



TECHSTRACKS

Materials Science and Engineering

A newsletter for alumni and friends of the Department of Materials Science and Engineering

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Keck Laboratory for Combinatorial Nanosynthesis and Multiscale Characterization

The University of Maryland has received a major award of \$750,000 from the W. M. Keck Foundation of Los Angeles to establish a new Laboratory for Combinatorial Nanosynthesis and Multiscale Characterization. Conceived by Professors Ichiro Takeuchi, Gary W. Rubloff, and Ellen Williams, the Keck Laboratory will be a centerpiece for pioneering research which extends campus strengths in combinatorial materials science, scanning nanoprobe, and highly controlled materials synthesis profoundly into the nanoscale domain to enable fundamentally new insights into the behavior of materials at the nanoscale.

The Keck Laboratory for Combinatorial Nanosynthesis and Multiscale Characterization will be located in the new Jeong H. Kim Engineering Building, scheduled to open in January 2005. The \$750,000 award from the Keck Foundation will support the creation of a revolutionary experimental platform with unprecedented capabilities for rapid exploration of advanced complex smart materials and memory devices, as well as systematic investigation of their physical mechanisms. Laser molecular beam epitaxial growth under ultraclean conditions will enable control and lattice engineering of materials at the atomic level, while in-situ patterning of the materials will deliver combinatorial libraries for rapid materials discovery and development. Characterization of materials properties and performance metrics across the combinatorial libraries will be carried out using a novel microscope which measures the performance of materials through spin resonance microwave microscopy at the nanoscale and surface structure at the

atomic scale. The chemical and structural properties of the combinatorial material libraries will be monitored during their production using surface analytical techniques; then the samples will be transferred to the microscope under ultraclean conditions. This will enable researchers to establish clear correlations and deep understanding of how the architecture of materials at the nanoscale determines the properties and performance of complex material systems.

The Keck Laboratory brings together University of Maryland excellence in materials research, particularly in complex multifunctional oxide materials, combinatorial materials science, surface nanostructures, and integrated materials processing. The NSF Materials Research Science and Engineering Center (MRSEC) at Maryland is a leader in the synthesis and characterization of complex material systems, the development of surface nanostructure probes, and nanoscale understanding of underlying physical mechanisms of materials and surfaces. The NSF

Message From the Chair



R.M. Briber
Chair, Materials
Science and
Engineering

Welcome to the Fall 2004 MSE Newsletter. There have been many recent exciting developments in the Department which are highlighted in this newsletter. In particular, I would like to draw your attention to the accomplishments of our faculty and students. Professors Takeuchi, Rubloff and Williams (Physics) received a large award from the Keck Foundation to build a **Laboratory for Combinatorial Nanosynthesis and Multiscale Characterization**. This will be a state-of-the-art facility for the combinatorial synthesis and high resolution characterization of novel new materials. The laboratory will be housed in the Kim Engineering Building, due to open in January 2005. In addition, the Kim Engineering Building will contain a new teaching laboratory for materials characterization - **The Modern Engineering Materials Instructional Lab**. This will provide a significant improvement in the laboratory experience for our MSE undergraduates. The lab is partially funded by a new NSF grant obtained by Professors Martinez-Miranda, Briber, Bruck (Mechanical

Engineering), Cardenas (Mechanical Engineering) and Bonenberger (Aerospace Engineering).

There have also been significant accomplishments of our students which should be noted. Erin Dreyer received the Dinah Berman Memorial Award which is presented to a junior for demonstrated leadership and service to the Clark School of Engineering. Erin also received the Morgan L. Williams Memorial Scholarship from the Washington, DC Chapter of ASM International. Dan Janiak received the Chairman's Outstanding Senior Award and Susan Beatty received the Outstanding Materials Student Service Award. Please read through the newsletter to learn about other awards and achievements by our students and faculty. The Department is looking to hire two new assistant professors this year which makes it an exciting time to be leading the effort in Materials Science and Engineering at the University of Maryland. *If you are in the Washington DC metro area, please stop by the Department for a visit.*

Keck Laboratory - continued from page one

International Materials Institute (with Rensselaer Polytechnic Institute and Florida International University) is a focal point for global collaboration and advance of combinatorial materials experimentation and informatics.

Prof. Williams (Physics), founding Director of the NSF MRSEC at Maryland, is an expert in scanning probe microscopies and atomic scale characterization of surfaces. She is a distinguished university professor in Physics and the Institute for Physical Science and Technology (IPST), and the recipient of numerous awards, including the APS Goepfert-Mayer award and the MRS Turnbull Lectureship. **Prof. Takeuchi** is

a pioneer in combinatorial materials science and multifunctional materials. An associate professor in Materials Science and Engineering and the Center for Superconductivity Research, he has received an NSF CAREER award and an ONR Young Investigator award. **Prof. Rubloff** has been a leader in ultraclean, integrated processing and characterization of electronic materials. He is the former director of the Institute for Systems Research, professor in Materials Science and Engineering and ISR, and the recipient of the AVS Gaede-Langmuir Prize.

The W. M. Keck Foundation is one of the nation's largest philanthropic organizations. Established in 1954 by the late

William Myron Keck, founder of The Superior Oil Co., the Foundation's grant-making is focused primarily on the areas of medical research, science, and engineering.



The new Jeong H. Kim Engineering Building will open in January, 2005.

studentNEWS

Materials Engineering Society Activities Through the Year

The 2003-2004 academic year was a time of great success for the Materials Engineering Student chapter (MatES). Throughout the year, MatES worked to improve the quality of its programming, through social, service, and career development activities. Many past events were retained and improved upon, while new activities were added. The new activities were designed to give Chapter members the opportunity to network, and to learn about their field, their career options, and their Chapter organization.

Erin Dreyer, MatES President, developed a weekly electronic newsletter. She also compiled a member directory which was mailed and posted in the student lounge.

Chapter members assisted in the organization of the Materials Science and Engineering Fall Open House. This half-day event attracted over 100 engineering students. The open house included demonstrations, lab tours, and food, as well as conversation with materials faculty and students.

Student chapter meetings were diverse and well attended. Some of the most interesting meetings featured a discussion with Robert Briber, Department Chair, discussing his plans for the Department, Stephanie Coffin from the Nuclear Regulatory Commission, and the return of six former alums who shared post college information.

The Chapter continued its tradition of capturing national awards. It received the TMS Most Improved Chapter award and for the fourth year in a row, the award for the Most Creative Recruitment Strategies. For the first time, MatES won a monetary prize and certificate for its Maryland Day design: a crystal crawl-through structure with crystal building station. The design was voted Best Representation of the Major in the "Obstacles of the Mind and Body" competition.

Chapter members continue to win scholarships, and leadership, service and academic awards at the University and nationally. Student awards are listed below.

Officers for the 2004-05 school year

are Erin Dreyer, President, Paul Freese Vice President, Erin Flanagan, Secretary, and Jo Meador, Treasurer.

The society continues to encourage support from department alumni. Guest speakers are always welcome. Contact the society president, Erin Dreyer (edreyer@umd.edu), if you would like to speak at a meeting or contribute in another way. See the MatES website at <http://www.mse.umd.edu/mates/> for upcoming events and more information.



MatES members Erin Flanagan and Paul Freese sell goodies in Martin Hall to help raise funds for chapter activities.

Undergraduate Awards and Honors

Chairman's Outstanding Senior Award

Presented to a graduating senior for scholarship, leadership, and service to the department

Daniel Scott Janiak

Outstanding Materials Student Service Award

Presented to a graduating senior for outstanding service to the department's recruiting efforts and the student society.

Susan Lynn Beatty

ASM/TMS Materials Undergraduate Service Award

Presented to an undergraduate for service to the ASM/TMS Chapter

Erin Candice Dreyer

Dinah Berman Memorial Award

Presented to a junior for demonstrated leadership and service to the Clark School of Engineering

Erin Candice Dreyer

ASM Outstanding Scholar Award

Presented to an undergraduate ASM member who shows potential in materials science and engineering or metallurgy, based on academic achievement, interest in the field and personal qualities

Erin Candice Dreyer

Morgan L. Williams Memorial Scholarship, ASM International, Washington DC Chapter

Presented to a Washington area student majoring in science or engineering disciplines dealing with metals/materials.

Erin Candice Dreyer

Department Ranks 23rd in US News and World Report Graduate School Rankings

In the most recent issue of the **US News & World Report**, "America's Best Graduate Schools", the A. James Clark School of Engineering and its graduate programs were rated among the best in the nation. The Clark School is rated 16th overall (10th among public universities) tied with Princeton University and the University of California, Los Angeles.

Out of seven engineering specialties, six Clark School programs were ranked among the top 25. Materials Science and Engineering was ranked 23rd (13th among public universities). Other Clark School specialties which were ranked included Aerospace Engineering ranked 9th (5th among public universities), Electrical Engineering ranked 14th (8th among public universities), Computer Engineering ranked 16th (9th among public universities), Civil Engineering ranked 22nd (15th among public universities), and Mechanical Engineering ranked 24th (15th among public universities).

"These achievements are a testimony to the quality of the Clark School's faculty, staff and students and a reflection of our collective commitment to excellence. We have established our leadership in engineering education by recruiting outstanding faculty members, launching new research initiatives, and strengthening well-established research programs, in addition to developing outstanding academic experiences for our students", stated Engineering School **Dean Nariman Farvardin**. He added, "We will continue our efforts toward building one of the very best engineering programs in the world."

Ph.D. Student Patent Is Invention of the Year Finalist

A patent submitted by Physics Ph.D. student Xuefeng Hua was selected as the 2003 Invention of the Year finalist by the Office of Technology Commercialization in the physical sciences area. Hua is a student of **Prof. Gottlieb Oehrlein**. His research focuses on the use of low temperature plasmas in nanotechnology. Several patent disclosures on this new approach were submitted.

Organizers of the prestigious IEEE International Conference on Plasma Science (ICOPS 2004) have informed Hua that the abstract of his contributed conference presentation on a related topic has attracted a high level of interest. His abstract has been upgraded to an invited conference presentation.

Materials at Maryland Day

Over 70,000 people attended the fifth annual Maryland Day festivities held April 24, 2004. The Engineering Student Council's theme for the major-versus-major design competition was "Obstacles for the Mind and Body." Materials Science and Engineering undergraduates built a large crystal structure for children to crawl through. The structure had vacancies, substitutional defects, and even a dislocation. They also built models of several types of crystal structures and provided gum drops



Children enjoy climbing through the crystal structure built by MSE undergraduate students for Maryland Day 2004.

and toothpicks so that attendees could build their own crystal structures. Crystal builders were asked questions based on previous information provided by the students. Participants were encouraged to answer questions about crystals. Those who got the correct answer were rewarded with rock candy.

The project won "Best Reflection of the Major" in the design competition. The students were awarded a certificate and a monetary prize. This is the first time that MSE students have won a prize during the competition! All of their hard work certainly paid off.

Meanwhile, faculty and students staffed a table of demonstrations which included a number of newly designed informational posters which explained the demonstrations. Information about the major was also provided. Visitors were enthusiastic about the demos and information provided about materials science and engineering.

Calling All MSE Alumni

The A. James Clark School of Engineering will undergo accreditation by the Accreditation Board for Engineering and Technology (ABET) in 2005. During the summer and fall of 2004, each department in the Clark School will work on preparing the documentation required by ABET. In order to complete some of this documentation, we will need up-to-date information on alumni. If you have not contacted the department recently to update your employment and contact information, please email or write Kathleen Hart, 1113 Chem/Nuc Engineering Building, University of Maryland, College Park, MD 20742 or hart@umd.edu. She thanks you in advance!

First 5 Year BS/MS Student Graduates

Theresa Valentine is the first student to graduate from the Department's new 5 year BS/MS program. This program is available to outstanding students who have the ability to pursue graduate work. Valentine received her BS in Spring 2003 and her MS in Spring 2004. Her research was in polymer based microfluidics under the direction of **Prof. Gary Rubloff**. Two additional MSE undergraduates are currently participating in the 5 year program.



Theresa Valentine, first 5 year BS/MS grad pictured with fellow MS grads Chuan-Lan Lin and Ke Yu

New Staff Members

Charlene Werner joined the Materials Science and Engineering Department in February, 2004. She works in the business office as a Business Services Specialist. **Dale Morey** serves as the departmental contact for the Clark School IT staff.

High School Students Explore MSE

During the summer of 2004, several student groups visited the Department through a number of summer programs in the Clark School of Engineering. Three hundred rising junior and senior high school students attended the National Student Leadership Conference in July. They toured the Laboratory for Advanced Materials Processing (LAMP)

and the Transmission Electron Microscope (TEM).

Thirty juniors and seniors participating in the Women in Engineering summer program also visited the Department. Led by **Prof. Isabel Lloyd, Mey Saied, Joanna Meador** and **Kathleen Hart**, the women saw demonstrations of "fried marbles" (to show how stress gradients cause tempering of glass), shape-memory alloys, and superconductor levitation. They also learned about crystal structures by building models with gum drops and toothpicks. These activities, combined with "be-an-engineer" brainstorming and lab tours got the students excited about MSE. (See picture in the photo gallery.)

The Crucial Role of Materials Science

In April, Team CoSMIC, consisting mostly of MSE Department graduate students, staff and faculty, entered the competitive campus wide men's intramural softball tournament. CoSMIC faced such formidable opponents as Keg Killers and Girlie Men early on in the tournament. After fending off more fearsome fraternity teams, CoSMIC entered the championship game an underdog. CoSMIC ended up beating the last opponent by more than 10 runs. After 4 days and 5 games of carnage, Team CoSMIC won the championship.

Hiroyuki Ohguchi, a graduate student in the Department and the team captain stated, "We wanted to show that we can successfully compete not only in science and engineering, but also in sports." Many on the team agreed that a designer bat was a key element in the high-scoring championship game, thus proving once again that materials science plays a crucial role in everyday life.

CoSMIC is an acronym for a research center in the Department which stands for Combinatorial Sciences and

Materials Informatics Collaboratory. Contact **Prof. Ichiro Takeuchi** at takeuchi@squid.umd.edu or 301-405-6809 for a challenge match against Team CoSMIC.

A Good Cause

Marta Vornbrock, MSE 2002, recently attended the Minerals, Metals and Materials Society (TMS) conference in North Carolina. She strongly believes that participation at professional conferences is important for students. As a former president of the student group, she realizes that money for travel to these conferences is limited. She would like to challenge all alumni to contribute to a travel fund for undergraduates. Please make your tax deductible contribution to the University of Maryland and mail to Director of Administrative Services, 2144 Chem/Nuc Eng. Bldg., College Park MD 20742. Please note MSE Student Travel Fund in the memo section.

A Presidential Scholar in our Midst

Erin Dreyer was awarded the prestigious Phillip Merrill Presidential Scholars Award, given to top graduating seniors for academic excellence. This year, 27 Presidential Scholars (3 from Engineering) were chosen by the Deans of the Schools/Colleges.

A unique aspect of the Program is that it also honors the teaching excellence of a college professor and a high school teacher who inspired the Scholar. In addition to recognition at a November ceremony, a \$1000 scholarship in her high school teacher's name will be awarded to a student from Erin's high school who attends Maryland. Congratulations, Erin!

Roytburd Honored by TMS

Prof. Alexander Roytburd was recognized for his scientific contributions in understanding the mechanisms of phase transformations and microstructural evolution by the Minerals, Metals & Materials Society (TMS) at their annual meeting in Charlotte, NC in March, 2004. During the Roytburd Symposium on Polydomain Structures at the Conference, Prof. Roytburd introduced and developed the theory of elastic domains as a new type of domains in solids.

National Neutron Scattering Conference in Maryland

The Second American Conference on Neutron Scattering was hosted by the National Institute of Standards and Technology (NIST) Center for Neutron Research at the Inn and Conference Center, University of Maryland University College in College Park, MD on June 6-10, 2004. The conference was organized under the auspices of the Neutron Scattering Society of America (NSSA), and was sponsored by the North American neutron centers.

Prof. Robert Briber is the President of the NSSA. A conference will be

hosted by one of the centers every other year in years that do not coincide with either the International

Conference on Neutron Scattering or the European Conferences on Neutron Scattering.

The 2004 conference was attended by approximately 500 individuals. It



was intended to showcase recent scientific results in neutron science in a wide range of fields, including soft and hard condensed matter, liquids, biology, magnetism, engineering materials, chemical spectroscopy, crystal structure, fundamental physics, and developments in neutron instrumentation. Dr. J. Michael Rowe, NIST Center for Neutron Research, was presented with the first Cliff Shull Prize for Neutron Science. The Shull prize is awarded to recognize outstanding research in neutron science and leadership promoting the North American neutron scattering community.

For more information on NSSA and the Conference, visit the web site at <http://www.neutronsattering.org>.

Christou Chairs Conference

Prof. Aris Christou served as the Chairman of the Biennial Conference of the Federation of Materials Societies. The conference focused on Materials Education for the 21st Century and was held on May 24, 2004 at the National Academies of Science in Washington, D.C.

International Materials

Profs. Gary Rubloff, Gottlieb Oehrlein, Ichiro Takeuchi and Reza Ghodssi (Electrical and Computer Engineering) have ongoing collaborations with Dr. Mariano Anderle of the ITC-IRST in Trentino, Italy. ITC-IRST is a government research institute supported by the PAT, the Autonomous Province of Trentino.

Dr. Anderle spent last summer visiting UMD, and together with Profs. Takeuchi and Rubloff developed a new direction in combinatorial materials science. They submitted a proposal "Exploring New Materials by Combinatorial and Artificial Intelligence Methods," to the PAT, which was ranked 1st of 75 submissions and funded at 1.8M Euro over three years. The proposal joined their work to three different areas of IRST, including Dr. Anderle's

Division and other Divisions working in MEMS and in artificial intelligence.

The UMD projects will receive 116K Eu per year for three years, and will involve functional materials and combinatorial chemical vapor deposition work at UMD, as well as the design and use of a new "micro combi" facility at IRST. This work will also function as a precursor to the work planned with the new Keck Laboratory (see page 1.)

Wuttig Works on Smart Materials

Prof. Manfred Wuttig spent the past year on sabbatical in the smart materials group at the Forschungszentrum caesar in Bonn, Germany. This unique research center is operated by a foundation established by the German Federal Government, the State of Nordrhein-Westfalen and the City of Bonn with the mission to conduct forefront interdisciplinary research in materials and bio-related disciplines that can lead to novel industries.

Prof. Wuttig used the facilities at this center to miniaturize biferroic magnetoelectric sensors for biomedical applications. The results of his research will be reported at the 49th Conference on Magnetism and Magnetic Materials in Jacksonville, FL in November 2004. (<http://www.magnetism.org/>). He also presented invited talks at the Annual Meeting of the German Physical Society and major German universities and companies that expressed an interest in multiferroics. For more information on the smart materials group, please visit <http://www.caesar.de>.

Oehrlein Receives GOALI Grant

Prof. Gottlieb Oehrlein, Materials Science and Engineering and the Institute for Research in Electronics and Applied Physics, and his collabo-

rators at UC Berkeley, Lam Research Corporation, Shipley Corporation and ITC-IRST, Italy have been awarded a 3-year GOALI (Grant Opportunities for Academic Liaison with Industry) grant from the National Science Foundation. The grant will address chemical and morphological stability of nanoscale features produced in organic materials as they are exposed to the plasma environments used for pattern transfer.

The NSF portion of the support is \$450K, with the industrial partners providing additional support for students and materials. The goal of this research is to establish an atomistic understanding of the interactions of well-characterized/controlled plasmas and radical and ionic particle beams with model organic materials used for pattern transfer. This understanding will be used for the development of improved organic masking materials, satisfying the needs of nanoscale manufacturing.

Faculty Honors

Prof. Aris Christou, Professor of Materials Science and Engineering, was selected to receive the iNEER (International Network for Engineering Education and Research) Leadership Award in 2004 for Achievements in Engineering Education and Research. The award was presented to Prof. Christou at the International Conference on Engineering Education in Olomouc, Czechoslovakia in June, 2004 (See photo gallery.)

Prof. Raymond J. Phaneuf was promoted to the rank of Associate Professor of Materials Science and Engineering.

Prof. Ichiro Takeuchi was promoted to the rank of Associate Professor of Materials Science and Engineering.

researchFEATURE

Dental Restorations: Material design for modern manufacturing and next generation specifications

Materials, manufacturing, design, mechanics, and dentistry are combined in a NIH sponsored program to develop the next generation of dental materials. **Prof. Isabel Lloyd** and her students are collaborating with dentists at NYU and the University of Medicine and Dentistry of New Jersey, mechanics experts at NIST and Princeton, manufacturing-oriented faculty at Oklahoma State and Maryland's Mechanical Engineering Department, bioengineers at Catholic University, and dental manufacturers to develop aesthetic dental restorations that can be made using modern computer-aided manufacturing techniques.

Every tooth, and thus every crown, is unique. Currently, restorations are made using time consuming, labor intensive hand forming techniques using non-noble metals which are a concern for some patients. The goal of this research effort is to develop an understanding of the critical issues in failure and reliability, manufacturability, and biocompatibility to allow rapid, effective designs of the next generation crown systems. Posterior crowns were chosen as models since they are subject to the largest and most frequent loads.

Prof. Lloyd's group is focusing on developing techniques that allow each of the layers in a laminar composite to be optimized. Their work examines ways to join individually fabricated layers with optimized properties and solid freeform manufacturing approaches to produce individual layers and functionally graded structures. It incorporates knowledge of failure modes and desired interfacial characteristics determined by the groups at NIST, Princeton, and NYU. Novel joining approaches include the development of new, very high modulus, flowable dental composites and nanocomposites, and glass nanocomposite join systems with tailored modulus and thermal expansion coefficients. Control of interfacial properties is the key to both composite development and join behavior.

The research is interdisciplinary and targeted towards both the materials and dental communities. Publications have appeared in Biomaterials and Applied Biomaterials, Dental Materials, and the Journal of the American Dental Association, as well as more traditional materials venues. A 2003 article on the research in Dental Materials was one of the 10 most downloaded articles in the Journal that year. The interdisciplinary nature of the work and the straightforward applications involved have allowed the inclusion of undergraduates as well as graduate students in the program. It is also exciting since long term applications include biomechanical systems, armor systems, and electronic systems.



It's not all academics in the MSE Department! The CoSMIC team, comprised of MSE faculty, staff and students posed for a picture with family members after winning the Maryland Intramural Invitational tournament in April.



Susan Beatty describes the bioMEMS device which was the subject of the Fall 2003 Capstone Design Course directed by Prof. Gary Rubloff.



Patrick Stahl prepares a sample for his research work in the area of ceramics bonding materials. He spent the summer working in Prof. Isabel Lloyd's research group. Patrick was participating in the Banneker-Key Research Scholars Program.



2004 Maryland Day attendees learn about superconductors at the MSE Department's information table (above) and build crystal structures (below).



MSE graduate students enjoy lunch provided by the Department during Graduate Student Appreciation Week in April, 2004.



Prof. Christou receives the International Network for Engineering Education and Research Leadership Award in Czechoslovakia.



The Fall 2003 Captstone Design Course members (L-R): Dan Janiak, Shawna Dean, Jia Ni, Kunal Thaker, Charles Brooks, Anne Samuel, Bryan Sadowski, Susan Beatty, Theresa Valentine (Graduate Assistant), Mark Hanna, Chen Kung, and Prof. Gary Rubloff.



High school juniors and seniors participating in the Summer 2004 Exploring Engineering program learn about crystal structures and other materials topics.

Member of First Undergraduate Class Receives PhD

Soon Cho was a member of the first graduating class of the new Materials Science and Engineering degree at the University of Maryland in December 1999.



Soon Cho

He received his PhD in August 2004. His dissertation entitled, "Real-Time In-Situ Chemical Sensing In AlGaIn/GaN

Metal-Organic Chemical Vapor Deposition Processes For Advanced Process Control", is one of his three major research projects performed under the direction of **Prof. Gary Rubloff**.

He also received his M.S. degree in May 2004 based on his research on "Dynamic Simulation and Optimization of Cu CVD Unit Process for Environmentally Benign Manufacturing."

Soon was an enthusiastic, active member of both the Department and the School as an undergraduate. He was actively involved in the early TMS/ASM Student Chapter, serving in officer positions. He received numerous scholarships including the Dean's Scholarship, A. James Clark School of Engineering; the Morgan L. Williams Memorial Scholarship (ASM International); and the H. Russell Knust Memorial Engineering Scholarship. He also served as an Undergraduate Teaching Fellow for the School, while performing his undergraduate research at the National Institute of Standards and Technology and the NSF Materials Research Science and Engineering Center at the University of Maryland.

He was chosen to receive the Department of Materials and Nuclear Engineering Chairman's Outstanding Senior Award, as well as the Outstanding Student Service Award, A. James Clark

School of Engineering Alumni Chapter. Upon his graduation in December 1999, he was chosen to be one of two students awarded the Departmental Academic Distinction Award and selected as one of 25 students for the Senior Marshal Award at the commencement ceremony.

Soon continued his successful academic career in graduate school. He received the Distinguished Teaching Assistant Award, and is a two-time winner of the AVS Manufacturing Science and Technology Group Graduate Student Fellowship Award in 2001 and 2002. In 2003, Soon was awarded the Best Paper Award at the International Sematech AEC/APC Symposium XV.

Soon is the first author of 5 refereed journal publications and 6 or more international symposiums. We wish him continued success as he completes his academic career at Maryland.

An Army of One

Chris Ziegler graduated from the University of Maryland with a Bachelors of Science in Materials Science and Engineering in the spring of 2003. He feels that he has put the degree to good use since moving on from the familiar, friendly, and comfortable confines of the Chemical/Nuclear Engineering Building. Shortly after finding his "degree in a tube" (which he has yet to open a year and a half later) in the mailbox, he accepted a position that granted him "the opportunity to not only pay my bills but to help bring U.S. soldiers home alive and well." He works at the United States Army Research Laboratory at the Aberdeen Proving Grounds, Aberdeen, Maryland.

His job at the Army Research Laboratory is to characterize and identify microstructures of polymeric materials in an effort to get technologies such as chem-

ical sensors and light-weight armors to the U.S. soldier. In order to classify polymer morphologies, he generally turns to the combination of Transmission Electron Microscopy (TEM) and both Small-angle and Wide-angle X-ray Scattering such that he may magnify a sample hundreds of thousands of times or determine a samples crystallinity (or lack thereof). From time to time, he also finds himself doing thermal analysis using Differential Scanning Calorimetry and Thermo-gravimetric Analysis. He even works a fair amount of time under a fume hood on nano-chemistry. Chris believes it is sufficient to say that he has learned a great deal in just under a year while working for the Army Research Lab. He couldn't be happier with the great amount of experience he has obtained all the while knowing that his work could someday save a life.

Prior to finishing high school, he dreamed of receiving a doctorate which he plans on pursuing beginning in the fall of 2005. He hopes to do research and develop future MEMS and nanotechnologies, as long as the university he attends is close to a Chipotle!

Learning Never Ends

Theresa Valentine graduated in May 2004 with a M.S. in Materials Science and Engineering after completing her undergraduate degree at Maryland in May 2003. She was the first of many participants to join the



department's new 5-year B.S./M.S. program. Although her undergraduate and graduate studies focused on electronic and biomaterials, her post-UMD life has been quite different.

recentGRADUATES

In June 2004, Theresa began a career at the U.S. Nuclear Regulatory Commission in Rockville, MD, joining several other Maryland materials graduates. The Commission is responsible for regulating civilian uses of nuclear materials -- nuclear reactors, medicinal uses, high- and low-level waste, and other applications. She is a participant in the newly-renamed "Nuclear Safety Professional Development Program," a two-year rotational program for new permanent employees that allows them to try four or five different jobs, including one at a nuclear power plant, before choosing their career path.

Theresa's first rotation is currently in the Probabilistic Safety Assessment Branch in the Office of Nuclear Reactor Regulation. The primary focus in her branch is the evaluation of how events and configuration changes at nuclear power plants affect the overall risk to the public.

Her next rotations may include the Office of Congressional Affairs, the Indian Point nuclear power plant in New York, and the project management directorate. In all of these rotations, a materials background is extremely useful to understand issues with nuclear reactors. Much of the work, however, involves communicating with colleagues, reactor licensees, and the public.

Recent Graduates

Ling-Chen Kung (Spring '04) is working at Ford Motor Company.

David Lunking (Spring '03) is working in Maryland at Reactive Nano Technologies.

Susan Beatty (Spring '04) will continue her education at the University of Maryland. She is enrolled in the Masters of Science program in Materials Science and Engineering.

Dan Janiak (Spring '04) will continue his education in the Ph.D. program in Materials Science in Engineering at the University of Southern California.

2003-2004 B.S. Graduates

Susan Beatty
Shawna Dean
Nicole Harrison
Daniel Janiak
Ling-Chen Kung
Jia Ni
Anne Samuel
Kunal Thaker

2003-2004 M.S. Graduates

Soon Cho
Olugbenga Famodu
Allan Jaworski
Noboko Koda
Kai-Chi Lai
Chuan-Lan Lin
Latosha Marshall
Brett Neuberger
Sadia Rafique
Sonam Shah
Theresa Valentine
Ke Yu

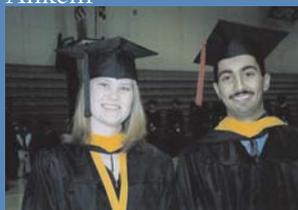
2003-2004 Ph.D. Graduates

Chang, Kao-Shuo "Combinatorial Synthesis of Multifunctional Metals" Advisor: Takeuchi

Cho, Soon "Real-time In-Situ Chemical Sensing in AlGa_N/Ga_N Metal-Organic Chemical Vapor Deposition Processes for Advanced Process Control" Advisor: Rubloff

Garland, Marc "Neutronic Effects of Tungsten-186 Double Neutron Capture" Advisor: Al-Sheikhly

Hudson, Candi "Theoretical and Experimental Study of Ambient Temperature Beta Titanium Alloys" Advisor: Ankem



New Materials Undergraduates!

Class of Fall 2003 (left): Shawna Dean, Kunal Thaker

Class of Spring/Summer 2004 (right, left to right): Jia Ni,

Susan Beatty, Anne Samuel, Nicole Harrison, Dan Janiak

endNOTES

All Maryland alumni can now use the **Terp Alumni Network** (available through <http://www.alumni.umd.edu>). After establishing a user-id and password, you can search for the contact information of fellow alums, create a permanent @terpalum.umd.edu forwarding email, look at e-notes about classmates' activities, and check out the alumni events calendar. Access is free and simple. Register today and look up a friend from the Materials Department!

TECHSTRACKS is published annually for alumni and friends of the Department of Materials Science and Engineering at the A. James Clark School of Engineering.

Your alumni news and comments are welcome. Please send them to: Editor, Department of Materials Science and Engineering, 2135 Chemical and Nuclear Engineering Building, College Park, MD, 20742-2115.

Visit our Web site at www.mse.umd.edu

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Editor: Kathleen Hart



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