelsior, Minnesota. While her current schedule does not leave much leisure time, Kent and her husband hope one day to resume their hobbies of hiking/camping, photography, gardening, and sleep.

Siblings in MatSE Ph.D. program

Fathers and sons, husbands and wives, sisters and brothers are among the alumni of our department. The latest siblings to work towards their degrees in MatSE at Illinois are Tim and Jennifer Dellinger. Growing up in Orange Park, Florida, Tim and Jennifer were good at math and science like most engineers. Their grandfather was a civil engineer, and their great-grandfather was a mechanical engineer who helped build the Panama Canal, so engineering runs in the family. When deciding upon a college major, both siblings decided upon materials.

Tim, who is 18 months older than Jennifer, entered the University of Illinois in 1992. He co-oped as a MatSE undergraduate, working at a paper and ink lab in the Chicago suburbs. The work he performed as a co-op student tied in with the colloids he had studied in his ceramics classes.

Jennifer entered Georgia Tech in 1994 as a materials undergraduate and co-oped at a ceramics company in Laurens, South Carolina. It took Tim and Jennifer an extra year to complete their B.S. degree because of their co-op assignments, but both agreed it was one of the best things they have ever done. After graduation, they chose to enter graduate school rather than go into industry.

“When I looked at the jobs that I wanted,” Tim said, “I thought I wouldn’t hire me.” Likewise, Jennifer loved industry but felt there was much more she wanted to learn. Tim began graduate study in 1997, continuing research he started as an undergraduate in Steve Granick’s group. He later joined Paul Braun’s group, still working in polymer research.

Jennifer visited Illinois as a prospective graduate student in the spring of 1999 and was impressed by the facilities, especially the Materials Research Laboratory. She joined her brother at the University that fall. Jennifer started out in Jeff Bullard’s research group but had to find a new advisor when he left the university for a job in industry. She is now in Russ Jamison’s group doing biomaterials research. “I ab-

solutely hated biology when I was in high school,” Jennifer said. Seeing biology taught from an engineering perspective changed her mind.

Tim and Jennifer have something else in common—both siblings will have spouses who are alumni of the MatSE Department. In October 2003, Tim wed Jennifer Gerbi

Jennifer hopes to complete her Ph.D. degree in time for her wedding and is looking for jobs at Sandia National Lab, where her fiancé is a staff member, or NIST in Maryland. In her free time, she relaxes by figure skating, a sport she started when she came to Illinois for graduate school. “She’s an ice princess,” joked her brother. “It totally kills my image,” Jennifer responded.



Tim and Jennifer Dellinger

(Ph.D. MatSE ’01), and in September 2004, Jennifer will marry Aaron Hall (Ph.D. MatSE ’00).

Tim would like to graduate in May so he and his wife, a postdoc at Argonne National Lab, can look for permanent positions. While a job in the research triangle of North Carolina would be nice, he would probably be equally happy opening his own whiskey distillery. Tim is a member of the Homebrew Club and has taken a course at the University on fermented and distilled beverages. “It turns out that most of the master distillers now have Ph.D.’s in chemical engineering,” Tim said. He is animated when he talks about his love of old time music, such as that from the 1920s and ’30s. Tim plays the guitar, banjo, and piano.

“Okay,” says Tim, “an ice princess who drives a pickup truck and likes power tools.” She also does Search & Rescue with Aaron when she is doing research with collaborators at Sandia National Lab in Albuquerque, New Mexico.

The brother and sister have shared a fifty year-old house in Champaign for two and a half years. Being in the same graduate program and living together, “We got to know each other in ways that we never would,” Tim said. They don’t divulge their sibling status unless asked, keeping it to themselves. “I’ve been asked if he’s my husband,” Jennifer said. The siblings have a younger brother who is a materials undergraduate at Georgia Tech. Perhaps one more Dellinger will come to Illinois for graduate study?

Controlling material structure at nanoscale makes better thermal insulator

Heat may be essential for life, but in some cases – such as protecting the space shuttle or improving the efficiency of a jet engine – materials with low thermal conductivities are needed to prevent passage of too much heat. As reported in the February 13 issue of the journal *Science*, researchers have created a better thermal insulator by controlling material structure at the nanoscale.

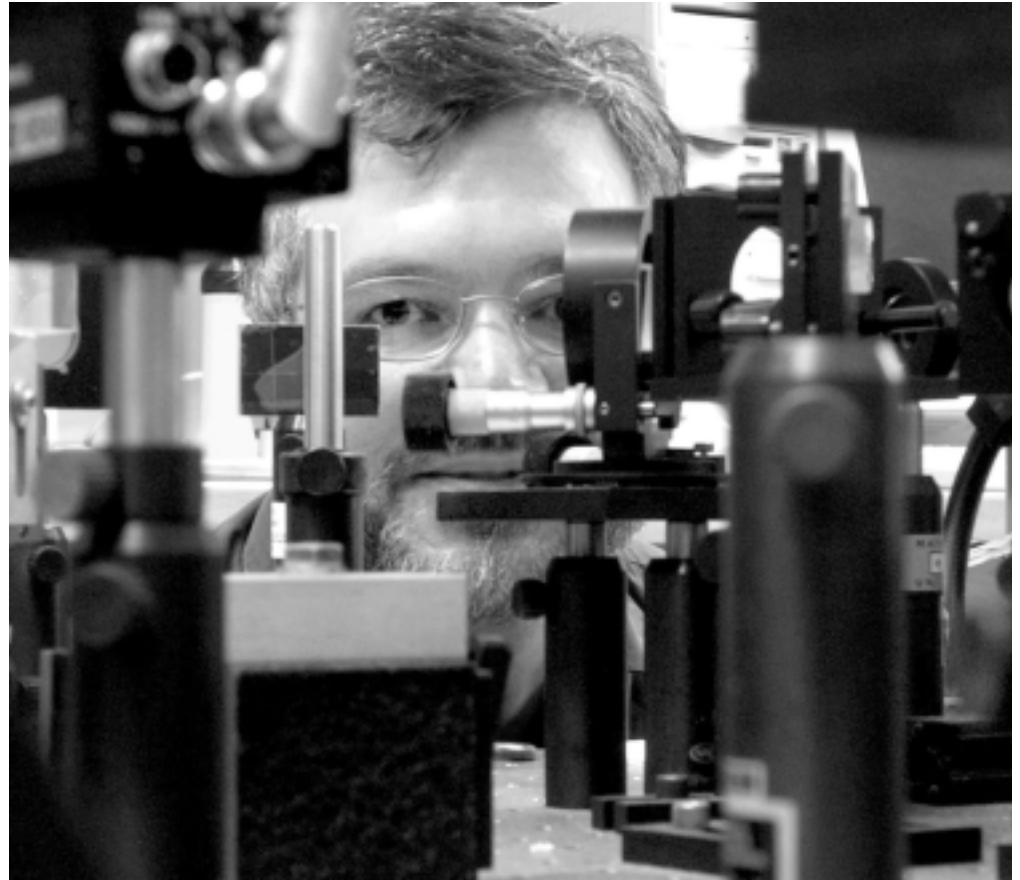
“We explored ways to control thermal properties in materials by introducing structure on nanometer length scales,” said David Cahill, MatSE professor and Willett Faculty Scholar. “By making nanolaminates of dissimilar materials, we found that we could significantly decrease the thermal conductivity because heat cannot be carried efficiently across the material interfaces.”

Cahill, graduate student Ruxandra Costescu, and colleagues at the University of Colorado at Boulder first synthesized thin-film nanolaminates composed of alternating layers of tungsten and aluminum oxide using atomic layer deposition and magnetron sputter deposition. Cahill and Costescu then measured the thermal conductivity of the nanolaminates using a technique called time-domain thermoreflectance.

“The reflectivity of a metal is a very subtle function of its temperature,” Cahill said. “By measuring how fast the reflectivity, and therefore the temperature, changes over time, we can determine the thermal conductivity.” To measure the temperature of such small samples, the researchers use an ultra fast, mode-locked laser that produces a series of subpicosecond pulses. The laser output is split into a “pump” beam and a “probe” beam. The pump beam heats the sample and the probe beam measures the reflectivity, and hence the temperature.

“By making the individual layers only a few nanometers thick, we produced a nanolaminate material that had a thermal conductivity three times smaller than a conventional insulator,” Cahill said. “The high interface density produced a strong impediment to heat transfer.” Heat flow from one material to another is limited at the interface, Cahill said. Heat is carried by vibrations of atoms in the lattice, and some of these lattice vibrations are scattered at the interface and don’t get transmitted across the interface.

“In our nanolaminates, vibrations in one material don’t communicate well with those in another,” Cahill said. “The heavy tungsten



David Cahill

atoms are vibrating fairly slowly, but the light aluminum oxide atoms are vibrating quickly. The differences in elastic properties and densities of vibrational states inhibit the transfer of vibrational energy across the interface.”

The experimental results suggest that materials engineered with high interface densities may provide a route for the production of thermal insulators with ultra-low thermal conductivities. The researchers’ findings also have some surprising implications for nanomaterials that are intended to perform as high thermal conductors in applications such as dissipating heat from electronic circuits or sensors. For example, carbon nanotubes – which have been shown to have extremely high thermal conductivities – will not perform well as fillers in composite materials designed to improve thermal transport.

“Nanotubes do not couple well thermally to the surrounding material,” Cahill said. “As a result, the heat transport across the nanotube-matrix interfaces will be very limited.”

-Article courtesy of James E. Kloeppe, UI News Bureau.

Robin Scholz/The News-Gazette

Geil Symposium to be held in 2005

An international Polymer Physics/Morphology Symposium in honor of Professor Philip Geil's 75th Birthday will be held at the University of Illinois, Urbana-Champaign, on April 8-9, 2005. Geil has been Associate Head of the Department of Materials Science and Engineering since 2000 and was the founder of the polymer group of the department. Following periods at the E. I. du Pont de Nemours & Co., Camille Dreyfuss Laboratory, and Case Western Reserve University, where he was one of the several founding members of the group that has evolved into the Department of Macromolecular Science and Engineering, Geil joined the University of Illinois as Professor in 1979.

A renowned scholar in the characterization of polymer morphology and structure, Geil is also known for his expertise and pioneering research in polymer microscopy and electron diffraction for polymer crystal structure determination. He has conducted pioneering research of lasting significance in numerous areas of polymer morphology

and biophysics. His publication "Polymer Single Crystals," written more than 40 years ago, still remains an excellent summary of polymer morphology.

In addition, as an educator, Geil has guided numerous undergraduate and graduate students, as well as post doctoral researchers, many of whom have made major contributions in academia and industry. From his students' perspective, he has always been a teacher *extraordinaire*, inspiring a keen sense of inquisitiveness in their research and the need for high standards in all that they do.

Former students, Tsuey-Chen (Hsu) Long (U of I, 1987, W L Gore and Associates) and Charles Garber (Case Western Reserve University graduate, Structure Probe Inc.) will be co-hosts for the symposium, in collaboration with the MatSE Department at the University of the Illinois.

Confirmed speakers include Darrell Reneker, Ronald Eby, and Stephen Chang from the University of Akron; Freddy Khoury, NIST; Kenn Gardner, Du Pont; Benjamin Hsiao, University of New York-Stony Brook; Hirokazu Hasegawa, Kyoto University; Anthony Ryan, University of Sheffield; Sergei Magonov, Veeco Metrology; Edwin Thomas, MIT; and I.M. Ward, University of Leeds.

Alumni, friends and students of Geil interested in the event and the reunion are encouraged to contact Tsuey-Chen Long (tlong@wlgore.com) or Charles Garber (cgarber@2spi.com) to update their contact information. Registration, reception and hotel information for the event is on the website www.geil-symposium.com. Organizers are looking for financial sponsors for this event. Individuals and corporations interested in sponsorship, please contact Tsuey-Chen Long directly.

www.geil-symposium.com

<p>Welcome to the University of Illinois Alumni Association.</p> <p>Your membership is helping build an even greater University alumni network. We hope you will become involved in the Association's many activities and take advantage of the growing number of exclusive member benefits.</p>  <p>Loren R. Taylor President and CEO</p> <p>Please clip and mail this application with your check or credit card authorization to:</p> <p>University of Illinois Alumni Association 1401 W. Green St., Suite 227 Urbana, Illinois 61801</p>	<p> UNIVERSITY OF ILLINOIS ALUMNI ASSOCIATION</p> <h2>MEMBERSHIP APPLICATION</h2> <p>PERSONAL INFORMATION</p> <p>Name _____ E-mail Address _____ Degree/Year _____ Social Security Number _____ Address _____ City, State, Zip _____ Home Phone _____ Fax Number _____</p> <p>SELECT YOUR MEMBERSHIP OPTION AND PAYMENT METHOD</p> <table><tr><td>Annual Membership</td><td></td><td>Method of Payment</td></tr><tr><td><input type="checkbox"/> Single \$45</td><td><input type="checkbox"/> Joint* \$60</td><td><input type="checkbox"/> Check: Please make your check payable to the University of Illinois Alumni Association.</td></tr><tr><td><input type="checkbox"/> Single, Recent Grad** \$30</td><td><input type="checkbox"/> Joint, Recent Grad** \$40</td><td><input type="checkbox"/> Credit Card: Please charge my:</td></tr><tr><td><input type="checkbox"/> Single, Senior Alumni*** \$30</td><td><input type="checkbox"/> Joint, Senior Alumni*** \$40</td><td><input type="checkbox"/> MasterCard <input type="checkbox"/> VISA <input type="checkbox"/> American Express <input type="checkbox"/> Discover</td></tr><tr><td>Life Membership</td><td></td><td>Card Number _____</td></tr><tr><td><input type="checkbox"/> Single \$750</td><td><input type="checkbox"/> Joint* \$1,000</td><td>Expiration Date _____</td></tr><tr><td><input type="checkbox"/> Single, Senior Alumni*** \$375</td><td><input type="checkbox"/> Joint, Senior Alumni*** \$500</td><td>Signature _____</td></tr></table> <p><input type="checkbox"/> Check here if you would like information on other payment plans.</p> <p>Membership dues include \$12 per year for a subscription to <i>Illinois Alumni</i> magazine.</p> <p>JOINT MEMBER INFORMATION</p> <p>If you have selected a joint membership, please provide the following for the joint member:</p> <p>Joint Member Name _____ Social Security Number _____ University of Illinois graduate? <input type="checkbox"/> No <input type="checkbox"/> Yes Relationship to Member (optional) _____ Name on Diploma (if different from above) _____</p> <p><small>* Joint members are two persons living at the same address who receive one copy of each issue of the alumni magazine and Alumni Association, college and department mailings. ** Currently enrolled as a University of Illinois student or earned a University of Illinois degree within the past three years. *** Must be age 65 or older or have graduated from the University of Illinois 40 or more years ago. In the case of joint memberships, one of the joint members must meet this criteria.</small></p> <p style="text-align: right;">UD21</p>	Annual Membership		Method of Payment	<input type="checkbox"/> Single \$45	<input type="checkbox"/> Joint* \$60	<input type="checkbox"/> Check: Please make your check payable to the University of Illinois Alumni Association.	<input type="checkbox"/> Single, Recent Grad** \$30	<input type="checkbox"/> Joint, Recent Grad** \$40	<input type="checkbox"/> Credit Card: Please charge my:	<input type="checkbox"/> Single, Senior Alumni*** \$30	<input type="checkbox"/> Joint, Senior Alumni*** \$40	<input type="checkbox"/> MasterCard <input type="checkbox"/> VISA <input type="checkbox"/> American Express <input type="checkbox"/> Discover	Life Membership		Card Number _____	<input type="checkbox"/> Single \$750	<input type="checkbox"/> Joint* \$1,000	Expiration Date _____	<input type="checkbox"/> Single, Senior Alumni*** \$375	<input type="checkbox"/> Joint, Senior Alumni*** \$500	Signature _____
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“A unique set of laboratories, just for undergraduates.”

Kiln House renovation 10 years later

The spring 2004 semester marks the 10th anniversary of the Student Instructional Laboratory Center (SILC). The \$2 million renovation of the old Kiln House into the state-of-the-art SILC was made possible through donations from alumni and friends, as well as through funds from the College of Engineering and the University. One of the first courses taught in the new center was the junior laboratory course MatSE 208.

When the ceramic and metallurgy departments merged in 1987, faculty faced the challenge of creating common labs for the students. In 1991, the new Materials Science and Engineering curriculum was approved. The curriculum included a set of

learn the fundamentals of working in a laboratory.

I was hired only a week before classes started in August 1993. When MatSE 207 was taught for the first time that fall, I had to scramble to develop experiments that the students would be doing the following week. I put together the procedure before the experiments were conducted and I had to often scavenge for the equipment to set up the experiments. Despite these difficulties, the experiments worked!

During the second semester when we moved into the SILC, the lab course ran more smoothly. Professor Robert Averback was assigned to teach the MatSE 208 class for



*by Dr. Raju Perecherla
(Ph.D. Cer '92)*



Students from the senior polymer lab characterize their samples using a Differential Scanning Calorimeter (Model: Perkin-Elmer DSC 7, foreground) and Dynamic Mechanical Analyzer (Model: Perkin-Elmer DMA 7, background).

junior laboratory courses, MatSE 207 and MatSE 208. Today students from all five areas of concentration—metals, ceramics, electronic materials, polymers, and biomaterials—enroll in these courses to

the first time in spring 1994, and we worked on developing new experiments and instructions. Since then I have worked with several faculty to develop and create new laboratory experiments. What started as a

temporary job turned into a permanent position in 1997, when I was hired to take care of all the instructional laboratories in the department. Since 2001, I have also assumed the responsibility of teaching MatSE 207 and 208 courses.

In MatSE 207 and 208, juniors learn to measure thermal, electrical and mechanical properties of different materials. Students also conduct experiments related to polymer characterization, scanning electron microscopy, sample preparation for microstructural examination, diffusion and order-disorder transformations, simulations, high temperature creep, age hardening, and ceramic processing. In these courses, students are required to write 6 to 7 formal technical laboratory reports in each course. In addition, the students give oral presentations at the end of each semester on one of the experiments. When the juniors successfully complete both MatSE 207 and 208 courses, they also receive credit for Composition-2; a writing requirement all University of Illinois students must complete in order to graduate.

Visitors from different universities are amazed to see the type of equipment and facilities we have, and the experiments our undergraduates do. Until I went to graduate

school, I never had the opportunity to use many types of equipment and techniques that our juniors use today.

Apart from having the state-of-the-art equipment in the senior and junior laboratories, we have centralized facilities for sample preparation, optical microscopy, macro and micro hardness testing, weighing and high temperature materials processing for our undergraduates.

We are constantly striving to improve the facilities, and with support from the department, we have been able to purchase new equipment every year. We have been told that the equipment grant from the College of Engineering has been phased out from the State Budget, so the department will have to find new resources to keep our instructional laboratories operational. One of our latest acquisitions is a high-temperature TMA that goes up to 1500 degrees Celsius. I tell my students that when they have graduated and are in their jobs, if their boss gives them a material for analysis and won't tell them what to do, they will know how to proceed because of their junior lab courses.

Editor's note: Alumni wishing to make a donation for new equipment can fill out the form on page 13 and check the box for the MatSE labs.

“We have one of the best specimen preparation laboratories on campus... we have come a long way in the last 10 years.”



Students from the senior metals lab polish samples for micro-structural examination using a dual wheel two speed Polisher (Model: Buehler Ecomet 5)

We want to hear from you

and find out what has been happening in your life. Your fellow alumni, as well as the MatSE Department, want to hear about your activities. The Alumni News is mailed twice a year and is also available on-line at www.mse.uiuc.edu/alumni.html.

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News about you (continue on separate sheet if necessary) _____

Return to: The Editor, MatSE Alumni News, 1304 W. Green St., Urbana, IL 61801 or e-mail brya@uiuc.edu

Department Notes

READ LECTURE – William Johnson, Ruben and Donna Mettler Professor of Engineering and Applied Science of the California Institute of Technology, gave the talk “Bulk Amorphous Metals: Science and Technology,” at the Thomas Read Lecture in October.

LANE LECTURE – Louis Brus, Professor of Chemistry at Columbia University, gave the talk “Chemistry and Physics of Semiconductor Nanocrystals,” at the Lane Lecture in March. The lecture, sponsored by MatSE and the Chemistry Department, was made possible through the generosity of Joseph (BS Met ’43) and Wyvona Lane (PhD Chem ’46).



Duane Johnson

Duane Johnson was elected a 2004 Fellow of APS. He was cited “For theoretical and computational contributions to our understanding of physical properties of disordered alloys which have uncovered the microscopic underpinnings of the thermodynamics and phase transformations of alloys.” He also received the 2004 Xerox Award for Faculty Research for Associate Professors.

David Payne gave an invited talk at the Pac Rim meeting in Nagoya, Japan, and attended an alumni dinner organized by Toshihiko Tani (M.S. Cer ’93, Ph.D. Cer ’94).

Paul Braun and co-authors Pulickel Ajayan and Linda Schadler (both from Rensselaer

Polytechnic Institute) have published a new book, *Science and Technology*, Wiley-VCH (2003). Braun also received the 2004 Xerox Award for Faculty Research for Assistant Professors.

Ian Robertson’s research with Pacific Northwest National Laboratory on the dynamic recrystallization of an alloy was mentioned in *Materials Today*, October 2003.

Erik Luijten and Ph.D. student **Jiwen Liu** have developed a new algorithm that speeds up computer simulations of complex fluids. Their work made the cover of the March 2004 issue of *Physics Today*.

Gerard Wong was named a 2004 Sloan Foundation Fellow. Wong’s research on like-charged biomolecules was mentioned in the APS “Physics News in 2003,” a summary of physics highlights for the past year.

Robert Averback was elected to the Board of Directors of the Materials Research Society (MRS).

Steve Granick was elected incoming Vice-Chair of the APS Division of Polymer Physics, which will rotate in the following year to Chair of the Division.

MIT’s technology review magazine selected **John Rogers’** work on tunable microfluidic optical fiber as one of “10 emerging technologies that will change your world.” Rogers’ paper on microfluidic devices was highlighted on the cover of *Applied Physics Letters* on December 15.

The paper “Microstructure of dense colloid-polymer suspensions and gels,” co-authored by **Ken Schweizer** was selected as one of the best papers of 2003 in the *Journal of Physics: Condensed Matter*.

Abby Morgan, Ph.D. student in Jamison’s group, was selected as a member of the review panel for the 2004 NSF East Asia Summer Fellowship Program. This is an important recognition of the quality and significance of her work as an NSF fellow at Kyoto University last summer.



David Xu and Ken Bratland

Ken Bratland (Ph.D. MatSE 2003) received the Dorothy M. and Earl S. Hoffman Award from AVS last fall. This is the first year offered and is the highest award the society bestows on grad students for outstanding research. The award consists of a \$1,500 and reimbursed travel support to attend the International Symposium.

David Xu, Ph.D. student in Weaver’s group, won the Varian award for excellence in graduate research and the Dorothy M. and Earl S. Hoffman Scholarship. The Varian Fellowship is presented to recognize and



Greg Gratson and MRS President Marilea Mayo

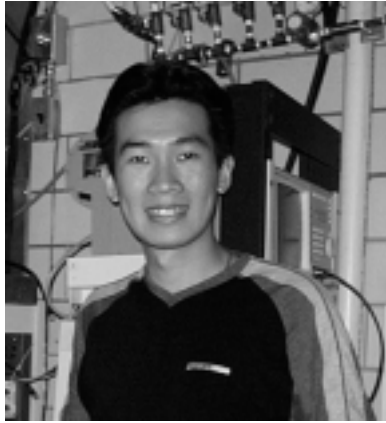
encourage excellence in graduate studies in vacuum science. The award consists of a cash prize and reimbursed travel support to attend the AVS International Symposium.

Greg Gratson, Ph.D. student in Lewis’ group, won a Gold Award at the MRS meeting

in December. The award is given to graduate students presenting work at the MRS meeting in Boston. Fifteen finalists were selected to receive the Gold Award consisting of a \$400 prize and a plaque.

Greg Gratson and **Stephanie Pruzinsky** received 2004-05 Mavis Memorial Scholarships from the College of Engineering. The award of \$5,000 recognizes graduate students who have excelled in academics and research and who have shown interest in engineering education. Pruzinsky is a Ph.D. student in Braun's group.

Marcel Wall (Ph.D. MatSE 2003) won the



Chong Lim

AVS Morton Traum Award in Surface Science last fall. The AVS Surface Science Student Award is presented annually for the best student paper based on work leading to a Ph.D. thesis.

Hongjun Liang, Ph.D. student in Wong's group, won a Best Poster Award at the MRS meeting for his poster "Molecular imprinting of biomaterialized CdS nanostructures: Crystallographic control using self-assembled DNA-membrane templates."

Chong Lim, Ph.D. student in Greene's group, won the Ludo Frevel Crystallography Scholarship from the International Centre for Diffraction Data (ICDD), worth

\$2,200, for the second year in a row—the first time this has ever been accomplished.

Rachel Williams, senior in MatSE, received the H.L. Wakeland Undergraduate Leadership Award and was named a Knight of St. Pat.



Rachel Williams

www.mse.uiuc.edu/alumni/giving.html

Department of Materials Science & Engineering Fund

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Class Notes

1950s

Victor Tennery (B.S. Cer '54, M.S. Cer '55, Ph.D. Cer '59) married Marlene Scott in November 2003. They reside in Oak Ridge, Tennessee.

1960s

Kenneth Wood (B.S. Mining '60) recently retired as a marketing executive from Culligan International in Chicago. He would love to hear from any classmates. He lives on the shore of Lake Michigan, two hours from Chicago.

John Willi (B.S. Cer '66) received a 2003 ASTM Award of Merit and the accompanying title of Fellow, the highest society recognition for individual contributions to standards activities. Throughout his career, Willi has focused on production engineering, quality control, and environmental compliance aspects of refractory manufacturing with special emphasis on the manufacture of tap hole products. He has been with Riverside Refractories since 1984 and is the director of quality assurance and engineering.

1970s

Randy Tustison (M.S. Met '72, Ph.D. Met '76) is manager of materials engineering and principal fellow at Raytheon Integrated Defense Systems. In June 2003, he was appointed technology area champion of materials and structures for Raytheon Co. He currently manages the company's Lexington, Massachusetts, laboratory and lives in Andover with his wife Kay (B.S. UIUC '75) and their son Eric and daughter Anna.

1990s

Pin Yang (Ph.D. Cer '92) is a distinguished member of technical staff at Sandia National Laboratory. He received the Defense Programs Award of Excellence from the Department of Energy National Nuclear Security Administration in 2003. His research on electrically induced strain development during the hot polling process has led to a no-cost process change that improved



Pin Yang

hot polling yields from 60 percent to greater than 95 percent, eliminated potential design changes to current stacks, and significantly reduced overall production costs.

Thad Edwards (B.S. Met '93) is a bar product metallurgist at Steel Dynamics Inc. in Pittsboro, Indiana.

Cory Padfield (B.S. Met '96) is a materials engineer at Hyundai in Ann Arbor, Michigan.

Drew Kofahl (B.S. Met '97) left The Timken Company to join Steel Dynamics, Inc., Bar Products Division as a regional sales manager. He is based from his home in Oak Park, Illinois.

2000s

Thomas Cass (B.S. MatSE '00) married Karalyn Kasper in November 2003 in New Lenox, Illinois. He is a chemical engineer for ExxonMobil at the Joliet refinery. His wife is a health educator for DuPage County Health Department in Wheaton.

Craig Gowin (B.S. MatSE '00) married Lindsay Wilson (BS UIUC '01) in March 2004 in Champaign. Gowin received

an M.B.A. from Millikin University last year. He is a senior production engineer at PPG Industries in Mt. Zion, Illinois. His wife is completing her final year of law school and will join a law firm in Chicago.

Shawn Yurkovich (B.S. MatSE '02) married Sharla Cherry (B.S. UIUC '03) in July 2003 at Allerton Park in Monticello. He is a sales engineer for Mid-State Industries in Arcola, Illinois. His wife is currently employed at Kleiss Nursery in Tolono.

Obituaries

Howard Raymond Swift

Howard Raymond Swift (B.S. Cer '40, M.S. Cer '42, Ph.D. Cer '45) of Westerville, Ohio, passed away December 8, 2003, at the age of 83. He was born March 3, 1920, to Fred and Mabel Swift in Streator, Illinois. He enjoyed a long and celebrated career in the glass industry. After retiring from Libbey Owens Ford in 1982, Swift pursued his love of family, travel, gardening, music, and puzzle making. He was a popular vendor at the Toledo Craftsman's Guild shows as the "Puzzle Man" and attended several international puzzle conventions. Swift's accomplishments as a scientist are known worldwide, but his friends and family remember his generosity, kindness, sense of humor, and special rapport with children. He leaves his wife of 57 years, Betty Shull Swift, five children and eight grandchildren.



Robert Beals

Robert J. Beals

Robert J. Beals (M.S. Cer '50, Ph.D. Cer '55) died February 28, 2004, in Beaver, Pennsylvania. Beals held several positions with the Ceramic Engineering Department at the University of Illinois, including instructor, 1952-1955; assistant professor, 1955-1960 and associate professor, 1960-1962. From 1962-1969, he worked at Argonne National Laboratory, and was technical director of The Charles Taylor Sons Company in Cincinnati from 1969-1971. He joined The Hall China Company in East Liverpool as director of research and development in 1971 and held that position until 2001.

He was a Fellow and Distinguished Life Member of the American Ceramic Society (ACerS). He was a past President of ACerS as

continued on next page

Reflections of a metallurgist during the war years

World War II was on and we had registration for the army. They saw on my application that I had graduated in metallurgical engineering and gave me a list of companies doing defense work. I chose the Allison Company, which was a division of General Motors, in Speedway, Indiana. I worked as a laboratory assistant in non-ferrous metallurgy. We had two divisions in the company; one was ferrous and the other was non-ferrous. Ferrous metallurgy is anything that dealt with materials that were made out of steel, stainless steel and so forth, and non-ferrous metallurgy was anything that didn't have iron or steel in it such as aluminum, copper, bronze, magnesium, and titanium. At the time there were about 14 young engineers in the non-ferrous group, just out of college. We accomplished several great things at the time. One of the developments was in the manufacture of gears.

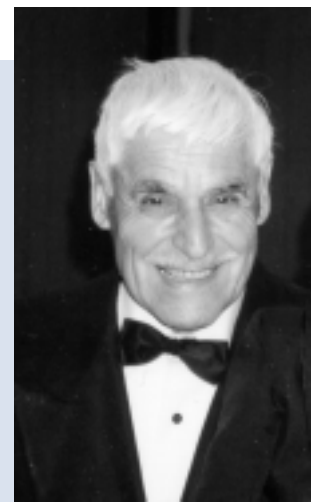
Gears were hobbled and machined down to tolerances of plus or minus one thousandths of an inch. That is after heat treatment, which was the hardening of the gears. After heat treatment, they would be put in a wheel-abrader and shot peened. Shot peening the gears was necessary or they would fail. After a cycle of maybe ten or fifteen revolutions in the wheel-abrater, they would go indefinitely without failing. We would run into problems periodically on this operation. As the gears would go through the wheel-abrater, they

would chip on the gear teeth and were made scrap. We would run into cycles, a few weeks at a time every year. I worked on aluminum, copper, brasses, and bronzes, but I told my boss I would like to work on this problem. He agreed to let me work on it part-time.

After about eight months of cycling in and out of trouble, I came up with the answer. We had a metalligraph where we'd blow up areas in microstructure up to 2000-2500 degrees diameter, which was quite high resolution. I would cut a gear into two and then treat half of it in the laboratory. A friend of mine, Bill Brechtle, was the nightshift superintendent in the heat-treating department and took the other half of the gear to be heat-treated. Then we would tape the two halves together with masking tape and put them through the wheel-abrader. After about two or three revolutions, one half of the gear teeth would have chipped completely, whereas the other half had nothing happen. Normally we would run them around 15 times through the wheel-abrater, but we ran over 100 revolutions in our test. One half of the gear had no

chipped teeth. In the other half, the teeth had completely fallen off like a bunny had chewed them off.

The company decided to start heat-treating all the gears with the new heat treatment. This saved the company millions of dollars, plus countless hours of labor since when they had problems they would shut down the production line for several days. We never had any trouble with the gear teeth after that.



by Tom Simms
(B.S. Met '40)

Beals, continued...

well as the National Institute of Ceramic Engineers (NICE). He belonged to the Ceramic Educational Council, Keramos, Professional Interfraternity Conference, and the Accreditation Board for Engineering and Technology.

He was also involved with Rotary International, Boys Scouts of America, East Liverpool Area Chamber of Commerce, American Red Cross, Columbiana County (Ohio) Progress Council, East Liverpool High School, and the Carnegie Public Library.

Survivors include his wife of 51 years, Lois, two daughters, a son, and seven grandchildren.



Superconductivity up close. Professor Paul Braun demonstrates high temperature superconductivity to a group of students from Paxton-Buckley-Loda High School. The liquid nitrogen pouring from the flask cools a ceramic disk to the temperature where it becomes a superconductor, at which point it can levitate a small magnet.

Flashback



Do you recognize the ceramics students in this photo? Please share your memories with us as well as any pictures you may have from our department's past. Contact the Editor at 217-333-8312, brya@uiuc.edu.



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