



WINTER 2006

*The Newsletter of  
the Department of  
Materials Science and  
Engineering*

# MSE News

## Professor Tresa Pollock Inducted Into the National Academy of Engineering

Professor Tresa Pollock was one of 74 members inducted into the National Academy of Engineering in Washington, D.C. on October 9, 2005. Election to the Academy is one the highest professional distinctions in engineering. It honors those who have made outstanding contributions to “engineering research, practice, or education, including, where appropriate, significant contributions to the engineering literature”. And it recognizes those who: have pioneered new and developing fields of technology, made major advancements in traditional fields of engineering, or developed/implemented innovative approaches to engineering education.” The mission of the National Academy of Engineering (NAE) is to promote the technological welfare of the nation by marshaling the knowledge and insights of eminent members of the engineering profession. Professor Pollock was elected “For contributions to our understanding of the processing and performance of advanced metallic materials.”



**Professor Tresa Pollock, with Craig Barrett and William Wulf, President of the National Academy of Engineering, at the 2005 NAE induction ceremonies in Washington, D.C.**

Prof. Pollock, who joined MS&E in 2000, has made major contributions to the field of high temperature structural materials, particularly in the areas of advanced Ni-base superalloys and intermetallics. Her work has spanned the subjects of microstructure evolution, structure-property relations and processing. Her research has advanced the understanding of single crystal solidification and identified new high-gradient single crystal growth approaches for nickel-base superalloys. She is co-inventor of the commercial single crystal alloy René N6. She and her research group conduct fundamental studies on alloying, microstructure and high temperature deformation mechanisms in nickel, titanium and magnesium-based systems. More recently she and her students and postdoctoral fellows have been involved in collaborative research projects on the development of new intermetallic coatings, use of ultra-intense femtosecond lasers for materials diagnostics and microfabrication and high temperature ultrasonic fatigue. Professor Pollock has advised 23 Ph.D. students, 9 M.S. students and 8 postdoctoral researchers as a faculty member at Carnegie Mellon University and the University of Michigan.

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# Letter to the Alumni



## **MSE NEWS**

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Peter Green

**Newsletter Staff**  
Kay Artico

## **The Regents of the University of Michigan**

David A. Brandon, Ann Arbor  
Laurence B. Deitch, Bingham Farms  
Olivia P. Maynard, Goodrich  
Rebecca McGowan, Ann Arbor  
Andrea Fischer Newman, Ann Arbor  
Andrew C. Richner, Grosse Pointe Park  
S. Martin Taylor, Grosse Pointe Farms  
Katherine E. White, Ann Arbor  
Mary Sue Coleman, *ex officio*



On September 1, 2005, I succeeded John Halloran as Chair of the Materials Science and Engineering (MS&E) Department. In this, my first letter to the alumni, I want to share news of a number of exciting events that occurred within the department during the past year and to give you my thoughts on the field of materials science and how we as a department will respond to the exciting opportunities and significant challenges that lie ahead.

By any measure, this has been a most exciting year for our department. Research funding within our department is at an all-time high, despite the decline of government-sponsored research in universities throughout the country. The number of MS&E undergraduates has doubled during the last five years, reaching an all time high of just over 100. With a total of approximately 100, the number of PhD and MS students is also at an all-time high, after a decline in 2002. Our students are finding employment in a range of industries, from medical and pharmaceutical to electronics and automotive. Many undergraduates continue their education in graduate and professional schools.

Members of our faculty have been recognized for a number of achievements in the past year. Tresa Pollack was elected to the National Academy of Engineering; the first faculty member of MS&E to receive this prestigious recognition. This year Tresa is also President of The Minerals, Metals and Materials Society, one of the world's leading materials societies. Four major awards for teaching were earned by MS&E faculty this year; the Jon R. and Beverly Holt Award for Excellence in Teaching and the 1938E Award were awarded by The College of Engineering to Michael Falk. Michael also received the Outstanding Student Group Advisor Award from the Epeians Engineering Leadership Society. Wayne Jones was one of a select group of faculty members within the University to be awarded the prestigious Arthur F. Thurnau Professorship. Three textbooks were published by MS&E faculty this year, two by Bill Hosford. Ron Gibala was selected as the Interim Dean of the College of Engineering. Our graduate and undergraduate programs continue to be highly ranked. This year, US News and World report ranked our undergraduate program 4<sup>th</sup> in the nation; our graduate program is tied for 8<sup>th</sup>.

Having provided you with a brief snapshot of events in our department during the past year, I now address an obvious question on your minds; what challenges and opportunities exist for MS&E in the immediate future and how do I plan to engage MS&E and our constituents in identifying and responding to them. During the next year, we will develop a new Strategic Plan

for the department. Our most recent strategic plan was created five years ago. During the past five years, the MS&E department, through John Halloran's leadership, evolved to reflect significant developments in the field. The MS&E program at Michigan now encompasses computational and experimental aspects of Materials Science and Engineering, and covers a wide range of materials research and education, from advanced structural alloys and nanostructured materials for automotive, aerospace and power generation applications, to soft functional materials with applications that include medicine and organic electronics.

To understand the evolution of the department and, more generally, that of the field, please consider the following. The discipline of Materials Science and Engineering has changed at a more rapid pace during the last few years than, perhaps, during any period in its history! Significant developments in the field have largely been connected with the synthesis and process-

**Continued on page 12**

# The Greenhills-UM Engineering Connection

The MSE department recently initiated a new high school outreach program consisting of hands-on research opportunities for local high school students, including women and members of underrepresented groups. The students participate in hands-on-research projects in the laboratories of several MSE faculty, combined with a research class at their school. In the research class, the students write papers to be submitted to various Science Fairs, such as the Intel Science Talent Search, as well as prepare PowerPoint and poster presentations for in-school seminars. Thus, the program benefits students and teachers who are both directly and indirectly involved in the research class.

With seed funds from the UM CoE, the program was initiated by Dr. Rachel S. Goldman, Associate Professor of MSE, EECS, and Applied Physics, in conjunction with Martha Friedlander and Dr. James Lupton from Greenhills School in Ann Arbor. The program was modeled after a similar program at Breck School, in Minneapolis, Minnesota (<http://realscience.breckschool.org/upper/research/default.html>), with significant advice from Ms. Lois Fruen, Science Head and Founder of the Breck School Science Research Program. Ms. Fruen was Dr. Goldman's high school chemistry

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Greenhills High School students participating in UM materials research laboratories during summer 2005: Ms. Jamie Berg, Ms. Jayne Choi, Mr. Sam Seever, and Dr. Max Shtein.

## 2005 Departmental Scholarship & Awards

### *Richard A. Flinn Scholarship*

Thomas Conry  
Elisabeth Mueller

### *Mars G. Fontana-William C. Leslie*

*Scholarship*  
Eric Sterling

### *James W. Freeman Memorial Scholarship*

Da Mao  
Alexander Melville  
Timothy Waxweiler

### *John Grennan Scholarship*

Suzanne Brown  
Brian Gorney  
Eric Heining  
Michael Katz  
Sheila Kornlyo  
Philip Standiford  
Qian (Faye) Yang

### *Jack J. Heller Engineering Scholarship*

Garnet DeNolf  
Chloe Funkhouser  
Laura Povlich

### *Clarence A. Siebert Memorial Scholarship*

Carrie Bayer  
Sameer Kumar  
Amanda Martel  
Jeffrey Roslund  
Zachary Shemon

### *Alfred H. White Memorial Scholarship*

Michael Kravchenko

### *Schwartzwalder Memorial Scholarship*

Nathaniel Tindall

### *2005 Brian Worth Award*

Nicholas Rudawski

### *2005 MMS Anvil Award*

Meghan Pocs

### *Distinguished Achievement Award*

Undergraduate - Matthew Larson  
Graduate - Arnold Allenic

### *Best Overall Teaching Assistant*

Kahn Wu

### *Best Overall GPA - Brian Puchala*

### *Best Overall Doctoral Written*

*Exam - Xiaoxia Zhu*

*MLK Spirit Award - Jonathan Madison*

**Congratulations to our Scholarship Winners!!**

# Scientists create two-sided nanoparticles

As with many things in nature, including nanoparticles, two are better than one.

Scientists at the University of Michigan have used electricity to create nanoparticles with two sides, similar to how a fish bobber is made of two colored half shells. The technique could fuel a new research direction in the field, because the limits of size and shape are expanded, said Joerg Lahann, assistant professor of Chemical Engineering, and Materials Science and Engineering at U-M.

The new particles are exciting for several reasons, Lahann said, and could be used in many applications including targeted drug delivery, or to create new self-assembling particles. The big advantage is that the two sides, or phases, may be modified separately.

A good way to understand this is to picture two full water balloons squished into a see-through jar. The membranes are pressed together but the contents of each balloon could differ, because the membrane separates the two balloons. Scientists could load two different drugs into the particles, one on each side, for use in targeted drug delivery.

The Janus particles are anisotropic, which means as you move through it you have different compositions, a bit like a layer cake. The halves could act as tiny balloons if loaded with different drugs, or other substances. “You could potentially fill each balloon with a different drug,” Lahann said. He added it’s important to understand that the halves of the nanoparticle are not hollow like balloons though. Rather, the particles are made of a solid plastic.

Using the fish bobber analogy, scientists can chemically alter the surfaces of the two halves to create “patches,” chemically altered spots on the particle with different instructions. The ability to engineer or chemically modify the particles to create different surface patches is crucial to self-assembly of nanoparticles, and also in drug delivery, Lahann said. For example, one of the two sides could be modified to ‘dock’ at certain proscribed points on a cell membrane or a cell tissue.

The particles are formed by ejecting polymers from two parallel needles, Lahann said. The needles are close enough together that the polymers merge; think of squeezing out a line of toothpaste with two colors, Lahann said. At the end of the needles, a fluid droplet forms which is then blasted with several thousand volts of electricity. This causes the droplet to elongate and break into nanoparticles. The side-by-side positioning is preserved, hence the formation of the two-sided particles.

The findings are published on-line in Nature Materials, in a paper entitled, “Biphasic Janus Particles with Nanoscale Anisotropy,” co-written by Lahann, Kyung-Ho Roh, and Prof. David Martin.





# Faculty Kudos

*Michael Falk* received the inaugural Jon R. and Beverly S. Holt Awards for Excellence in Teaching. These awards, made possible by a generous donation by Jon and Beverly Holt, are presented annually to one faculty member in Industrial and Operations Engineering and one in Materials Science and Engineering to recognize outstanding teaching. Nominations are made by Department Chairs and their citations follow: "For outstanding teaching of first year students, advanced undergraduates, and graduate students, done with respect for the student and concern for their development."

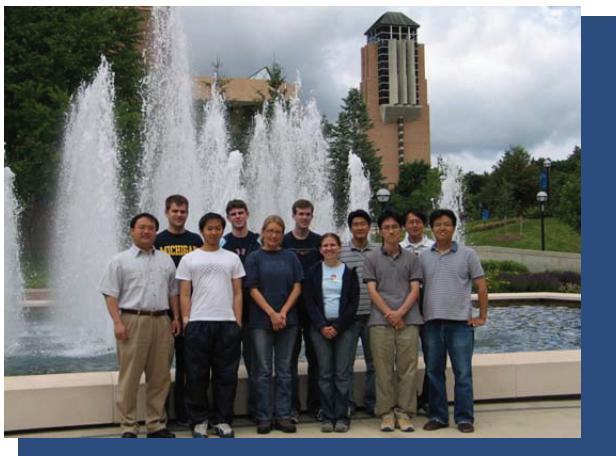
*Frank Filisko* received a Weiser Fellowship to spend three weeks in Bratislava, Slovakia to collaborate with faculty at the Slovak Technical University in Bratislava on vibration control using ER materials. The fellowship is awarded by Ambassador and Mrs. Weiser for pursuit of such studies in Slovakia. Frank will be going in May 2006.

*Sharon Glotzer*, promoted to Professor with Tenure.

*Rachel Goldman* was recently named a 2005-2006 Radcliffe Institute Fellow at Harvard University, for her project entitled, "Directed Matrix Seeding of Semiconductor Nanostructure Arrays". Goldman was one of 48 women and men chosen from a pool of approximately 780 applicants. Radcliffe Institute fellowships are designed to support scholars, scientists, artists, and writers of exceptional promise and demonstrated accomplishments who wish to pursue work in academic and professional fields and in the creative arts.

Other awards for Rachel include the UM Faculty Fellowship Enhancement Award (2005) and Board of Directors, AVS (2005-2008).

*John Kieffer*, promoted to Professor with Tenure.



## *Jinsang Kim* wins NSF Grant on Molecular DNA Sensors

Assistant Professor Jinsang Kim recently received an NSF grant to develop a new type of molecular DNA sensor which is very sensitive, highly selective, and self-amplifying. His research will create a bio-synthetic hybrid material, combining the extraordinary selectivity that nature provides with DNA with the ability to electronically amplify signals using synthetic conjugated polymers. Kim's sensors will be able to detect DNA sequences from any type of organism, by keying on specific DNA sequences. The potential applications range from medical diagnostics for genetic diseases to sensing biological warfare agents.

These molecular sensors will have a conjugated polymer backbone with several side chains. Biologic function comes from side chains with protein-like peptide sequences or oligonucleotide molecular beacons. Water solubility is provided with non-ionic and anionic side chains. High sensitivity is expected because the signals can be amplified. The molecular DNA sensors will be used in high accuracy DNA microarrays. The proposed molecular DNA sensors will open a new era of rapid specific organism detection based on their DNA signature without the costly and time-consuming PCR (polymerase chain reaction) amplification, labeling with fluorescent dyes, and thorough purifications of analyte DNA. For further information, see Prof. Kim's website at <http://msewww.engin.umich.edu/people/faculty/kim/>.

*Nicholas Kotov* was elected to the Langmuir Advisory board and published a paper in *Nature* on nanoparticle materials.

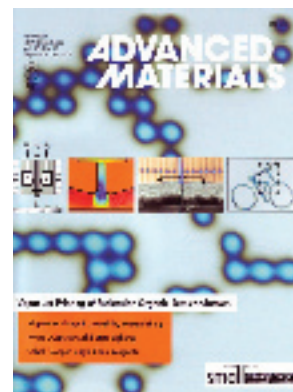
CONTINUED ON PAGE 15

# New Faculty Join MSE

## Max Shtein



Max Shtein joined the department in September 2004 as an Assistant Professor. He obtained his undergraduate degree in Chemical Engineering from University of California Berkeley in 1998, followed by a PhD from Princeton in 2004. During his graduate studies he received several awards, including a Graduate Student Instructor Award, the MRS Graduate Student Gold Medal Award, and the 2004 PRISM-Newport Award of Excellence and Leadership in Photonics and Optoelectronics. His doctoral thesis was on “Organic Vapor Phase Deposition and Vapor Jet Printing for Electronic and Optoelectronic Device Applications.” Some of which is finding application in the commercial production of OLED displays, and has appeared on the September 16, 2004 cover of *Advanced Materials*.



Building on his expertise in organic semiconductor processing, Prof. Shtein’s research group is developing optoelectronic devices with novel form factors, such as woven displays and solar cells, with the emphasis on developing high precision, low-cost processing methods for making them. The group is also working in using organic semiconductors in nanoscale devices for ultra-high resolution microscopy and sensors, which can help further elucidate the mechanisms at the heart of energy conversion in organic devices. His group is looking to apply these techniques in the near future to the field of thermoelectrics, biomedical engineering, information storage, and others.

## Katsuyo Thornton



Katsuyo Thornton joined our faculty as an assistant professor in September 2004. She comes from Northwestern University where she was a research assistant professor conducting research in computational materials science. She received her Ph.D. in Astronomy and Astrophysics from the University of Chicago in 1997, then received postdoctoral training in computational materials science at Northwestern University in 1998 and 1999 under the guidance of Prof. Peter W. Voorhees in the Materials Science and Engineering Department. She gained further experience by researching and teaching in the field of computational materials science at the Massachusetts Institute of Technology in the following years, prior to taking the research assistant professorship at Northwestern.

Her research focuses on computational and theoretical investigations of the evolution of microstructures and nanostructures during processing and operation. These investigations facilitate the understanding of the underlying physics of materials to aid us in designing advanced materials with desirable properties and in developing manufacturing processes that are the most cost-effective. The topics include coarsening in elastically stressed solids, evolution of topologically complex systems in

three dimensions, simulations of electrochemical systems, and self-assembly of quantum dots and other nanoscale phenomena during heteroepitaxy of semiconductors using large-scale simulations.

She was recently awarded several external grants. She is the principle investigator of “NSF-EC Cooperative Activity in Computational Materials Research: Bridging Atomistic to Continuum - Multiscale Investigation of Self-Assembling Magnetic Dots During Epitaxial Growth”, leading a team of four US investigators. Also awarded are “Collaborative Research: Morphological Evolution in Materials” from NSF (Co-PI, PI: Prof. Xiaofan Li, IIT), “the Evolution of Topologically Complex Structures: Coarsening of Dendritic Mixtures” from Department of Energy, Basic Energy Science (Co-PI, PI: Prof. Peter Voorhees, Northwestern University), and “MURI: Hyperspectral and Extreme Light Diagnostics for Defense Critical Advanced Materials and Processes” from Air Force Office of Scientific Research (Co-PI, PI: Prof. Tresa Pollock, University of Michigan). Katsuyo also received an NSF Award “Collaborative Research: Three-Dimensional Mapping of Solid Oxide Fuel Cell Electrodes: Processing, Structure, Stability, and Electrochemistry” from NSF (Co-PI, PI: Prof. Scott Barnett, Northwestern University).

## Anton Van der Ven

Anton Van der Ven specializes in the application of first-principles computational methods to study and predict materials properties. A particular focus of his research is the development of statistical mechanical techniques to link the electronic structure of materials to their thermodynamic and kinetic properties. Van der Ven has used these methods to elucidate and predict the properties of a wide variety of oxide intercalation compounds for rechargeable batteries as well as metal alloys for structural and catalysis applications.

Van der Ven received his undergraduate engineering degree in metallurgy from the University of Louvain, Belgium, and his PhD degree in materials science from MIT. Before joining the department in January, 2005, Anton Van der Ven was a postdoctoral researcher and instructor at MIT.



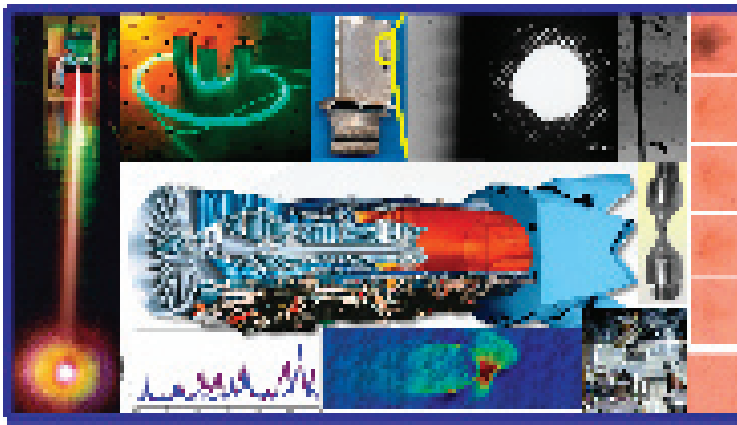
## Peter F. Green



Peter F. Green became Chair of the Materials Science and Engineering Department on September 1. He was formerly Professor of Chemical Engineering at the University of Texas at Austin, where he was the BFGoodrich endowed Professor of Materials Engineering. During his tenure at the University of Texas, 1996-2005, he held positions as Chair of the Graduate Studies Committee (GSC) for the field of Materials Science and Engineering (MS&E) as well as the Graduate Advisor for MS&E. Professor Green was also the Chair-elect (2002) and Chair (2003) of The University of Texas Graduate Assembly; the Graduate Assembly is the legislative body for Graduate Education at the University of Texas, covering graduate education in areas from business and law to engineering. From 1985 to 1996 he worked at Sandia National laboratories, and was manager of the Glass and Electronic Ceramics Research Division from 1991-1996. He earned B.A. and M.A. degrees in Physics from Hunter College in 1981 and his M.S. and Ph.D. degrees in Materials Science and Engineering from Cornell University in 1983 and 1985, respectively.

Prof. Green is the 2006 President of the Materials Research Society (MRS). He is fellow of the American Physical Society and of the American Ceramic Society. He was elected to a 4-year term as member of the Council of Gordon Research Conferences (GRC) in 2003; this is the legislative body for GRC and its membership includes representatives from all areas of science, from biology and medicine to physics and materials. Professor Green is a divisional associate editor for Physical Review Letters and serves on the editorial board of the scientific journals, Macromolecules and Journal of Polymer Science: Polymer Physics. Green is the current vice chair of the National Research Council Solid State Sciences Committee and is a member of the National Academies Board on Physics and Astronomy. He just completed a three-year term as a member of the external advisory committee of the Division of Math and Physical Science of the National Science Foundation. He is author of the textbook Kinetics Transport and Structure in Hard and Soft Materials, CRC, Taylor and Francis, 2005.

# AFOSR-MURI Program on Hyperspectral and Extreme Light Diagnostics for Advanced Materials and Processes



A five year Multidisciplinary University Research Initiative (MURI) has been awarded to a team of University of Michigan Investigators from Materials Science and Engineering (MSE), Physics and the Center for Ultrafast Optical Sciences (CUOS). The objective of this MURI program is to develop the scientific basis for use of ultra-high-intensity femtosecond lasers as materials diagnostics and microfabrication tools. The materials focus will be on advanced aircraft engine materials and components. The interaction of femtosecond lasers with materials is unusual because the ultrashort, ultraintense pulses can ablate material with no melting or collateral damage, un-

like longer pulse lasers. Of specific interest is the development of techniques that can deliver diagnostic structural and chemical information in a non-destructive mode at “standoff” distances in ambient or inert gas environments with no specialized chambers. For example, x-rays can be generated in air (or helium) and utilized for radiography. The program will address fundamental aspects of laser-material interaction and quantify the capabilities and/or extend the limits of individual laser-based material interrogation modes, including x-ray and electron-based diagnostics, terahertz tomography and “non-destructive” LIBs. The program begins in May 2005 and the Principal Investigator is Professor Tresa Pollock (MSE). Other senior investigators include Professors J. Wayne Jones (MSE), Katsuyo Thorton (MSE), Steve Yalisove (MSE), Roy Clarke (Physics), Almantas Galvanauskas (CUOS), John Nees (CUOS) and John Whitaker (CUOS).

## **Qiang (Charles) Feng Receives Research Mentor Award in the College of Engineering**



Dr. Qiang (Charles) Feng, MSE senior research fellow, has received the 2004 Research Mentor Award from the College of Engineering at the University of Michigan. The Research Mentor Award was established in 2003, by the Office of the Associate Dean for Graduate Education and the Graduate Student Advisory Committee. It was created to recognize graduate students, post-docs and senior research fellows who go above-and-beyond their ordinary responsibilities, to guide other students through the sometimes overwhelming process of conducting research.



# Cahn Delivered 2005 Van Vlack Lecture

The 2005 Van Vlack Lecture was given by Dr. John W. Cahn, from the National Institute of Standards and Technology. His lectures on March 17 and March 18, 2005, were entitled, “Glass Formation from a Melt by a Nucleation and Growth Process, as in a First-Order Transition”, and “The Evolving Paradigms of Materials Science”, respectively.

On April 6 and 7, 2006, Ali S. Argon from Massachusetts Institute of Technology, will become the 2006 Van Vlack Lecturer. His lectures will be as follows: Thursday, April 6, 2006, “Atomistic Simulation and Analysis of Plasticity in Amorphous Silicon” and Friday, April 7, 2006, “How to Toughen Brittle Plastics”. Ali will be honored at a dinner on April 7, 2006.

# Hosford Endowed Scholarship Fund

William F. Hosford, emeritus professor, recently provided a gift of \$125,000 to the Regents of the University of Michigan, for the benefit of its College of Engineering. The gift will be used to establish a fund named the Hosford Endowed Scholarship Fund.

The fund will be used for the following purpose: to provide financial support for students enrolled in the College of Engineering with a minimum of 14 credit hours per semester and who are pursuing a major in the Department of Materials Science and Engineering. Preference will be given to students interested in metallurgy or mechanical behavior, and be in the top half of their class in academic standing based on GPA. Distributions from the fund may be used for tuition, room and board, student fees, books and course guides, and other materials that may be required to complete coursework at the College of Engineering.

The recipients and the amounts shall be recommended annually by the MSE department undergraduate program committee.

The University may accept future, additional gifts from other parties to enhance the Fund. Please see the gift form on page 16 if you wish to contribute to this fund.



# Wang Chu Chien-Wen Research Internship Fund

Tony K. H. Wang recently provided a gift of \$100,000 to the Regents of the University of Michigan, for the benefit of its College of Engineering, to establish a fund named the Wang Chu Chien-Wen Research Internship Fund. Tony is establishing the fund in memory of his mother.

The fund will be used to support a summer research intern in the Department of MSE. At the end of the internship, each intern will write a formal report and make an oral presentation within the department during the fall semester immediately after the internship.

# Student Section

## UNDERGRADUATE DEGREES

### December 2004

Brian Andrew Birchler  
Kaylan Marie Brakora  
Matthew Harrison Eder  
Matthew David Fisher  
Christopher Brian Irwin  
Sara Jane Johnson  
Chadwick Allen Korthuis  
Brian Thomas Puchala  
Fatima N. Syed  
Hongfei Wu

### April 2005

David J. Alberts  
Mark D. Barbieri  
McLean P. Echlin  
Carmela Franco  
Alexis C. Goolik  
Corey R. Grice  
Mary E. (Molly) Hegarty  
R. Brendan Held  
Katie L. Herta  
(Julian) Katarzyna M. Katie Imach

Karolyn P. Knutson  
Matthew E. Larson  
Michael J. Lear  
Karen M. Lipkin  
Thomas M. Mahon  
Matthew T. Martin  
Rachel D. Mathews  
Neo Huiyan Neo  
Blake A. Nickles  
Zachary A. Olds  
Meghan M. Pocs  
Sarah S. Polleta  
Russell W. Pong  
Carlos J. Remedios  
Michelle L. Renaud  
Deepa Rengaraj  
Nickolas G. Rudawski  
Noah O. Shanti  
Lindsay C. Shuller  
Sarah E. Thompson  
Brian Wang  
Po-Shan (Tony) Wang  
Melissa A. Zielinski

### August 2005

Tatsuhiko Osada  
Aaron Tyler

### December 2005

John Bobanga  
Chloe Funkhouser  
Brian Gorney  
Nicole Keyes  
Maggie Leinberger  
Elisabeth Mueller  
Jeffrey Roslund  
Bradley Thomas  
Qian Yang  
Erik Young

## GRADUATE DEGREES

### December 2004

Christopher M Rasmussen, M.S.  
Xiaoxia Zhu, M.S.  
Kahn Chia Wu, Ph.D.  
Fabio Albano, M.S.  
Kathleen Ann Boszak, M.S.  
Alisha Bernadette Diggs, M.S.  
Michael Wonjae Lee, M.S.  
Fang Cao, M.S.  
Alexandru Riposan, Ph.D.  
Michelle L Tokarz, Ph.D.  
Kiyoshi Araki, Ph.D.  
Huagen Peng, Ph.D.

### April 2005

Brian S Tryon, Ph.D.  
Andrew J Elliott, Ph.D.  
Haiping Sun, Ph.D.  
Todd Joseph Menna, Ph.D.  
Georgette Tanya Obeidi, M.S.  
Wei-Wen Hu, M.S.  
Gaurav Gupta, M.S.  
Katharine T Beach, M.S.  
Larry A Godlewski, Ph.D.

### August 2005

Nicholas David Saddock, M.S.  
Christopher John Szczepanski, M.S.  
Deniye Shan Wickramanayake, M.S.

### December 2005

Qi Yang, Ph.D.  
Laura Jill Rowland, Ph.D.  
Kahn Chia Wu, Ph.D.

# Alumni News

Send us your news. We'll feature you in the next newsletter. Tell us what you have been doing - your job, where you live, research news, accomplishments, and more. Send to [kaymac@umich.edu](mailto:kaymac@umich.edu).



*Dr. Raymond F. Decker*, BS MTL '52, MSE '55, PhD '58, received the Alumni Society Distinguished Service Award, at the Alumni Society Awards Dinner on October 7, 2005. The Alumni Society Distinguished Service Award was established to honor College of Engineering graduates who have given generously of time and talent to further college projects and activities. The selection of this award was made by The Alumni Society Selection Committee. He is the Chief Technical Officer and Founder of Thixomat of Ann Arbor. Ray recently founded a new company, Nanomag, Inc., to commercialize a joint invention with Prof. Amit Ghosh of MSE. He has volunteered extensively with the College of Engineering, and is an Adjunct Prof of MSE. He currently serves on the MSE Advisory Committee and is President of the MSE Alumni Society. He was Co-Chair of the Class of 1952E Reunion Committee, who just recently reached their goal of endowing a scholarship. In addition, he served as a class representative for the 2002 commencement. Dr. Decker has been tireless in his support of the University of Michigan and can be counted on to step in and help wherever needed.

*Ms Amy Mercado Vince* was recently promoted to the position of Technical Expert for Integrated Risk Management, GS-14, Systems Integration Branch of the ASC Engineering Directorate. Ms Vince is an outstanding engineer with an extensive background in Integrated Risk Management, Systems Integration Engineering, and Environmental Engineering. Her experience over the past 13 years of service to the USAF includes systems and environmental engineering assignments in the Reconnaissance Systems Wing, the Engineering Directorate's Environmental Management Pollution Prevention, Restoration, and Compliance branches, and the 88 Air Base Wing Environmental Management office. Ms. Vince will be responsible for providing technical expertise including systems engineering and design, technical risk identification and mitigation, engineering statistics, project scheduling, and technical resource estimation. Ms. Vince is the IPT lead of a automated tool development group challenged with precisely evaluating the status of ASC's and Space and Missiles Center's environmental, safety, and occupational health programs reflecting today's Operational Risk Management guidance. Ms. Vince received a Bachelor's degree in Materials Science and Engineering from the University of Michigan and is currently enrolled in a Master of Project Management program at the American Graduate University.



*Kristie Denovich*, from Caterpillar recently moved to Lafayette, IN to the Large Engine Center, for her 3rd rotation spot in the Manufacturing Professional Development Program. She is currently working as a tooling engineer for the 3600 Rod and Block lines as well as doing the processing for the Rod line.

## Continued from Page 1 - Pollock Inducted into NAE

Professor Pollock was also the 2004 – 2005 President of the Minerals, Metals and Materials Society (TMS). The society, which has about 10,000 members internationally plays an important role in the field of materials in terms of (1) providing meeting forums for the exchange of information, (2) promoting the education and development of current and future professionals and (3) representing the profession in the accreditation of educational programs and in the registration of professional engineers and (4) providing state of the art technical information through publications, including one of the field's premier journals: *Metalurgical and Materials Transactions*, for which she also serves as associate editor. Professor Pollock says that the development of collaborations with related professional societies, given the ever-increasing breadth of the materials field, has been a priority during this presidential term along with the development of young professionals in the field.

ing of new, advanced, materials. Such materials include new functional organic, hybrid organic-inorganic nanocomposite and nanostructured, materials that possess diverse functionalities, rendering them useful for applications that range from medicine and energy to electronic and photonic device applications. Lessons learned from the field of biology and from nature have provided new clues on how to synthesize materials with unusual properties and pose new intellectual and technological opportunities and challenges for the field. Theory and computer simulations of materials processing, structure and properties are now at a level of sophistication that, often combined with experiment, play a critical role toward surmounting large multidisciplinary problems of societal value. Computer simulations and have now become an integral part of ours and other first tier MS&E departments around the country. Necessarily new MS&E educational curricula will evolve to reflect such developments.

A natural consequence of this intersection between MS&E and other disciplines is that materials research is now conducted across a wide spectrum of disciplines here at the University of Michigan. Other departments within the College of Engineering, the College of Literature, Science and Arts, the Medical and Dental Schools are all involved in some level of materials research. One of our challenges is to develop effective mechanisms to interact with the various materials communities on campus so that we can play a meaningful leadership role and to facilitate further advances in the field. Given the rapid evolution of the field, the challenges faced in funding first class research and given our desire for MS&E to have an even greater national, state and UM role in materials education, research and service, it is essential that we develop effective strategies for growth and change that will guide our actions in the coming years.

I am honored to have been selected to lead MS&E at Michigan. I look forward to getting to know our many alumni and friends and I encourage you to stay informed and involved with MS&E. I hope that you enjoy this and future newsletters, and I also encourage you to visit our website to learn more about other developments in the department. I also invite you to come visit us to see first-hand the many interesting and innovative activities that are part of MS&E. Go Blue!

## Alumni Society Merit Award



Ronald Gibala, Robert Pehlke, and Peter Green

### Nominations Sought for 2006 Alumni Society Merit Award Winner

The Alumni Committee has until March 17, 2006 to nominate. The Alumni Meeting and Dinner will be held on October 27, 2006.

Robert D. Pehlke (BSE MTL '55), professor emeritus, was recently honored at the Alumni Society Awards Dinner on October 7, 2005. He received the Alumni Society Merit Award. The Alumni Society Merit Awards were established to honor alumni who personify the College's tradition of excellence and who have achieved significant accomplishments in their professional lives. The awards are given each year to graduates from each academic department. Recipients are selected by departmental committees, whose members are chosen and headed by the department chair. Congratulations!



and A.P. chemistry teacher in the 1980s.

Examples of Greenhills students working in UM materials research laboratories are shown in the figure. Ms. Jamie Berg worked with Dr. Jinsang Kim, Assistant Professor of MSE, ChE, Macro, and BME, on a project entitled, “Reversible Fluorescent Imaging on Functional Conjugated Polymers”, Ms. Jayne Choi worked with Dr. David C. Martin, Professor of MSE, Macro, and BME, on a project entitled, “Surface Properties of an Electrically Conductive Polymer”, and Mr. Sam Seever worked with Dr. Max Shtein, Assistant Professor of MSE, Macro, and Applied Physics, on a project entitled, “Deposition of Organic Solar Cells on Fibers”.

Ms. Jamie Berg tested the effects of UV irradiation and heat on oxadiazole-alternating conjugated polymers. Conjugated polymers are used for many optoelectronic devices, such as cell phone displays. However, most conjugated polymers are prone to photobleaching; exposure to light causes the polymer to darken. It is expected that the presence of an oxadiazole unit on a conjugated polymer backbone provides improved stability, which is beneficial to optoelectronic devices. Using a photo mask and exposing the polymer to UV irradiation, Berg was able to write on the oxadiazole-alternating conjugated polymers and test the subsequent level of fluorescent intensity. Surprisingly, the area exposed to UV irradiation showed the brightest emission. Berg also observed and charted the erasing effect of heat on the polymer.

Ms. Jayne Choi worked in a Biomedical Engineering lab where one of the major research focuses is to develop biocompatible polymers to aid in the improvement of neural prosthetic devices that could eventually enhance the quality of life for individuals troubled by paralysis. One polymer under study is PEDOT (polyethylenedioxythiophene), an electrically conductive polymer that can be deposited onto an electrode from an aqueous solution. PEDOT creates a “fuzzy” texture on the surface of the electrode, increasing the interfacial surface area. Jayne’s project was to determine the hydrophobic or hydrophilic character of different species of PEDOT by measuring the contact (or wetting) angles of the different samples. It is hypothesized that more hydrophilic PEDOT will be more biocompatible with brain tissue.

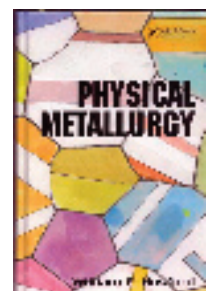
Mr. Sam Seaver designed and built an organic vapor phase deposition system for coating plastic fibers with organic materials that may allow these fibers to capture sunlight and convert it into electricity. One long term objective of this project was to coat fibers that are long enough to be woven into pieces of cloth, in order to demonstrate the concept of a solar energy harvesting fabric that could be made in the future to provide power to homes or industrial buildings. The deposition system has yet to be tested, and Sam has been invited back to the lab to continue his research.

During 2006, in addition to continuing the program with additional students from Greenhills School, the program will be expanded to involve students and teachers from other local and nearby high schools, including Community and Pioneer High Schools in Ann Arbor, as well as all girls’ schools including Detroit Mercy High School, whose enrollment includes many African-American students of various economic classes.

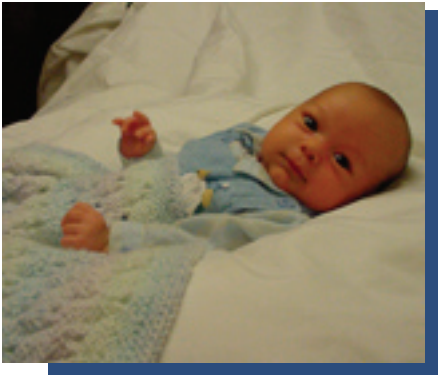
## MSE Faculty Publish Books in 2005

*Professor Green* published *Kinetics, Transport, and Structure in Hard and Soft Materials* (Taylor and Francis).

*Professor Hosford* published *Mechanical Behavior of Materials* (Cambridge U. Press) and *Physical Metallurgy* (CRC Taylor and Francis).



# New Arrivals!



Katsuyo & Patrick Thornton welcomed their first child, Kaden John Thornton, on August 12, 2005.

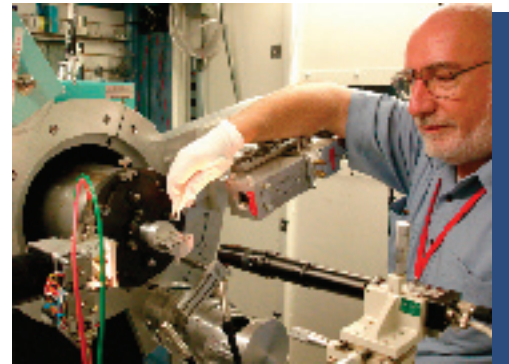


Jeong and Jinsang Kim welcomed their third child, Anne Yoonah Kim, on November 9, 2005.

## John C. Bilello Retires

John retired as Professor of Materials Science and Engineering at the end of the Fall Semester 2004, but still maintains a sponsored research program characterizing materials using Advanced X-ray methods.

He graduated from New York University in 1960 and 1962 with a B. Met. E., and a M. S. degrees, respectively. He received his Ph. D. from the University of Illinois in 1965 in Metallurgy and Physics under the late Marvin Metzger. In 1967, after a brief sojourn in industry at General Telephone and Electronics Laboratories he moved on to the State University of New York at Stony Brook where he eventually served one term as Dean of the College of Engineering and Applied Sciences (1976-81).



In the late 1970's, while spending a sabbatical with Keith Bowen at Warwick University, UK, John became interested in Synchrotron Radiation, as a non-destructive tool for understanding the microstructure, phase relationships and local chemistry of materials. This led to him heading a multi-institutional research team whose job it was to build and exploit a materials science imaging/diffraction beamline at the National Synchrotron Light Source at Brookhaven National Laboratory (1979-1986). He went on to become the founding Dean of Engineering and Computer Science at the California State University in Fullerton, CA before coming to Michigan in 1989 as Professor of Materials Science and Engineering and Professor of Applied Physics.

John has been the recipient of a number of visiting Fellowships – first at the Centro Studi Nucleari E. Fermi, in Milan, Italy in 1973-74 where he worked with Professor G. Caglioti and later from 1981 to 2004 under NATO sponsored cooperative programs with the Departments of Engineering and of Materials at Oxford University with David Dew-Hughes and later with Chris Grovenor, which involved spending most summers in Oxford, UK doing collaborative research and having lunch at the Lamb and Flag.

John is a Fellow of ASM and of IAE, but what has given him the most satisfaction has not been any honors - rather it is the more than 50 graduate students he has mentored over the years.

# Gifts from our Donors - 2005

*Thank you for your generous gifts to the Department of Materials Science and Engineering, or to the College for the benefit of MSE. If we have missed someone, please accept our sincere apology, and let us know so that we can correct our records.*

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## CONTINUED FROM PAGE 5 - FACULTY KUDOS

*Victor Li* received some recent honors:

The first is election as Fellow to the World Innovation Foundation (WIF). In its letter of elected fellowship to Professor Li, the foundation states: "The WIF mission....brings into a new world order that is based on equality, a sharing environment, human dignity, self-worth and the economic cooperation of nations.....scientists and engineers are the only ones who can provide the 'tools' for this future condition. . . . (WIF fellow) members will become involved with national and international decision-making." Nobel Laureate Dr. Jerome Karle is WIF's president.

The second honor comes from the Christopher Columbus Foundation. Professor Li is one of two finalists for the 2005 Frank Annunzio Award in the field of science and technology for his work in bendable concrete. In the recognition program, the Foundation notes that Professor Li has "invented bendable concrete that retains the benefits of normal concrete, but eliminates the commonly observed cracking and spalling associated with concrete brittleness."

He also received the 2005 Stephen S. Attwood Excellence in Engineering Award for extraordinary achievement in teaching, research, service, and other activities that have brought distinction to the College and University.

*Tresa Pollock* was awarded the Lee Hsun Award from the Chinese Academy of Sciences Institute for Metals Research (IMR). The Award is presented to individuals who have made outstanding contributions to the field of materials science and engineering. The award was presented in conjunction with a lecture she gave on new developments in high temperature materials at IMR in Shenyang, China on October 17th, 2005.

*Katsuyo Thornton* was recently awarded several external grants. She is the principle investigator of "NSF-EC Cooperative Activity in Computational Materials Research: Bridging Atomistic to Continuum - Multiscale Investigation of Self-Assembling Magnetic Dots During Epitaxial Growth", leading a team of four US investigators. Also awarded are "Collaborative Research: Morphological Evolution in Materials" from NSF (Co-PI, PI: Prof. Xiaofan Li, IIT), "the Evolution of Topologically Complex Structures: Coarsening of Dendritic Mixtures" from Department of Energy, Basic Energy Science (Co-PI, PI: Prof. Peter Voorhees, Northwestern University), and "MURI: Hyperspectral and Extreme Light Diagnostics for Defense Critical Advanced Materials and Processes" from Air Force Office of Scientific Research (Co-PI, PI: Prof. Tresa Pollock, University of Michigan). She also received an NSF Award "Collaborative Research: Three-Dimensional Mapping of Solid Oxide Fuel Cell Electrodes: Processing, Structure, Stability, and Electrochemistry" from NSF (Co-PI, PI: Prof. Scott Barnett, Northwestern University).

*George Wynarsky* received the College of Engineering Thomas M. Sawyer, Jr. Teaching Award.

## You make the difference

Every year we strive to offer our students in Materials Science and Engineering the best possible educational and research opportunities. Your annual gifts to the Department provide the funding for that margin of excellence which prepares our graduates to compete successfully in today's world and to contribute substantially to society. We count on you to help us continue our offering of exceptional educational opportunities in MSE.

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