

WINTER 2005 ALUMNI NEWS

New diffraction techniques improve sensitivity to small structures
John Rogers listed in 2005 *Scientific American* 50

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On the Cover

The development and understanding of nanomaterials for nanotechnology rely critically on high-resolution structural characterization of individual nanostructures. Structure characterization tools, such as diffraction, need to be developed and adapted to nanoscale requirements. The image on the cover shows single-wall carbon nanotube bundles from NASA Johnson Space Center. The materials are being characterized by Prof. Zuo's research group to understand nanotube growth and devise effective methods to increase the percentage of metallic tubes for applications.

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Correspondence concerning the *MatSE Alumni News* should be sent to:

The Editor
MatSE Alumni News
201B MSEB
1304 West Green Street
Urbana, IL 61801

mse@uiuc.edu
www.mse.uiuc.edu

Department Head
Ian Robertson

Associate Heads
Phil Geil, Angus Rockett

Assistant to the Head
Jay Menacher

Editor & Development Associate
Cindy Brya

From the Head

Time seems to be flying past; it seems as if it was just yesterday that I was writing to you. It has been a great summer and fall. Forty-seven new faces joined the undergraduate program and twenty-seven joined the graduate program. We remain a leader in materials education, with both programs ranked #2 nationally. We hired a new faculty member, Jianjun Cheng, and are looking for a few more. When you read about Jianjun's research, you will get an overview of how your department continues to broaden and develop. It is exciting to learn about these new fields and to see how all aspects of materials science and engineering are contributing to the welfare of our nation. Jianjun's addition helps strengthen our expanding biomaterials program.

Inside the newsletter, you will also learn of the passing of Professor Earl Eckel. Some of you may have been lucky enough to have him as a teacher. While everyone I have talked to about Earl has said how tough he was and how fortunate they felt to get a "C" from him, they also mention how much they learned in his class. At his memorial service, I had a chance to talk to his wife and son and to see some of his old teaching notes and exams. I thought about sharing those with you but then realized some of you may not have "enjoyed" the exams too much. We continue to have dedicated instructors like Earl Eckel—his tradition lives on in your department and it is what makes the difference. If you would like to thank Earl for the education you received, I encourage you to make a contribution to the Eckel undergraduate scholarship fund; you will find details on how to do this inside.

Over the last few years, we have asked for your help in many different ways and I want to take this opportunity to thank you. Your support allows us to continue activities to enhance relationships between faculty and students, to provide research opportunities for undergraduates, to continue the job placement service at no cost

to students, alumni and companies, and to recognize the excellence of our students.

Following a suggestion by your Alumni Board, we will with their help be organizing events, luncheons and dinners at various locations throughout the country. I hope as I travel to your area you will be able to join me and other alumni as we celebrate your achievements and those of your department. As always, if you have comments or concerns about your department, please contact me. If you are visiting Champaign-Urbana and have some time, please come in. I would very much enjoy hearing about your experience and showing how and why your department remains at the forefront of undergraduate and graduate education.

On a personal note, I want to thank Doug Ruhmann for his incredible loyalty and service to the department. He has served you well as President of the Alumni Board and I hope he will continue to stay involved now that his term has ended. Thank you, Doug, for all your help, support, and friendship.



Ian M. Robertson
Department Head



Chester Connors (BS CER '62) and his son **Tim Connors (BS CER '87)** returned to campus in October to speak to MatSE students about their careers and what it is like to own and operate your own company. Chester and Tim are pictured at left with Department Head Ian Robertson.

Electron nanodiffraction reveals double helix structure in boron nitride nanotubes

New diffraction techniques that use nanometer-sized electron beams to improve sensitivity to small structures are being developed at the University of Illinois. The technique works on the same principle as X-ray diffraction, but can record structure from a single nanostructure or macromolecule.

“Structure determination using x-ray diffraction requires crystalline samples, which precludes determination of many interesting proteins and nano-sized objects, as they cannot be easily crystallized,” said Jian-Min (Jim) Zuo, a professor in the MatSE Department. Zuo is pioneering a new technique that can probe individual nanostructures at atomic resolution.

To demonstrate the effectiveness of their new diffraction technique, Zuo, Ph.D. student Celik Ayten-Aktas, and their colleagues recorded the diffraction patterns from individual multiwall boron nitride nanotubes. The results were described in a recently published paper in the journal *Acta Crystallographica* and will be highlighted in an upcoming issue of the International Union of Crystallography newsletter.

“Boron nitride nanotubes are of special interest because boron nitride is a large gap semiconductor with high oxidation resistance and in nanotube form have excellent mechanical properties,” said Zuo. “From a structural point of view, boron nitride is ionic bonded and the nanotube structure is very different from that of multiwall carbon nanotubes.”

Bulk boron nitride is a synthetic material that can exist in two structural forms: one is hexagonal with a layered structure similar to that of graphite and the other is cubic like zinc oxide. Both boron nitride and carbon nanotubes are formed based on the hexagonal layered structure. Because it is not possible to roll up a slab of a single crystal into a tube without introducing a large amount of strain, a multiwall nanotube has to relax its structure to adapt to its tube geometry.

“Since the properties depend on structure, our electron nanodiffraction technique opens a door to examining the atomic structure of individual nanostructures.”

JIM ZUO

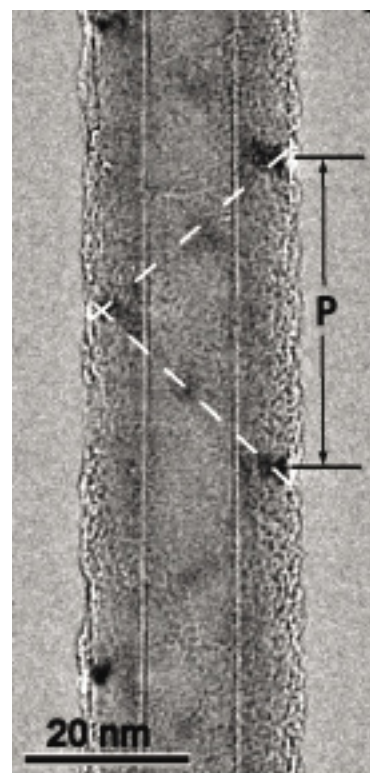
“The interaction between layers is extremely weak for carbon nanotubes,” Zuo said. “Because of that, the structure of different walls is not related to each other. This is not the case for boron nitride nanotubes.”

To determine the structure of boron nitride nanotubes, the researchers first selected a single nanotube target of ~30 nm in diameter in a transmission electron microscope. Then they illuminated the nanotube with a narrow beam of electrons about 50 nanometers in diameter and recorded diffraction patterns from place to place moving the electron beam along the nanotube. After recording, they analyzed the diffraction patterns using simulations from models of cylindrical and hexagonal faceted nanotubes.

“The diffraction pattern is very sensitive,” Zuo said. “We can see the symmetry of the diffraction pattern change as we scan the nanotube.”

The complexity of the boron nitride nanotube structure was surprising. The multiwall nanotube consists of two helices of different nanostructure. One helix is highly ordered and the other is defective including many dislocations. The ordered helix is also faceted. The two helices interwind and join together to form a tube. “No one has imagined this type of structure in a multiwall nanotube before,” Zuo said.

The ability to determine individual nanostructure is very important for developing technologies based on these materials. “Since the properties depend on structure, our electron nanodiffraction technique opens a door to examining the structure of individual nanostructures,” Zuo said. “The structure is the first step to understand nanostructure formation.”



A high resolution electron microscopy image of a multiwall boron nitride nanotube showing the zig-zag contrast that comes from the double helix structure of the tube.

2005 Alumni Awards



Loyalty Award
Elwin L. "Pete" Johnson
(BS CER '56, MS CER '57,
PHD CER '60)

Pete Johnson joined the Central Research Labs of Texas Instruments Inc. in Dallas after graduating from the University of Illinois. During his 32-year career at TI, he worked in research, engineering and manufacturing divisions, holding positions from individual contributor to corporate management, including Senior Member of Technical Staff, Project Manager, Program Manager, Product Manager, Branch Manager, Department Manager, and Laboratory Director. He served on and directed many division and corporate committees and teams. He held numerous U.S. and foreign patents, several with Nobel prize-winner Jack Kilby (recognized for inventing the integrated circuit among >60 patents). At TI, Johnson chaired the EIA JEDEC JC-11 engineering standards committee for more than 10 years; published extensively; made invited presentations; and lectured in the U.S. and overseas. After retiring from TI in 1992, he was employed by DSC Communications Corp. as a Senior Manager for four years and retired again in 1997. He was a Registered Professional Engineer in the State of Texas for over 40 years. Johnson served on the MatSE Department's Alumni Board and has been a life member of the UI Alumni Association for 45 years. He and his wife, Nell, reside in Dallas.



Young Alumnus Award
Paul Osenar
(PH.D. MATSE '98)

After receiving his degree from Illinois, Paul Osenar was drawn to the Boston area to work in contract research at Foster-Miller Inc., given the wide range of projects and the comfortable transition from the more basic research of graduate school. Projects included hydrophobic coatings for MEMS devices and anti-icing, polymer nanoparticles, high temperature proton exchange membranes, and high-speed sausage manufacturing. Early in 2000, Osenar and several others from Foster-Miller formed Protonex. Leveraging their collective experience in fuel cell materials, Protonex was formed to commercialize fuel cell technology for high performance portable and remote applications. Since 2000, Protonex has grown to 26 people, funded in part by a variety of military contracts and two rounds of venture capital. As Chief Technology Officer, Osenar is responsible for technical leadership, product development, intellectual property and corporate strategy. In the early days however, he had the opportunity to fill a variety of rolls, including human resources, finance and business development. He lives in Westford, MA (a far suburb of Boston) with his wife Amy and son Torin (one).



Distinguished Merit Award
Burton Person
(BS MET '47)

After receiving his engineering degree, Burt Person earned a masters degree in management from the University of Illinois. He co-authored "The Foundry Industry in Illinois" with Harry Czyzewski, an assistant professor in metallurgy. In 1953 he earned an MBA from Harvard Business School. In his 37-year career, Person moved from refinery metallurgist at Esso to Chairman and CEO of Pawnee Industries, a custom plastics manufacturing concern. En route he held senior executive positions in manufacturing (John Wood Company, McKinsey & Company, Hinderliter Industries, Inc.), consumer products (The Singer Company, ARA Services), energy and communications (Columbia Broadcasting Systems, Resource Sciences Corporation)—always fast growth situations. The companies ranged in size from a \$1 million start-up to \$1.2 billion annual sales. He has taken two companies public and bought (LBO) and sold one company. Person has been active in the Service Corps of Retired Executives for several years. He is a member of the MatSE Department's Senior Advisory Committee and the University of Illinois Presidents Council. He and his wife Barbara (B.A. UIUC '49) live in Coronado, CA.

Looking forward...

by Burton Person (BS MET '47), recipient of the 2005 Distinguished Alumnus Award

I guess my career would be encouragement for those MatSE students unsure of their research posture. You can have a satisfying career on the management side with your technical foundation providing good skills and enriching your life. I would condense my 56 years of experience into three guidelines:

1. *Find a central core for your life* to give you balance when life “knocks you over,” which it will. For me it is my Christian faith; for you, it may be something else—a sport, family, special interest.
2. Try always to *have a job you like*. It releases your energy and talent and moves you forward.
3. *Set goals*. “What would I like to be doing in 5 years?” Then work toward them.

You are in an exciting field. I wish you well.

Call for nominations

The MatSE Department, College of Engineering, and University of Illinois Alumni Association annually honor alumni who have distinguished themselves in a variety of areas. Do you know an alumnus who would be a candidate for an award? Please contact Cindy Brya at (217) 333-8312, brya@uiuc.edu, for information on award criteria and how the department can assist in the nomination. The MatSE Alumni Board votes on alumni awards at its fall meeting. Nominations for the College of Engineering's Alumni Award are due in March (see page 10 for an article one of this year's recipients, Nestor Zaluzec). Nominations for the UI Alumni Association awards are due September 30. Please help us recognize our outstanding alumni!

Scenes from the 2005 banquet

The 2005 awards banquet was held at the Urbana Country Club. Undergraduate students, faculty, and members of the MatSE Department's Senior Advisory Committee and Alumni Board were on hand to congratulate the student and alumni award winners. The department awarded \$106,000 in scholarships to MatSE undergraduates for the 2005-06 academic year.



Vic Tennery (BS CER '54, MS CER '55, PHD CER '59), John Weaver, and Ken Kuna (BS CER '68, MS CER '69)



Andy Blake (MS MET '82) and Ron Morris (BS MET '59)



Steve Hales (PHD MET '86), Sidsel and John Wert (Charlie's son), Ian and Vicky Robertson, Stephen House, and Julie Wong.



Bob (BS MET '51) and Aileen Anderson

2005 Student Awards

A. I. ANDREWS SCHOLARS: Daniel Shoemaker, Nicholas Vito
PAUL A. BECK SCHOLAR: Ernest Timmons
HARRY J. BECKEMEYER JR. SCHOLAR: Robert Ronald
CLIFTON G. BERGERON SCHOLAR: Ryan Jensen
LOUIS R. BERNER SCHOLARS: Jennifer Gaddis, Bradley Norke-
wicz
ROBERT BOHL SCHOLARS: William Buniak III, Scott Cronin, Ash-
ley Emmons, Matthew Hardy, David Pidgeon, Steven Wisel
Caterpillar Scholars: Brian Bertram, Justin Montgomery
EARL J. ECKEL SCHOLARS: Jacob Dolezal, Jennifer Gregg
M. LAIRD AND CHARISANN FROBERG SCHOLARS: Matthew Duch,
Jessica Koschmeder
HENRY E. GREIN JR. SCHOLAR: Han Joo Choe
KIMBERLY CLARK SCHOLARS: Robert Bierman, Ruoshi Sun
MATSE INDUSTRIAL SCHOLARS: Philip Heil, Jeffrey Kalish, Daniel
Krogstad, Julie Wong
KEVIN MOORE MEMORIAL SCHOLAR: Melissa Smith

JAMES A. NELSON SCHOLAR: Laura Cote
CULLEN W. PARMELEE SCHOLARS: Paul Camann, Stephen Kaun,
Jonathan Lelah, Matthew Montgomery, Kyle Wallenberg
NORMAN L. PETERSON SCHOLAR: Jonathan McDaniel
IVAN RACHEFF SCHOLARS: Christopher Britt, Zai Kuan Chang,
Ameena Husain, Chung Hee Moon, Timothy Tyler
3M POLYMER MATERIALS SCHOLARS: Meena Babu, David Hoying,
Wuisiew Tan
LUCILLE AND CHARLES WERT SCHOLARS: Matthew Bossemeyer,
Christopher Calvey, Stephen House, Marie Mayer, Courtney
Skinner
MATERIALS SCIENCE AND ENGINEERING ALUMNI BOARD AWARD:
Jonathan Hollander
ARTHUR L. FRIEDBERG AWARDS: Nicole Kwasigroch, Pamela
Roley, Lindsay Schubel
ALFRED W. ALLEN AWARDS: Matthew Duch, Stephen Kaun, Jes-
sica Koschmeder, Jonathan Lelah, Jonathan McDaniel, Justin
Montgomery, Michael Mulholland, Daniel Shoemaker, Ruoshi
Sun, Kyle Wallenberg

Student Scholar Profiles



Jessica Koschmeder

Jessica Koschmeder

I grew up in Williamsburg, IA, a small, rural town about 20 minutes west of Iowa City. My graduating class had 79 students. I didn't know what MatSE was until the summer after my junior year of high school. I did an internship at Iowa State University in the glass and optical materials research group. I loved it and that's why I'm here.

I have chosen ceramics as my concentration and will be taking most of the electronic materials courses as tech electives. I plan on attending graduate school and would like to work in R&D whether in industry, academia, or national labs. My work with Engineers Without Borders (EWB) has led me to consider a pretty wide range of non-traditional careers too.

I discovered EWB, lost, confused and overwhelmed on Quad Day. The people I talked to were nice and it seemed like a novel concept. Having spent my entire life in a small town, I was definitely excited to branch out, and applying some of my skills to help others seemed like a great idea. Since then, I have traveled to Eastern India and taken on the responsibilities of EWB president. We sent a team back to India this summer for implementation of our biofuel project and have started projects in South America and Africa. We have also developed quite an active local community, building solar cookers, welcoming guest speakers and planning an alternative career fair.

Our project in the village of Badakamandra in the state of Orissa, India, was our first international project. I was a member of the site assessment team. We had been given very little information about the area we would be working in so we went to dig around ourselves. We spent about two weeks there, of which three days

were spent in the village itself. Our time in the village revealed to us so many little details that became central to our project, like the fact that the villagers leave lanterns burning all night because they are afraid of what is in the dark, when kerosene makes up a huge part of their monthly expenses. We played in the first rains of the monsoon much to the villagers' entertainment, took soil samples in the middle of the Indian afternoon and almost lost a team member or two to heat exhaustion, slept on mud floors, ate from plates made of leaves, and taught a few kids how to play Frisbee. My favorite part of EWB is the wide cross-section of students and faculty members that I get to work with on a regular basis. EWB has widened my social perspective on a global and local scale, introduced me to some fascinating new technologies and pointed me towards careers that I didn't know existed two years ago.

I play the trumpet in the Marching Illini as well as the Basketball Band. A lot of people ask me how I balance such a large time commitment with such a heavy class load. To be honest, I don't think that I would be so productive without band. For me, Marching Illini is an outlet. At times, it seems as if the two hours I spend at rehearsal might be better spent putting finishing touches on a lab report or homework set, but there are many more times when playing a new piece or an old favorite will leave me in a good mood for hours.

Without scholarships, I would never have been able to even consider attending the U of I. My parents told me that I could go to college anywhere that I wanted but that I would be fully responsible for the costs. In other words, unless I could magically come up with \$100,000, I would have to work hard and earn my tuition through other means. While loans and summer work have supplemented some of my costs, the scholarships I have received truly made it possible for me pursue my degree from one of the top universities in the country.

2005 Student Awards

Student Scholar Profiles



Bob Bierman

Bob Bierman

I'm from Carmi, a rural town three hours south of Champaign. I graduated with a class of 130.

I first heard of MatSE as a field of study my senior year of high school. My dad is an alumnus of the U of I, and he had mentioned several times how impressive the work of the ceramics engineers was. I always assumed that I would go into some type of engineering or science

field because math and science had always been my thing, but I was never sure just which field was best for me. MatSE gave me a chance to find out about ceramics and exposure to topics that are important to many types of engineers.

I am a sophomore and haven't decided on an area of concentration yet but am fascinated by the variation in properties and uses of metals. I'm currently enrolled in MSE 201, which is teaching me to understand how some of these properties come about. I feel like a kid in a candy store when I walk into any one of the local hardware stores. I'm not sure what I'd like to do after I graduate. I'd like an internship this summer where I can get a little more of an idea of what I would like to do.

I studied abroad in Darmstadt, Germany, this past summer. I took

classes in Darmstadt and lived a few miles away in the neighboring Eschollbrucken. My language abilities greatly improved during my stay, but for me, what I enjoyed most was my interaction with the German culture. I can recall several awkward, but educational situations from my time there. For example, during the week following an excursion to Prague, I stopped at the local store, the Galeria Kaufhof, to buy more socks, and the clerk refused to take my money. I couldn't see the problem. Yes, I was trying to hand her a 50 note for a purchase under 10, but I assumed that she could make change. Digging for smaller notes, I produced a 20. Still, she wouldn't accept it. After standing for a few moments longer in obvious confusion, she took the bill and pointed at the picture and text on it. I wasn't fluent in German, but I knew enough at that point to realize that I was trying to hand her Korunas from the Czech Republic. I still had the currency in my wallet from Prague. From then on, I double-checked every time I tried to make a purchase with something other than a U.S. greenback.

The scholarships I have received from the MatSE Department mean a great deal to me. Initially, a scholarship was one of the reasons I decided to attend this university. Now, it helps me to afford the cost of staying. Knowing that alumni and others think enough about the U of I and the curricula here to make these scholarship opportunities available is yet another measure of how outstanding the learning environment at Illinois really is. I feel fortunate to be here.

Graduate students recognized for outstanding research

Four graduate students received laptop computers and up to \$1,000 financial support to attend a conference at which their research will be presented, as recipients of the MatSE Department's Racheff/Intel Awards. Ken Cadien (Ph.D. MATSE '81) presented the computers on behalf of Intel Corporation.

2005 Award Winners:

Gregory Gratson (ADVISOR: Jennifer Lewis), Direct-write assembly of 3-D -periodic structures

Khalid Hattar (ADVISOR: Ian Robertson), In-situ TEM observations of toughening mechanisms in ultra-fine grained columnar aluminum thin films

Seokwoo Jeon (ADVISOR: John Rogers), Proximity field nanopatterning (PnP)

Folusho Oyerokun (ADVISOR: Ken Schweizer), Structure, thermodynamics, mechanical properties and glassy dynamics in anisotropic polymeric materials



Khalid Hattar, Gregory Gratson, Ken Cadien, Folusho Oyerokun, and Seokwoo Jeon.

Jianjun Cheng joins faculty

Assistant Professor Jianjun Cheng joined the MatSE faculty at Illinois in July 2005. Cheng received his B.S. in chemistry from Nankai University, China, his M.S. in chemistry from Southern Illinois University, and his Ph.D. in materials science from the University of California, Santa Barbara in 2001. He worked as a senior scientist at Insect Therapeutics, Inc., from 2001 to 2004, and as a research scientist at MIT from 2004 to 2005. His research interests include biomaterials, self-assembly, living polymerization, drug and gene delivery, tissue engineering, and bioimaging. He will be teaching a biomaterials class in the spring semester.

“My training in graduate school was in the area of polymer chemistry, especially in the synthesis of polypeptides in a controlled way using metal complexes. Polypeptides are biomimetic materials and have broad biological and biomedical applications,” Cheng said. His thesis advisor at the University of California, Santa Barbara, was Professor Timothy Deming, now in the bioengineering department at the University of California, Los Angeles.



Jianjun Cheng

At Insect Therapeutics, a privately held biopharmaceutical delivery company, he initially worked on a non-viral gene delivery project and later led a project of developing cyclodextrin based water soluble polymer for the systemic delivery of camptothecin, an anti-cancer drug. “We developed the delivery system very quickly after the project started and attempted the first tumor-reduction animal study within three months,” Cheng said. “Luckily the first anti-tumor animal study was very successful.”

In a series of animal studies, Cheng and his colleagues revealed several important parameters on the anti-tumor efficacy such as polymer molecular weights and pendant side chain for drug conjugation. The delivery vehicles were designed in such a way that they can be injected into mice systemically through the tail vein, reach and enter tumor cells, and slowly release drug molecules in the cancer cells to cause cell death. A single injection of the drug can last for more than 100 days with a detectable level in the tumor. “This work leads to one of most important proprietary delivery platforms at Insect Therapeutics,” Cheng said. Since he left Insect, the company has finished a series of additional animal studies using this delivery technology and plans on a human trial in the near future.

In June 2004, Cheng went to MIT to join Professor Robert Langer’s laboratory as a research scientist. His work involved using magnetic microparticle for insulin oral delivery. “The goal of the project was to use magnetic force to retain insulin containing particles in the small intestine, instead of being pushed out of the gastrointestinal tract,” Cheng explained, “so that released insulin can be absorbed

through the intestine to regulate glucose level.”

He also worked on prostate cancer targeting and therapy using aptamer, a nucleic acid ligand. “This work yielded very interesting results,” Cheng said. “The aptamer containing nanoparticle showed superior anti-tumor effects compared to the non-aptamer group.” This work was carried out in the laboratories of Dr. Langer and Dr. Omid Farokhzad at Harvard Medical School. Dr. Farokhzad, the principle investigator for this project, recently presented the research data at a European Cancer Conference in Paris.

Currently Cheng is building up his research group and working on fundamental research as well as applications of biomaterials. “I hope to develop functional nanobiomaterials through self-assembly and molecular recognition,” he said. “I am also working on developing techniques to allow the delivery of genetic materials, such as DNA or small interfering RNA, into cells. The latter can be very useful for treatment of genetic disease or cancer,” Cheng said. “To do such interdisciplinary research, we need to build up a team with students and post-docs from various backgrounds. I welcome applications from graduate students with synthetic chemistry, biology and bioengineering, or materials science backgrounds. I also encourage applications from undergraduate students who are interested in biomaterials research.”

Cheng lives in Champaign with his wife, Dan Shao, and their four year-old daughter, Irina. His wife is also an assistant professor at the University of Illinois, working in the Department of East Asian Languages and Cultures.



Nestor Zaluzec honored by College of Engineering

Nestor Zaluzec (PHD MET '79) has been named a Distinguished Alumnus of the UI College of Engineering. A principle investigator in the Electron Microscopy Center at Argonne National Laboratory as well as a Fellow of both Oak Ridge National Laboratory and the Computational Institute of the University of Chicago, Zaluzec is a scientist, educator, and inventor. His research includes the development of state-of-the-art instrumentation and techniques for atomic resolution x-ray and electron spectroscopy, magnetic imaging, and the invention of the scanning confocal electron microscope.

In addition to creating tools for science, he also uses these leading-edge technologies to study vexing problems in technologically important materials. His work over the last quarter of a century has included studies in the areas of structural phase transformation in metals, radiation damage in alloys, ceramic oxides for geologic immobilization of nuclear waste materials,

elemental segregation in semiconductors devices, and genetically engineered proteins for creation of two-dimensional templates for bio-materials nanoarrays. He was one of the earliest to realize the potential impact of the Internet on science and established the first TelePresence Microscopy Collaboratory, which has served as a model for outreach to both the scientific and education communities, providing unencumbered access to scientific resources.

In addition to his role as an adjunct professor at various Illinois' universities, Zaluzec engages the next generation of scientists through his work with the Illinois Junior Academy of Science, where

he continues to interact on a one-on-one basis with middle and high school students.

He has published more than 50 articles, and through Argonne National Laboratory, holds two patents. He has received numerous awards from professional societies, including the Burton Medal from the Microscopy Society of America, the Presidential Citation for International Collaborations from the Australian Society for Electron Microscopy, and the R&D 100 and SMSI Kohler Awards for developing the scanning confocal electron microscope.



Nestor Zaluzec

Welcome to the University of Illinois Alumni Association.

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.

Loren R. Taylor
Loren R. Taylor
 President and CEO

Please clip and mail this application with your check or credit card authorization to:

University of Illinois Alumni Association
 1401 W. Green St., Suite 227
 Urbana, Illinois 61801

UNIVERSITY OF ILLINOIS ALUMNI ASSOCIATION

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<p>Annual Membership</p> <p><input type="checkbox"/> Single \$45 <input type="checkbox"/> Joint* \$60</p> <p><input type="checkbox"/> Single, Recent Grad** \$30 <input type="checkbox"/> Joint, Recent Grad** \$40</p> <p><input type="checkbox"/> Single, Senior Alumni*** \$30 <input type="checkbox"/> Joint, Senior Alumni*** \$40</p> <p>Life Membership</p> <p><input type="checkbox"/> Single \$750 <input type="checkbox"/> Joint* \$1,000</p> <p><input type="checkbox"/> Single, Senior Alumni*** \$375 <input type="checkbox"/> Joint, Senior Alumni*** \$500</p> <p><input type="checkbox"/> Check here if you would like information on other payment plans.</p>	<p>Method of Payment</p> <p><input type="checkbox"/> Check: Please make your check payable to the University of Illinois Alumni Association.</p> <p><input type="checkbox"/> Credit Card: Please charge my:</p> <p style="padding-left: 20px;"><input type="checkbox"/> MasterCard <input type="checkbox"/> VISA <input type="checkbox"/> American Express <input type="checkbox"/> Discover</p> <p>Card Number _____</p> <p>Expiration Date _____</p> <p>Signature _____</p>
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JOINT MEMBER INFORMATION

If you have selected a joint membership, please provide the following for the joint member:

Joint Member Name _____

Social Security Number _____ University of Illinois graduate? No Yes

Relationship to Member (optional) _____

Name on Diploma (if different from above) _____

* 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.

UD21

Thank You

The student awards highlighted in this issue would not be possible without your support. The list of donors includes alumni and friends who have helped maintain MatSE's outstanding reputation. Included are individuals who have directed their gifts to MatSE between July 1, 2004, and June 30, 2005. We check the list carefully, but if we have overlooked you, please contact us so that we can correct our records. Some MatSE alumni chose to support other units of the University of Illinois; those gifts are not listed here but will be acknowledged by those units. If you wish to direct gifts to MatSE, please indicate MatSE on your check and on the donor form. For further information about making a gift, contact Cindy Brya, brya@uiuc.edu, (217) 333-8312. Individuals listed in **boldface** are first-time donors to MatSE. Thank you for your support!

Patrons – \$1,000 or more

Gerson Bilow (BS MET '65, MS MET '67)

Donald Burnett (BS MET '50)

Stephen Cheng

Steven (BS CER '81) and Pamela Grant

Hirokazu Hasegawa

James Hill (MS MET '83)

James (BS CER '70, MS CER '72, PhD CER '74) and Mary Humenik

John (BS CER '60) and Doris (MS CER '60) Krumwiede

Kenneth Kuna (BS CER '68, MS CER '69)

Ronald Larson (BS MET '58)

Alan Marlor (MS CER '73)

Frederick Petersen (BS CER '37)

Charles Schenk (BS MET '49)

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Earl Eckel, 1909-2005

Earl Eckel (MS MET '45, PHD MET '56) died June 20, 2005, in Champaign. He was born December 4, 1909, in Detroit, MI. He married Mary Elizabeth Cress on June 18, 1942, in Mayfield, KY. She survives. He is also survived by a son, Allan Eckel of Champaign.

Prof. Eckel received the Albert Easton White Distinguished Teacher Award of the American Society for Metals. He was valedictorian at Royal Oak High School in 1928. He studied at the University of Detroit while working for Ford Motor Co., then earned a bachelor of science degree from Michigan Technical University, graduating in 1937, as valedictorian. He worked for Chrysler as a metallurgist. He received master's and doctoral degrees in Metallurgical Engineering from the University of Illinois, in 1945 and 1956 respectively, and became a full professor in 1957. He taught a wide variety of metallurgy courses. He belonged to the American Society for Metals; American Institute of Mining, Metallurgical and Petroleum Engineers; American Powder Metallurgy Institute; Sigma Xi; and Tau Beta Pi. He enjoyed music and home electronics.

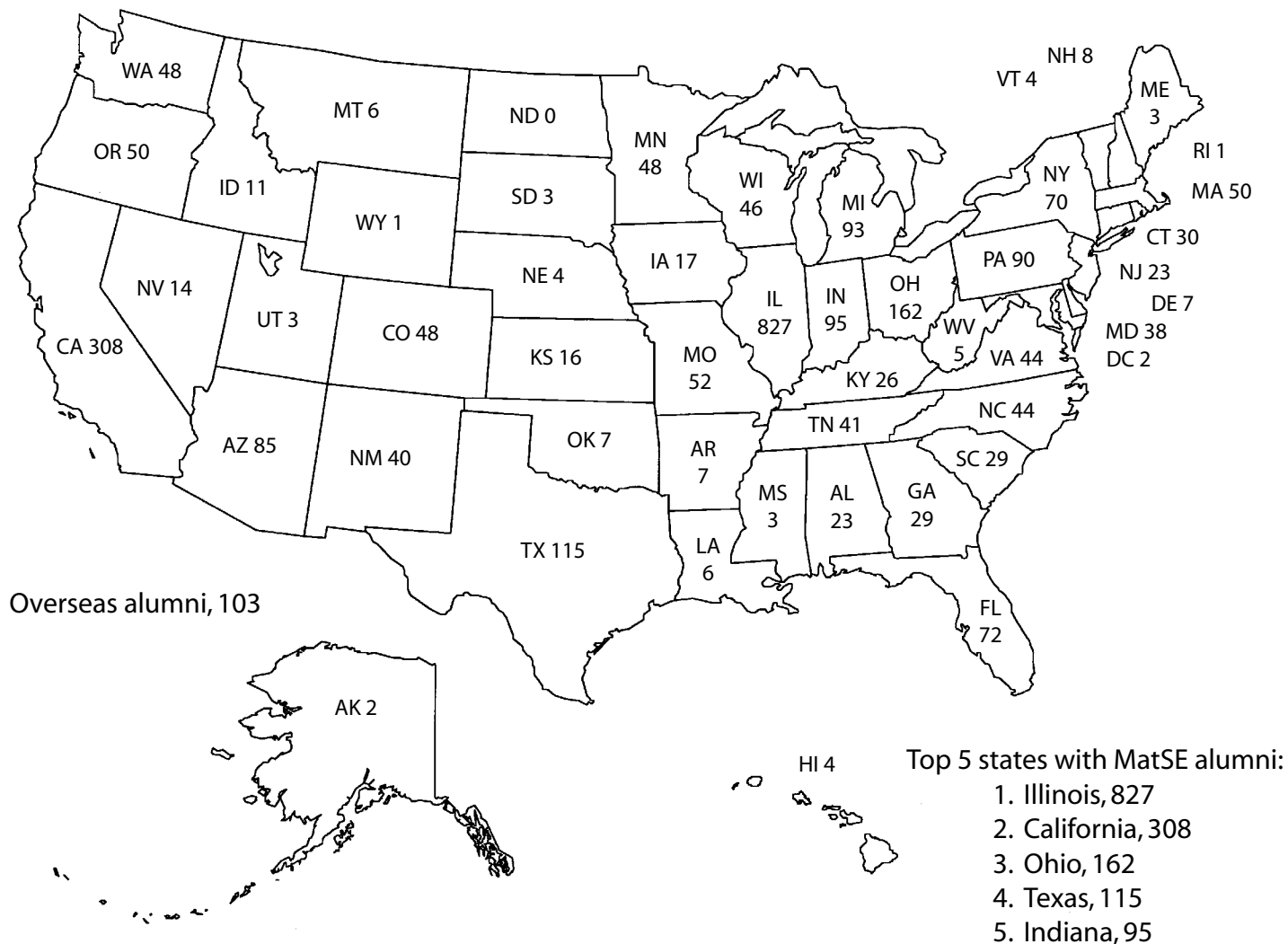
Memorials may be made to the Earl J. Eckel Metallurgy Scholarship using the form on this page.



Earl Eckel

Where are our alumni?

The Department of Materials Science and Engineering has 2,863 living alumni.
How does your state compare?



Department Notes

David Cahill and **Ian Robertson** have been named Donald Biggar Willett Professors by the College of Engineering. An investiture ceremony will be held in the spring 2006 semester.

Jim Economy received the Fiber Society's Founder's Award which recognizes outstanding contribution to the science and technology of fibrous materials by a professionally active scientist.

David Cahill was elected Fellow of the American Physical Society. Cahill's research was on the cover of *Advanced Engineering Materials* (July 2005).

Paul Braun was promoted to the rank of associate professor.

Khalid Hattar, J. H. Han, Taher Saif, and **Ian Robertson** won best poster award at the Midwest Microscopy and Microanalysis Meeting.

Jennifer Lewis' research was on the cover of the Royal Society of Chemistry's *Lab on a Chip* (June 2005).

John Rogers' research was on the covers of *Applied Physics Letters* (August 2005) and the *Proceedings of the IEEE* (July 2005).

John Rogers and **Moonsub Shim's** research on carbon nanotube array transistors was featured on the cover of the journal *Small* (October 2005).



Professors Erik Lijiten, Jianjun Cheng, and John Weaver talk to new freshmen about the MatSE Department at the Freshmen Welcome held in September.



REU 2005

Twenty students participated in the MatSE Department's Research Experience for Undergraduates (REU) program from June 6- August 12, 2005. The students came from the University of Massachusetts, University of Florida, Michigan State University, Boise State University, University of California at Berkeley, University of Chicago, Auburn University, Stanford University, Wake Forest University, Johns Hopkins University, as well as the University of Illinois. The program provides opportunities for students to conduct research, enhance their communication skills, and learn about a range of topics from exciting developments in materials to starting a business. The participants are pictured above with program coordinator, John Abelson, in front of Argonne National Laboratory.

Gerard Wong's research on DNA delivery systems was featured in the *Proceedings of the National Academy of Sciences* and in the *Champaign-Urbana News-Gazette* (August 2005).

A paper by **Duane Johnson**, **Pascal Bellon**, Kumara Sastry, and David Goldberg was chosen as a focused article of frontier research in the *Virtual Journal of Nanoscale Science and Technology* (August 2005).

Blythe Gore Clark, Ph.D. student in Ian Robertson's group, received the Fall MRS Graduate Student Gold Award for her paper "In-Situ TEM Observations of Dislocation-Particle Interactions during Elevated Temperature Deformation of



Blythe Gore Clark

Particle-Strengthened AlAlloys." Gold winners receive a plaque and \$400.

Peggy Wells joined the MatSE Department as a new secretary in the main office.

The MatSE Placement Office now offers employers resumes in book or CD format. If your company would like to receive a copy or if you would like your resume included, please contact Cindy Brya at brya@uiuc.edu, (217) 333-8312.

John Rogers in “2005 *Scientific American* 50”

MatSE Professor John Rogers has been named to the 2005 *Scientific American* 50, a list of people and organizations whose contributions to science and technology are recognized by *Scientific American*, the nation’s premier science magazine.

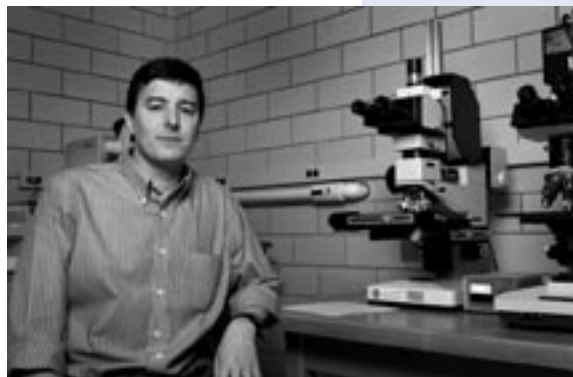
Rogers, who is also a Founder Professor of Engineering, was chosen as a Chemicals and Materials Research Leader for his research on plastic electronic systems. A profile of his work appears in the magazine’s December issue.

Understanding the intrinsic properties of organic semiconductor devices is crucial to the future of plastic electronic systems. In 2004, a research group led by Rogers and Michael E. Gershenson of Rutgers University reported a major advance in understanding how electric currents flow in these devices.

The group fabricated a plastic transistor by “stamping” electrodes on an extremely pure and defect-free crystal of rubrene. Measurements of the transistor’s properties revealed that the flow of charges in organics is slower than in silicon largely because the charges distort the flexible organic crystal lattice and then drag the distortions with them.

Plastic transistors offer different capabilities in consumer electronics than can be achieved with existing silicon technologies. Examples include inexpensive wall-to-wall displays and intelligent but disposable radio frequency identification tags. Taking the place of ordinary

“The Scientific American 50 honors research, business and policy leaders in an array of fields whose work has fostered science and technology advances that are helping produce a better future.”



John Rogers

product bar codes, such tags could ease congestion in supermarket checkout lines and help busy homemakers maintain shopping lists.

Selected by the magazine’s Board of Editors, the *Scientific American* 50 honors research, business and policy leaders in an array of fields whose work has fostered science and technology advances that are helping produce a better future. Among this year’s honorees are Korean stem cell researcher Woo Suk Hwang, philanthropist Fred Kavli, and U.S. Senators Arlen Specter and Patrick Leahy.

Scientific American was founded in 1845. Editorial contributors have included more than 100 Nobel laureates, among them Albert Einstein, Neils Bohr and Francis Crick.

-University of Illinois News Bureau

Birnbaum and Ehrlich Symposiums set for 2006

Birnbaum Symposium

The MatSE Department in association with the Frederick Seitz Materials Research Laboratory and the University of Illinois will sponsor a symposium to honor the contributions of Professor Howard Birnbaum to the field of hydrogen in metals and mechanical properties of metals in general. We hope you will make the time to join us at the University of Illinois at Urbana-Champaign on June 1 and 2, 2006, as we celebrate the contributions and achievements of one of our leaders. Presentations on the topics of point defects, diffusion, hydrogen in metals, hydrogen embrittlement and mechanical properties are being solicited. In recognition of Howard’s involvement in science policy and direction, one session will be focused on the “Future of Materials Science and Engineering in the USA” with contributions from our national funding agencies. Titles and abstracts of presentations should be submitted via the website www.mse.uiuc.edu/birnbaum-symposium.html.

Ehrlich Symposium

The Gert Ehrlich Reunion Symposium will be held on Tuesday, May 30, and Wednesday, May 31, 2006, with an optional picnic for group members on the day before, Monday, May 29 (U.S. Memorial Day). All past and present members of Gert Ehrlich’s 55 years of research activity are cordially invited to give a presentation. Since we have diverse careers, any topic relating to the group is acceptable. All sessions are open to the public and will be held in the Engineering Sciences Building on the University of Illinois campus. For more information, please email the reunion chairperson, Rob Chambers, at rhambrs@uiuc.edu.

In Memoriam

John J. Steencken (BS CER '39) of Bella Vista, AR, died October 1, 2005, at the age of 89. He played football for the UI. He played championship tennis in his 20s and won several trophies. He also won trophies in bowling and demonstrated bowling on television in Kansas City in the 1950s. He lived in Maryland, Pennsylvania, Michigan, Kansas City, and St. Louis before moving to Bella Vista in March 1973. His hobbies included golf and model railroads. He and his wife, Eleanor, were charter members of the Bella Vista Community Church, where he sang in the choir. Survivors include a daughter, granddaughter, and three great-grandchildren.

George H. Zink (BS CER '38, MS CER '42) of Little Rock, AR, died May 18, 2005, at the age of 90. After graduating with his master's degree in ceramic engineering, he taught and did research for two years at the UI. He played on the Illini basketball team. He served in the military from 1930-62, including World War II. He served in the Illinois National Guard's horse cavalry; ROTC; Officer's Reserve Corps, Wisconsin National Guard; and the 12th and 1st Armored Division in the European Theater. He was also a cavalry instructor at the UI. He retired as a lieutenant colonel in the Air Force. He began working as a research ceramic engineer in Canton, OH, in 1946. He was manager of glass coating material for A. O. Smith Corp. in Milwaukee from 1947-61. He worked at Dow Smith and A. O. Smith Inland Inc. from 1962-82, serving as manufacturing services manager from 1964-69 and purchasing manager from 1969-82. Survivors include a son, daughter, and two grandchildren.

Esther M. Tuttle (PHD CER '48) of Alfred Station, NY, died June 4, 2005, at the age of 85. She received her doctorate in ceramic engineering from the UI, where she was the second woman to ever earn a doctorate and the first woman to get one in ceramic engineering. Highlights of her working career included three years as a spectroscopist for the State Department of Geology and Mineral Industries in Portland, OR; three years as a research associate and project director at the North Carolina State Experimental Station at Raleigh; ten years in her privately owned petrographic lab; four years as a visiting professor of spectroscopy at the New York State College of Ceramics at Alfred; and finally, when she was 65 years old, two years as a teacher of digital electronics at Alfred State College. She led the Alfred 4-H photography club for a number of years, was an active member in the Alfred Women's Investment Club, the AU Faculty Wives Club and the First Alfred Seventh Day Baptist Church. Her hobbies included woodworking, computers and genealogy. She is survived by a daughter, two sons, and five grandchildren.

Robert Ostrem Martin (BS CER '48) of Fort Collins, CO, died June 4, 2005 at the age of 83. He grew up and graduated from high school in Joliet, IL, and received his bachelor's degree in ceramic engineering from the UI. He served in the Army during World War II. He married Mary Ellen Wright on January 25, 1947, in Glencoe, IL. He enjoyed a career in the Army. He retired as a colonel in 1970 and started a new career in real estate working for Rhodes Realty in Fort Collins. He retired from real estate in 1985.

He was a member of the First United Methodist Church in Fort Collins. His hobbies included photography, golf, traveling, reading and gardening. He leaves behind his wife, Mary Ellen (Mel) of Fort Collins, two sons, a daughter, and ten grandchildren.

Duane Moberg (BS MET '55) of East Moline, IL, died September 25, 2005, at the age of 72. He retired after many years of service as a metallurgical engineer at the Rock Island Arsenal. He previously had been employed by Astro Power, Costa Mesa, CA, and North American Aviation, El Segundo, CA. He was a lieutenant in the U.S. Army and served a tour in Europe while he was in the service. He enjoyed making model airplanes and was a member of the QC Skyraiders Club. He also enjoyed boating and fishing.

Daniel Weinstein (BS MET '57, MS MET '58) of Indian Wells, CA, died July 22, 2005, at the age of 70. He had two masters degrees in engineering and retired in 1995 in San Jose, CA, after a lengthy and distinguished career with IIT Research Institute in Chicago, Stanford Research Institute, and General Electric Nuclear Energy Division including numerous awards and 3 patents. He is survived by a son and daughter.

Sidney Diamond (MS MET '58, PHD MET '65) of Seabrook Beach, NH, died August 17, 2005, at the age of 72. He received his bachelor's degree from MIT and his graduate degrees from the UI. For the last 15 years, he was a Senior Technology Manager in Advanced Materials for the U.S. Department of Energy, contributing to a wide range of initiatives including the 80 mpg car, malleable ceramics, fuel ionization and other innovative technologies. He counted multiple patents and hundreds of technical papers and disclosures as his legacy, and was particularly proud of his recent developments to improve fuel economy of the United States commercial trucking fleet. In addition to his wife of 50 years, Anita, he is survived by two sons, two daughters, and eight grandchildren.

Edward Snajdr (PHD CER '71) of Findlay, OH, died September 8, 2005, at the age of 66. He received a bachelor's and master's degree from the University of Missouri-Rolla, a Ph.D. from the UI, and an MBA from Southern Illinois University. He was a ceramic engineer with a specialization in refractories who worked for Babcock and Wilcox upon obtaining his doctorate. He was then employed by Vesuvius and its predecessor companies since 1974. His memberships included the Norcrest Presbyterian Church, where he was a deacon, and the American Ceramics Society. He is survived by his wife, Wong Xiu Ping, two daughters, two sons, a step-daughter and three grandchildren.

Class Notes

1960s

John Roberts (BS MET '65) spent many years in the foundry business, becoming the chief engineer for an investment casting foundry in the Dallas area that made castings for the aerospace and oil field industry, primarily. About ten years ago he started his own company and now works as a manufacturer's representative selling all types of castings in the southwest. He is semi-retired and works out of his home. John would like to reconnect with the class of 1964-65 by email (jroberts132@comcast.net).

Hiro Otsuka (MS MET '66) traveled all the way from Japan to see Prof. Wayman who is still recovering from a severe stroke he suffered several years ago. Hiro is an emeritus professor at the University of Tsukuba.

1970s

Al Stone (BS MET '78) has moved his metallurgical laboratory to Wheeling, IL. Aston Metallurgical Laboratories offers testing, failure analysis, heat treating and other services.

1980s

Robert Sherman (PHD MET '82) stopped by the MatSE Department in August. He has been involved in precision cleaning since 1991 in his own company, Applied Surface Technologies, in New Providence. His wife, Sandie Brown (JD '79) is a tax lawyer in NJ. They have three sons, two of which have been at Big 10 schools.

Eric Smith (BS MET '86) is Business Development Manager for Bi-Link, a manufacturer of custom metal stampings with wholly-owned manufacturing facilities in Bloomindale, IL, Shanghai and Malaysia.

1990s

Michael Horton (BS CER '98) and his wife, Amanda, celebrated the birth of their first child, Jeremiah Reid Horton, on July 8, 2005. Jeremiah weighed 7lbs 6.5oz and

Three graduates who have maintained contact with each other over the years were in town for the Illinois-Wisconsin football game this fall. Those celebrating the mini-reunion were **Tony Schaffhauser (BS MET '63)**, **Ken Boris (BS MET '64)**, and **Doug Ruhmann (BS MET '64)**. Tony Schaffhauser has retired from Oak Ridge National Lab and is now consulting. He received his Ph.D. from the University of Tennessee. Ken Boris is making lots of money by virtue of his position at the U.S. Mint in Denver. Doug Ruhmann received his Ph.D. from Washington University and works at Boeing in St. Louis. Doug recently completed his three-year term as President of the MatSE Alumni Board. They are pictured below with Professor **Bob Bohl (BS MET '46, MS MET '49, PHD MET '56)**. The trophy they are holding is Caterpillar's Advanced Materials Excellence Award. **Sheryl Tipton (BS MET '80)** presented the trophy to Prof. Bohl at the fall MatSE Alumni Board meeting. Sheryl is starting her term as the new President of the Alumni Board.



Ken Boris, Bob Bohl, Doug Ruhmann, and Chuck Schaffhaueser

was born in Peoria, IL. Michael is currently in the Executive MBA program at Bradley University.

Rhonda Houston (BS CER '98) started a new job as Sales and Marketing Trainee for PPG's aerospace division in September. The division sells sealant and adhesives for space and aircraft industries. She moved to Grand Prairie, a suburb of Forth Worth/Dallas, TX.

Dave Diercks (BS CER '97, MS MATSE '99) is pursuing a Ph.D. in materials science and engineering at the University of North Texas in Denton, TX.

Valli Ramanathan (MS MATSE '99) is a stay at home mom in Irving, TX. Her

daughter, Nithya, was born on October 2, 2004.

2000s

James Gerloff (BS MATSE '00) married Amy Sanders on April 16, 2005, in Chatham, IL. James is an engineer with SGS North America Inc. Amy (BS UIUC '01, JD UIUC '04) is an attorney with Hart, Southworth and Witsman in Springfield. The couple resides in Springfield.

Flashback



One of the students in the photo above is featured in this issue of the MatSE Alumni News. Can you figure out which one? If you recognize these classmates or have a photo to share with our readers, please contact the Editor at (217) 333-8312 or brya@uiuc.edu.



University of Illinois at Urbana-Champaign
Department of Materials Science and Engineering
1304 West Green Street
Urbana, IL 61801, USA

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