

Fall/Winter 2013



ATERIALS SCIENCE & ENGINEERING

UConn

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This newsletter is published for the alumni, faculty, students, corporate supporters, and friends of the Department of Materials Science & Engineering at the University of Connecticut. Comments about the magazine, articles, letters, or address corrections may be sent to mseinfo@engr.uconn.edu.



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Colin Poitras, John Giardina,
MSE faculty, and MSE staff.

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Peter Morenus and others.
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A Word from the Department Head



This was an exciting year at UConn. In November 2012, the Board of Trustees approved the separation of the Department of Chemical, Materials, and Biomolecular Engineering (CMBE) into two departments: Materials Science and Engineering (MSE) and Chemical and Biomolecular Engineering. The “new” MSE Department at UConn consists of 16 tenured and tenure-track faculty members, 7 research and adjunct professors, 14 faculty in the graduate program, 130 undergraduate students, and over 90 graduate students with research programs covering the processing, characterization, properties, theory, and engineering applications of metals, ceramics, polymers, and composites.

UConn is experiencing massive growth in all STEM fields supported by two major initiatives: UConn Technology Park and Next Generation Connecticut. These targeted strategic investments in facilities, faculty, and students will establish UConn as a vital STEM institution, fueling Connecticut’s economy with new technologies, highly skilled graduates, new companies, patents, licenses, and high-wage STEM jobs. As a part of the Tech Park initiative, we succeeded in hiring two outstanding faculty in the materials genomics area. Joining us are Avinash M. Dongare (modeling of materials under extreme conditions) and Serge M. Nakhmanson (multifunctional ferroic materials by rational design) who will strengthen our materials theory core.

As for other faculty news, Rainer Hebert and Bryan Huey are taking over as the Director of Undergraduate Studies and Director of Graduate Studies, respectively. Mei Wei has been appointed as the Associate Dean of School of Engineering for Research and Graduate Education, and C. Barry Carter and Puxian Gao will be on well-deserved sabbatical leaves in the next academic year.

In terms of graduate education and research, UConn MSE continues to grow. We have a highly interdisciplinary graduate program that consists of faculty from Chemistry, Chemical Engineering, Mechanical Engineering, Physics, and Orthopedic Surgery (at UConn Health Center), in addition to the faculty members who have their primary appointments in the MSE Department. Our research expenditures for the AY 2012-2013 were \$3,704,085. In this academic year, we have awarded 9 PhD and 14 MS degrees and recent graduates have been placed in industry (including local employers Pratt & Whitney and United Technologies Research Center), in national laboratories (Oak Ridge, Lawrence Livermore, Argonne, etc.), and in academia.

We continue to be guided by an outstanding industrial advisory board comprised of accomplished engineers from the local industry: Bill Fallon (Senior Technical Fellow,



Sikorsky Aircraft), Dave Furrer (Senior Fellow Discipline Lead, Pratt & Whitney), Armand Halter (Vice President, Sonalysts, Inc.), Peter Jarrett (Chief Technology Officer, Ocular Therapeutix), Joe Mantese (Fellow, United Technologies Research Center), and Howard Orr (President and CEO, KTI Inc.). We were fortunate to add Katherine Saint to this excellent group. She is the President of Schwerdtle Stamp Co., a 134 year old manufacturing firm located in Bridgeport, CT. Kathy is also the President of the Manufacturers Education and Training Alliance and brings years of experience in additive manufacturing.

A priority on teaching has been to continue the improvements to our undergraduate labs so that we can better integrate lab experiences and lectures. Adam Wentworth is overseeing the changes – all of which he wishes were in place when he went through our undergraduate program. With a total of \$90,000 from the School of Engineering and \$70,000 from the Department, the labs have been renovated in the past year to provide education on a broader range of materials. New lab modules, including synthesis of superconductors and electrospinning of polymers, have specifically been developed to use the new equipment such as a universal hardness tester, an atomic force microscope, a fatigue tester, and more. These improvements, especially the scanning electron microscope that was installed last year, have also enhanced the Senior Design experience. This year, we had a record of 19 senior design projects from companies all over Connecticut, including Electric Boat, Pratt & Whitney, KX Technologies, Rockbestos-Suprenant Cable Corp., Sikorsky Aircraft, Connecticut Corsair, KTI Inc., and Ulbrich Specialty Steel. As examples of the Department's success, Jessica Bronowicki and Erica Pehmoeller had accepted positions with their sponsor (Ulbrich Specialty Steel) before they finished their projects. Hal Brody, who coordinates our capstone design course, is busy preparing an even larger class in the next academic year.

I invite you to take a few minutes to learn about our Department and the accomplishments of our students, faculty, and industrial partners. Enjoy reading this newsletter and don't hesitate to contact me with your feedback.

S. Pamir Alpay

MSE Graduate Program Is Among The Top 25 Public Programs

In the recently released US News and World Report national rankings of Materials Science and Engineering (MSE) graduate programs, UConn has risen to #39 and is in the top 25 for state schools. In response to this exciting news, newly appointed MSE Department Head Pamir Alpay commented: "We

attribute the rising profile of the graduate program to the outstanding quality of the graduate education and the exceptional research opportunities that we provide to our students. The improvement in our rankings will help us to attract even more top quality students both nationally and internationally."



The interdisciplinary character of the field of study is reflected in the composition of the MSE graduate faculty. This includes researchers in Chemistry, Chemical Engineering, Mechanical Engineering, Physics and Orthopedic Surgery (at UCHC) in addition to the faculty members who have their primary appointments in the MSE Department. The demand for graduates with an MS or PhD in MSE is very strong and recent graduates have been placed in industry (including local employers Pratt & Whitney and United Technologies Research Center), in national laboratories (Oak Ridge, Lawrence Livermore, Argonne, etc.) and in academia.

Capstone Senior Design Project



*Back row: Blake Knox, Connor O'Neill, Dr. Mei Wei, Ryan Adams, Dr. Rainer Herbert, Austin Poucher, Dr. Hal Brody, Adam Marco, Bryan Liggett, Timothy Plourde
Third row: Brandon Moffitt, Scott Sperl, Kayla Nicewicz, Erik Rogoff, Gabriel Paun, Jillian Falcetti, Kayla Molnar, David Wikholm
Second row: Dr. Pamir Alpay, Patrick Brueckner, Cody Doncker, Stephen Wieczerszak, Nicholas Santoro, Alexander Franchino, Brian Becerra
First row: TA Daisy Ramos, Jason Chan, Melissa Farnham, Drew Capolupo, Timothy Batt*

On May 3rd and 10th, Materials Science and Engineering students, faculty, and industry advisors convened to observe the final Capstone Design Project presentations. The Senior Capstone Design Project course educates UCONN's MSE students in innovation in the materials engineering arena, leadership, and provides the students with deep exposure to real-life challenges. Throughout their final year, students planned, designed, and researched projects dealing with unsolved material issues local companies face. The 19 projects were sponsored by UTC Aerospace Systems, Sikorsky, Rockbestos-Suprenant Cable, Delta Industries, and Ulbrich Stainless Steels and Specialty Metals, among others. The projects involved materials ranging from carbon fiber composites and nickel-based superalloys to yttria-stabilized zirconia thermal barrier coatings. Challenges also encompassed the modeling of the heat flow in electron beam welds and the casting of objects in complex geometries. The MSE department presented awards to the top three student project presentations. The 1st place (\$1500) was awarded to Gabriel Paun for his project entitled "A Predictive Model for Specification and Control of Advanced Electron Beam Welding", sponsored by PTR-Precision Technologies, Inc. The project's goal was to use an advanced electron beam welding process to join and repair nickel based superalloy, which is the material used in aircraft turbine blades. Paun focused on using computer simulation to simulate heat flow during welding, and analyzed the results to predict welding parameters that could be used to control PTR's newest welding system, which can fire multiple simultaneous electron beams.

The 2nd place (\$1000) was awarded to Bryan Liggett for his project entitled "Design Method to Predict End Properties in 300 Series Stainless Steels Based on Specific Chemistries". Liggett presented results which indicated that variations within the chemical composition ranges allowed by the standards set for stainless steel grades can alter their strengthening behavior during manufacturing. Typically these complex commercial alloys contain at least seven variable alloying elements that affect significantly their response to rolling and drawing processes. A method to predict steel behavior during processing has been proposed and its potential advantages and drawbacks were discussed. Ulbrich's Shaped Wire Division sponsored this study.

The 3rd place (\$750) was awarded to Jason Chan for his project presentation "A Predictive Model for Filtration Efficiency", sponsored by KX-Technologies. Chan presented that filtration is one way to address one of today's biggest issues with water in developing and developed nations. The performance of these filters is affected by factors such as flow rate and total flow volume, and more importantly, by the materials that comprise the filters. There is clearly a need to optimize and understand the capabilities of these filters. Such an understanding would save time from constant testing, reduce costs, and provide insight on their performance. Chan proposed an empirical model to predict the performance of these filters.

Faculty member Dr. Harold Brody maintains strong collaborative relationships with local companies to provide students with the opportunity to examine real-world

problems. He also works closely with industry advisors and MSE faculty to guide the students through their Senior Capstone Projects. "We are very appreciative of the continuing strong support of regional industry for our educational program, which is unique among public universities in New England. I am pleased to see so many graduates of the UConn-MSE program advance to leadership positions and to return to campus as industry advisors to our Capstone Design Project students", says Professor Brody.

MSE thanks the Senior Capstone Design Judges 2013:

- Robert Klancko, Klancko and Klancko Associates
- Thomas Cameron, Ultimate Ni/Ti
- Jason Brown, General Dynamics-Electric Boat
- Edward Kurz, UConn-IMS Associates Program



Senior Design Projects

Title: Welding Process Qualification

Sponsor: Delta-Industries

Industry Advisors: James Janiak and Joseph Gangi

Faculty Advisor: Prof. Harold D. Brody

MSE Student: Melissa Farnham

Title: Corrective Action for Surface Corrosion of 7075 Forgings

Sponsor: Consolidated Industries

Industry Advisors: Tim McHenry, Christopher W. Jackson, Graham Clark

Faculty Advisor: Prof. Prabhakar Singh

MSE Student: Kayla Molnar

Title: Corrosion Reduction in Concentrated Solar Power

Sponsor: Alstom Power

Industry Advisor: Dr. Ripi Singh

Faculty Advisor: Prof. Prabhakar Singh

MSE Student: Alexander Franchino

Title: Materials and Device Design for Next Generation Ultrasonic Transducers

Sponsor: United Technology Research Center

Industry Advisors: Dr. Joseph Mantese and Dr. Tony Vincitore

Faculty Advisor: Dr. George Rossetti

MSE Student: Kayla Nicewicz

Title: Develop Criteria for Selection of Polymeric Compound for Specific Cable Applications

Sponsor: General Cable Corporation

Industry Advisors: Koksai Tonyali and Chris Medling

Faculty Advisor: Prof. Mei Wei

MSE Student: Timothy Plourde

Title: Design of a Wear Resistance Coating for Diesel Fuel Injection Application

Sponsor: Stanadyne Corporation

Industry Advisors: Angie Cheung and Joseph Paganini

Faculty Advisor: Prof. Avinash Dongare

MSE Students: Connor O'Neill and Patrick Brueckner

Title: High Temperature Aging of Carbon Fiber / Bismaleimide Composites

Sponsor: UTC-Aerospace Systems

Industry Advisors: Michael Folsom and David Grulke

Faculty Advisors: Prof. Puxian Gao

MSE Student: David Wikholm

Title: Design Characteristics of Alternate Anaerobic Adhesives

Sponsor: UTC Aerospace Systems

Industry Advisors: Michael Folsom and David Grulke

Faculty Advisor: Prof. Bryan Huey

MSE Students: Zackary Hixon, Jacob Wrubel and Stephen Consoles

Title: Design a Method to Predict End Properties in 300 Series Stainless Steels Based on Specific Chemistries

Sponsor: Ulbrich Stainless Steels & Specialty Metals – Shaped Wire

Industry Advisors: Erica Pehmoeller and Chris DeConti

Faculty Advisor: Prof. C. Barry Carter

MSE Student: Bryan Liggett

Title: Bonded Joint Design

[Multidisciplinary MSE, ME, and MEM]

Sponsor: Sikorsky Aircraft Corporation and Sikorsky Innovations, Inc

Industry Advisors: Paul Inguanti, Dr. Michael Urban, William Fallon

Faculty Advisors: Profs. H.D. Brody (MSE), E. Jordan (ME), and Z. Bzymek (MEM)

MSE Students: Ryan Adams, Blake Knox, and Scott Sperl

ME/MEM Students: Nikolay Kolev, Michael Minopoli, Wade Moore, and Ryan McGuire

Title: Aluminum Brazing

[Multidisciplinary MSE and ME]

Sponsor: Sikorsky Aircraft Corporation and Sikorsky Innovations, Inc

Industry Advisors: Paul Inguanti, Dr. Michael Urban, William Fallon

Faculty Advisors: Prof. Theo Kattamis (MSE) and Prof. Eric Jordan (ME)

MSE Students: Jillian Falcetti, Adam Marco, and Brian Becerra

ME Students: Haruka Kanesaka, Ashley LaPlante, and Eric Parsons

Title: Thermal Barrier Coatings for Thermoset Composite Materials

Sponsor: Sikorsky Aircraft Corporation and Sikorsky Innovations, Inc

Industry Advisors: Paul Inguanti, Dr. Michael Urban, William Fallon

Faculty Advisor: Prof. Radenka Maric

MSE Student: Erik Rogoff

Title: Nondestructive Detection of Ply Wrinkles in Thick Composite Laminates
Sponsor: Sikorsky Aircraft Corporation and Sikorsky innovations, Inc
Industry Advisors: Paul Inguanti, Dr. Michael Urban, William Fallon
Faculty Advisor: Prof. Bryan Huey
MSE Students: Cody Donecker and Stephen Wieczerek

Title: Tooling and Processing Optimization for Complex Geometry, Nonferrous Castings
Sponsor: Sikorsky Aircraft Corporation and Sikorsky innovations, Inc
Industry Advisors: Zachary Stone, Tapas Mukherji, Paul Inguanti, William Fallon
Faculty Advisor: Prof. Harold D. Brody
MSE Students: Drew Capolupo and Timothy Batt

Title: A Predictive Model for Filtration Efficiency
Sponsor: KX -Technologies, Inc
Industry Advisors: Andrew Lombardo and Dr. Frank Brigano
Faculty Advisor: Prof. Pamir Alpay
MSE Student: Jason Chan

Title: Design Paradigm for Oxidation Resistance
Sponsor: Pratt and Whitney Aircraft
Industry Advisors: Daryl Slade Stolz
Faculty Advisor: Prof. Rainer Hebert
MSE Student: Austin Poucher

Title: A Predictive Model for Specification and Control of Advanced Electron Beam Welding
Sponsor: PTR-Precision Technologies, Inc
Industry Advisors: John Rugh and Gary LaFlamme
Faculty Advisor: Prof. Pamir Alpay
MSE Student: Gabriel Paun

UConn MRS Chapter Recognized for Outreach Activities

The UConn Student Chapter of the Materials Research Society (MRS) is highly dedicated to outreach activities, and recently, their efforts have garnered a lot of positive attention. This spring, UConn MRS proposed an outreach-based special project for 2013 encompassing two main initiatives. Society members will lead undergraduate students on two field trips to local industries, as well as planning three talks by industry representatives. The idea for this project arose to address a problem many MRS members noticed: that undergraduate students are torn when choosing between careers in industry and academia. MRS hopes this project will provide students with useful information and hands-on experience to guide their decisions.

This project proposal received \$400 in funding from the Materials Research Society, as well as generous awards from the UConn School of Engineering and the Materials Science and Engineering Department. The program was also endorsed by Associate Dean for Research and Graduate Education Dr. Michael Accorsi, who applauded the outreach activity of the UConn MRS Chapter. In the future, UConn MRS hopes to extend its outreach activities even further, visiting high schools in the Hartford area and other universities in Connecticut.

Title: Improved Sunlight Resistance for Cable Jacket Compounds
Sponsor: Rockbestos-Suprenant Cable Corporation, Inc
Industry Advisors: Dr. Daniel Masakowski
Faculty Advisors: Prof. R. Ramprasad and Dr. Fiona Leek
MSE Student: Brandon Moffitt

Title: Improve Predictive Criteria Relating Chemistry and Process Parameters to Strength of Hot Rolled Steel Reinforcing Bar
Sponsor: Nucor Steel Connecticut
Industry Advisors: John Brasell and Charles Hyatt
Faculty Advisor: Prof. Harris Marcus
MSE Students: Cody Unger and Nicholas Santoro

Materials Science Visits Bacon Academy High School



(Left to right) Materials Science & Engineering (MSE) seniors Jason Chan, Jillian Falcetti, Gabe Paun, Tim Plourde, MSE sophomore Alexandra Merkouriou, and MSE lab technician Adam Wentworth ('2009, '2011)

Six members of the UConn Materials Advantage Student Chapter (UCMA) went to Bacon Academy high school to educate and promote Materials Science to integrated science students. The UCMA members used demonstrations such as the insulating effect of a space shuttle tile and the Meissner effect of a high-temperature superconductor. They also exhibited a number of novel materials such as shape memory alloys or the world's lowest density solid, a silica aerogel, to showcase the diverse and far-reaching applications of the discipline. They explained how material research and discovery leads not only to exotic applications but also to everyday items such as smaller computers, long-lasting LED lights, and efficient transportation. The Bacon Academy high school students learned that a career choice in engineering means they can be involved in a multitude of evolving technologies like biocompatible implants, carbon fiber applications, and nanomaterials. They also learned that choosing Material Science as a major allows them to work in many industries including the sports, transportation, energy, electronics, and biomaterials sectors, among others. The UConn Materials Advantage student chapter is nationwide among the most active and successful chapters focusing on outreach. It has won the prestigious "Chapter of Excellence" award twice and the "World Materials Day Outreach".



Graduation 2013



Congratulations to the Class of 2013.

B.S. Graduates

Ryan Michael Adams
 Timothy David Batt
 Patrick J. Brueckner
 Drew Farley Capolupo
 Jason Chan
 Jillian Rosemary Falcetti
 Melissa Lynn Farnham
 Alexander P. Franchino
 Nathan William Freedman
 Bryan Christopher Liggett
 Adam Michael Marco
 Kayla Marie Molnar
 Kayla Jean Nicewicz
 Connor Pierce o'Neill
 Gabriel Chisolm Paun
 Timothy David Plourde
 Austin Jeffrey Poucher
 Erik William Rogoff
 Scott Paul Sperl
 Cody Thomas Unger
 David Brady Wikholm

M.S. Graduates

Ibibia Altraide
 Christian Julian Ayala
 Emily A. Davis
 Si Won Kim
 Dongwook Kwak
 Kevin Matthew Rankin
 Paul Daniel Shaw
 Salay Robyn Stannard
 Julie Anne Wittenzellner
 Linghan Ye
 Ling Li
 Felix I. Quiros-Pedraza
 Monica Sabina Sawicki
 Jack Sam Shamie

Ph.D. Graduates

WENJIE ANDY CAI

Advisor: Harris L. Marcus

Thesis: Metal Oxide-Based Hybrid Semiconductor Nanowires: Synthesis, Characterization and Chemical Sensing Applications

KYLE DANIEL CROSBY

Advisor: Leon L. Shaw

Thesis: Titanium-6Al-4V for Functionally Graded Orthopedic Implant Applications

ADAM ARTHUR HEITMANN

Advisor: George A. Rossetti, Jr.

Thesis: Design and Modeling of High Power Density Acoustic Transducer materials for Autonomous Undersea Vehicles

NEAL J. MAGDEFRAU

Advisor: Mark Aindow

Thesis: Evaluation of Solid Oxide Fuel Cell Interconnect Coatings: Reaction Layer Microstructure, Chemistry, and Formation Mechanisms

VINCENT PAUL PALUMBO

Advisor: Bryan Huey

Thesis: Microstructural Investigation of ASTM A913 Grade 65 Steel Subjected to Shock Loads at Elevated Temperatures

JONATHAN PAUL WINTERSTEIN

Advisor: C. Barry Carter

Thesis: The Influences of Interfaces on Reactions in Oxide Ceramics

GREGORY WROBEL

Advisor: Puxian Gao

Thesis: Stannate Nanomaterials for Sustainable Fire Safety: Processing Characterization and Application

ZENGMIN XIA

Advisor: Mei Wei

Thesis: Biomimetic Collagen-Apatite Composites for Bone Tissue Engineering

HONG ZHUMAJOR

Advisor: Ramamurthy Ramprasad

Thesis: First Principles Studies of HfO₂-Based Gate Stacks

Undergraduates Honored at 2013 Scholarship Recognition Ceremony

On March 12, 2013, the UConn School of Engineering held a reception ceremony to recognize the undergraduate students who received a scholarship in 2013. Both industry and private donors sponsor SoE scholarships, and many of these donors and industry representatives attended the reception to meet and congratulate the recipients. Numerous undergraduate students working towards a Materials Science and Engineering degree were honored on this night for their hard work, dedication, and outstanding academic performance.

The MSE scholarship recipients for 2013 are:

ALIYA CARTER: Tom A. Martin Scholarship

ROSE CERSONSKY: GE Advanced Materials Endowed Scholarship

KATHLEEN COLEMAN: Anonymous Donor Learning Mentorship Scholarship

PAUL KRENICKI: Endowed Scholarship in Sustainable Energy

DANIEL CUNNINGHAM: GE Advanced Materials Endowed Scholarship Program

STEPHEN ECSEDY: Shidler Scholarship for Engineering

ALEX FREEMAN: Harold P. Farrington Engineering Scholarship

DOUGLAS HENDRIX: Art McEvily Scholarship

AMY HERNANDEZ: Anonymous Donor Bridge Scholarship

JOSHUA LEVEILLEE: AT&T Scholarship



From left to right: Chris Gonzalez, Dan Violette, Josh Leveillee, Rose Cersonsky, Nathan Martin, Jason Chan, Stephen Ecsedy, Amy Hernandez, Danny Cunningham, Jordan Parley, Kathleen Coleman

JACKSON MACMILLAN: United Technologies Corporation Scholarship in Engineering

NATHAN MARTIN: GE Advanced Materials Endowed Scholarship Program

ALEX PAREDES: Anonymous Donor Bridge Scholarship

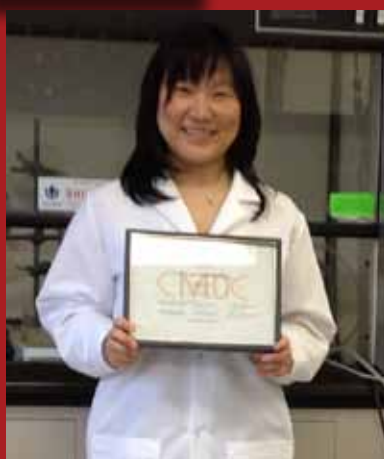
JORDAN PARLEY: GE Advanced Materials Endowed Scholarship Program

ALEXANDRIA ROSA: Anonymous Donor Bridge Scholarship

TIMOTHY SIU: Rachel and Ronald Brand Family Scholarship

Jialan Zhang Receives High Recognition for Conference Paper

Ph.D. student Ms. Jialan Zhang recently received the Best Oral Paper Prize at the 22nd Connecticut Microelectronics and Optoelectronics Consortium. The annual event was held at Yale University in New Haven, CT on March 13, 2013, with seven Connecticut colleges and universities participating.



Jialan presented on "Electrocaloric Properties of Epitaxial Strontium Titanate Films." In a polarizable material, there is a temperature variation upon the application of an external electric field. This is called the electrocaloric effect, and materials with high electrocaloric responses have the potential to be used as on-chip heating and cooling elements in microelectronics. Jialan's work shows how appropriate choices of the polarizable material, substrate, growth or annealing temperature, and electrode configuration can be used to optimize the electrocaloric properties. Her research was conducted in conjunction with her advisor, Dr. S. Pamir Alpay, and associate advisor, Dr. George A. Rossetti, Jr., both MSE professors at UConn, as well as Dr. I. Burc Misirlioglu, UConn MSE alum (PhD 2005) and professor at Sabanci University in Turkey.

MSE Introduces New Advisory Board Member



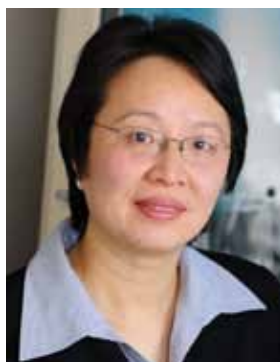
We are very pleased that Katherine Saint will be joining the UConn MSE Industrial Advisory Board.

Kathy is the President of Schwerttle Stamp Co., a 134 year old manufacturing firm located in Bridgeport, CT. Kathy is also the President of the Manufacturers Education and Training Alliance. She is a former president of Bridgeport Chamber of

Commerce, and continues to serve on the Board as well as chairing the Education Committee. She is also a past board member for Connecticut Business and Industry Association (CBIA), and serves on the Manufacturer's Advisory Committee. Working with the New Haven Manufacturer's Association and their Workforce Enhancement Committee, she is vocal in her advocacy for Education and particularly STEM skills with the Governor, state agencies and the legislature.

Kathy has received numerous awards for her community service, including being named a finalist in the 2006 "Women of Innovation Award," presented by the Connecticut Technology Council. She received the Bridgeport Regional Business Council's "Impact Award" in 2005 for outstanding leadership and the 2004 Connecticut Community Colleges "Award of Merit." She was also the first recipient of the Women's Leadership Award from the Bridgeport Regional Business Council.

Dr. Mei Wei Promoted to Associate Dean for Research and Education



Dr. Mei Wei, professor and undergraduate committee chair of the Materials Science and Engineering (MSE) Department, has been appointed the UConn School of Engineering Associate Dean for Research and Graduate Education.

Dr. Wei joined UConn MSE in 2002 as an Assistant Professor, and was promoted to Professor in 2012. During her time at

UConn, Dr. Wei's research has focused on biomaterials, tissue engineering, biomaterial-cell interactions, and in vivo performance of biomaterials. She is also affiliated with the UConn Health Center Institute for Regenerative Engineering, working intensively on bone regeneration and scaffolding research. MSE congratulates Dr. Wei on her new position within the School of Engineering.

New MSE Directors of Undergraduate and Graduate Studies

Dr. Rainer Hebert and Dr. Bryan Huey have agreed to serve as the Director of Undergraduate Studies and Director of Graduate Studies, respectively.

Rainer Hebert joined UConn in 2006. Over the



last 15 years, Rainer's research has focused on the phase stability of metallic materials including the crystallization behavior of metallic glasses under thermal and mechanical loads, and phase formations during intense plastic deformation and wear. The phase

stability theme has been recently extended to the area of additive manufacturing as a result of ties to Pratt & Whitney's Engineering Integrated Solutions Group and to the Connecticut Center for Advanced Technology. Rainer has been active with ASM International for the last 15 years and currently serves as the vice chair of the ASM Hartford Chapter. Rainer's research has been funded mainly from NSF and the Department of Homeland Security. He has published over 40 peer-reviewed articles, one book chapter, and articles in the Hartford Courant and various materials sites on the internet.

Bryan Huey has been with UConn MSE since 2004. He established the NanoMeasurements lab, an IMS user facility for Atomic Force Microscopy (AFM), which includes the fastest AFM in the United States. Focusing on developments and applications of AFM, Huey's group has been funded by NSF, DOE, and industrial partners to work on a wide range of disciplines, including projects on future data storage



systems, MEMS, drug delivery, biomechanics, tribology, composites, high-strain rate alloy testing, etc. Bryan has over 50 publications, organized last year's Electronic Materials and Applications (EMA) conference, and is the upcoming vice chair of the Basic Science Division of the American Ceramic Society.

MSE Industrial Advisory Board Member Honored for Outstanding Community Service



The MSE Department proudly acknowledges Industrial Advisory Board member Mr. Howard Orr (President, KTI, Inc. of East Windsor, CT) for his recognition as the Northeastern Economic Developers Association's 2012 Volunteer of the Year. Mr. Orr has been the Suffield Economic Development Commission (EDC) Chairman for over

twenty years, and this award recognizes his long and prosperous term of service. During his tenure, Suffield has taken advantage of its location near Bradley International Airport and attracted industrial and office development. Under his chairmanship, the EDC has also focused on developing a town center, promoting tourism, and implementing initiatives including a streetscape project, construction of a visitor's center, childcare facility, office facilities, and hospitality accommodations, and the development of a tourist brochure.

Mr. Orr has served as the President and CEO of KTI, Inc., since 1972. KTI is located in East Windsor, CT and special-

izes in electron and laser-beam welding. KTI serves customers in the aerospace, ground turbine, electronics, biomedical and automotive industries. Prior to his long term employment at KTI, Orr spent two years as a financial analyst in the space program at United Technology division, Hamilton Standard. He received his BS degree in Economics and Business Administration from Drury College in Springfield, MO, and his MBA courses from Western New England College in Wilbraham, MA. He continues his lifelong tradition of active volunteering and currently serves on over 25 non-profit boards and committees. Mr. Orr, as president of KTI, has partnered with the UConn School of Engineering through a Connecticut Innovations Small Business Innovation and Diversification Program grant.

The Northeastern Economic Developers Association Volunteer of the Year award recognizes an individual who volunteers his or her time and talents to the development of the local economy. The criteria include the service bestowed upon the community, the strong and well-established leadership of the volunteer, and the length of his or her dedication. MSE Department Head Dr. S. Pamir Alpay says: "This award once again affirms Howard's leadership role in the additive manufacturing and advanced materials processing communities in New England. We are extremely fortunate to have him on our Industrial Advisory Board."

MSE Well Represented at The American Ceramic Society's EMA 2013



Professor Bryan Huey co-organized this year's Electronic Materials and Applications (EMA 2013) conference in Orlando, Florida, January 23-25. EMA 2013 is sponsored by the American Ceramic Society and is designed for scientists, engineers, students, researchers and manufacturers with an interest in materials for electronics, energy, and sensor applications. The conference attendance rose by more than 50% over last year's conference, due to a re-invigorated program that included symposia on data storage, dielectrics, sensors and actuators. Other themes included photovoltaics, thermoelectrics, superconductors, energy harvesting, nanoscale devices, and more. A separate student-run symposium featured graduate and undergraduate student research, sponsored by ACerS President's Council of Student Advisors, providing



Dr. Bryan Huey

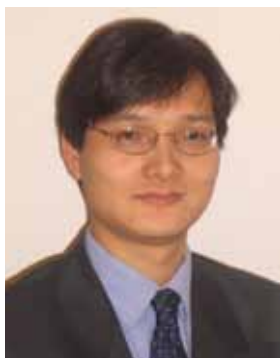
development and networking opportunities for the next generation of scientists.

MSE was represented by numerous students, department head Pamir Alpay, Professors Rampi Ramprasad, Puxian Gao, Serge Nakhmanson, and George Rossetti, as well as MSE Industrial Advisory Board member Dr. Joseph Mantese, Fellow with the United Technologies Research Center.

Professor George Rossetti will co-organize the Electronic Materials and Applications conference in 2014, proving UConn MSE's very active leadership in the discipline. Bryan Huey was elected as the secretary for the Basic Science Division of the American Ceramic Society, a position that will rise to division chair in 2015/16. This division is committed to the development of ceramic sciences and future ceramic applications. With 1116 members, the Basic Science Division represents 20% of the overall academic and industrial membership within the American Ceramic Society.

Puxian Gao Receives the Von Humboldt Research Fellowship

Alexander von Humboldt
Stiftung / Foundation



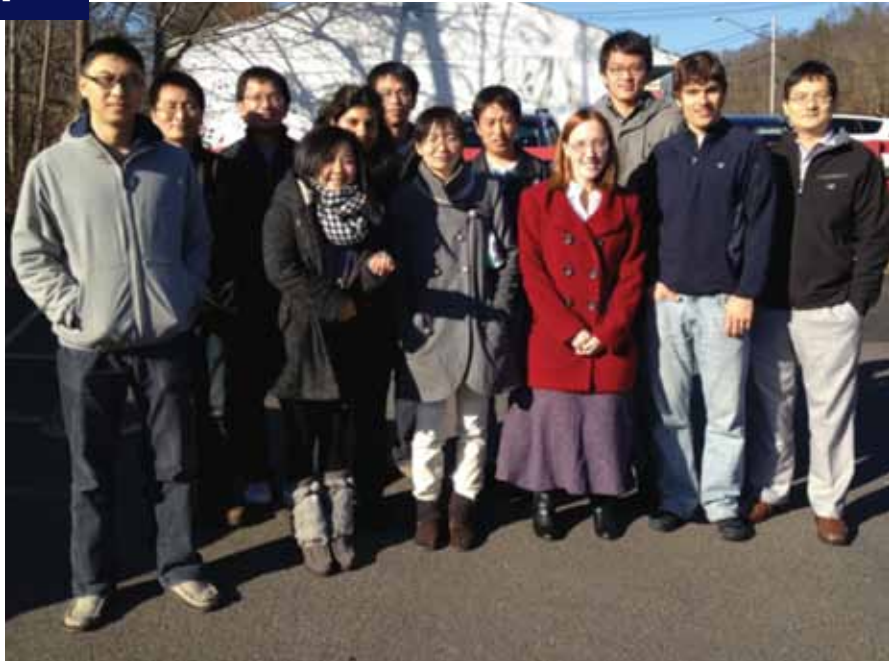
Dr. Puxian Gao, Associate Professor at the Department of Materials Science and Engineering & the Institute of Materials Science, has been awarded an Alexander von Humboldt Research Fellowship. Dr. Gao received the Fellowship in recognition of his research in Nanomaterials Science and Engineering, which mainly focuses on bridging nanomaterials science and

engineering with practical applications in energy and environmental catalysis, sensors and related electronics, fire security and energy sources, and bioenvironment-nanomaterials interfaces.

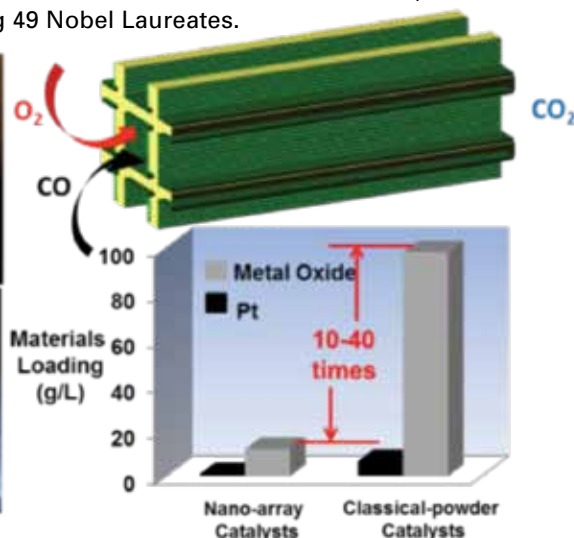
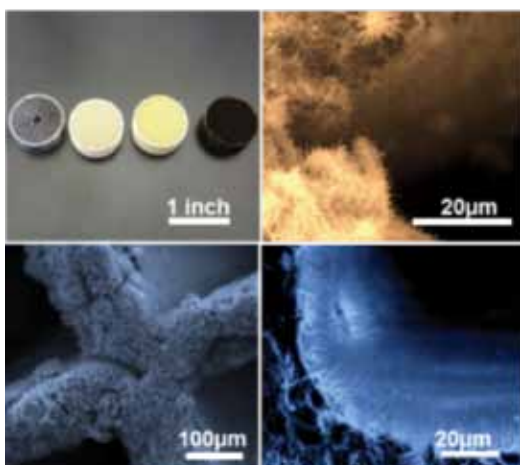
the applicant's future potential (academic potential, further academic development, career prospects)

Dr. Gao's fellowship, based at the Friedrich-Schiller-University of Jena and the Technical University of Ilmenau in Germany, will begin this fall and continue through the summer 2014. Dr. Gao plans to work with his hosts on the three dimensional (3D) nano-photo-voltaics and nano-magnetoelectronics, and study the manipulation of photons, and electrons, and their interactions and couplings by virtue of 3D nanostructure assembly and high energy ion implantation. In addition, he will also collaborate with the Fritz Haber Institute in Berlin for establishing the exact nanostructure-activity relationship through time-resolved optical spectroscopies. This work will help to understand the roles nanostructured surfaces and interfaces play on the catalytic behaviors of core-shell nanostructures.

Every year, the Alexander von Humboldt Foundation enables more than 2,000 researchers from all over the world to spend time doing research in Germany. The Foundation maintains a network of more than 26,000 Humboldtians from all disciplines in over 130 countries worldwide - including 49 Nobel Laureates.



Professor Gao's Nanomaterials Science research group (left to right): Yanbing Guo, Zhonghua Zhang, Hui-Jan Lin, Kuo-Ting Liao, Neda Paziresh, Zheng Ren, Caihong Liu, Haiyong Gao, Sarah Glod, Sibo Wang, Gregory Wrobel, and Puxian Gao



3D Configured Metal Oxide Nano-array based Monolithic Catalysts developed in Prof. Puxian Gao's Nanomaterials Science Laboratory: Constructed with parallel or honeycomb channels, monolithic devices such as catalysts, filters, and reactors have been utilized in various sectors ranging from household water treatment, mechanical, automotive, chemical, and pharmaceutical businesses, to biotechnology industries. By directly integrating the bare monoliths with metal oxide nanostructure arrays and Pt nanoparticles, the monolithic catalysts

significantly reduce the Pt and metal oxide usages by 10-40 folds compared to typical washcoated powder-form catalysts. Meanwhile the nano-array catalysts exhibit excellent thermal and mechanical stability, as well as tunable catalytic CO oxidation performance. The 3D configured nano-array based monoliths represent a new general strategy to fabricate highly efficient and robust catalysts and reactors for various industrial applications. (Adapted from Y.B. Guo, Z. Ren, et al., *Nano Energy*, 2013, <http://dx.doi.org/10.1016/j.nanoen.2013.03.004>.)

Materials Modeling Expert Avinash Dongare Joins UConn Faculty

Avinash Dongare, associate professor of materials science, who joins UConn from North Carolina State, is one of eight new tenure-track professors brought in to the School of Engineering this year. (Peter Morenus/UConn Photo)

As scientists across the country work to unlock the potential of new materials as part of President Obama's Materials Genome Initiative, materials modeling experts like Avinash Dongare are in high demand.

Dongare uses his skills in computational materials science to delve deep into the atomic microstructure of materials to find the optimal mix of components experimental scientists need to build stronger, faster, lighter, and more resilient steels, plastics, ceramics, and other materials.

Using advanced algorithms, Dongare's computer simulations screen out weaker or more problematic structures in a fraction of the time and at a fraction of the cost of traditional methods.

"To run an experiment and do analysis costs a lot of money and a lot of time," says Dongare, one of eight new tenure-track professors brought in to UConn's School of Engineering this year as part of President Susan Herbst's Faculty 500 initiative. "And it's very difficult to identify individual processes at the atomic level, because researchers often don't have that kind of equipment."

"By running simulations on a computer, we can try all the different possible combinations of a material and test them in different environments at the atomic scale in order to predict their behavior and weed out the good and the bad," says Dongare, an assistant professor in the Department of Chemical, Materials, & Biomolecular Engineering, who also will be associated with UConn's Institute of Materials Science. "That way, we can go back to the experimenter and say, 'You want to develop your material this way because this way will work.'"

Two graphs illustrate how Professor Dongare's computer model simulations (on the left) accurately reflect experimental results (on the right). The computer simulations save experimental scientists both time and money.

The Faculty 500 initiative that brought Dongare to UConn is expected to add 500 professors at the University over the next four years in order to bolster UConn's standing as a top public research institution and strengthen its academic core. A total of 18 new tenure-track and tenured faculty are expected in the School of Engineering by the fall of 2013.

"We are particularly excited by Avinash's research in using computational methods to investigate the behavior and properties of novel materials," says Professor Douglas Cooper, interim head of the Department of Chemical, Materials, & Biomolecular Engineering. "We expect his work to have an



Assistant Professor Avinash Dongare

impact on the development of next-generation high-tech materials for automotive, aerospace, manufacturing, and energy technologies. He is a thought leader, who can collaborate with Connecticut industries to improve competitiveness and create jobs."

Dongare is particularly adept at developing computational tools for hybrid materials, which are widely used in materials science today.

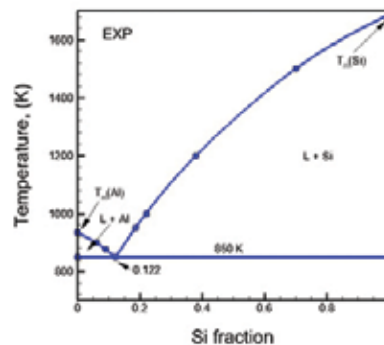
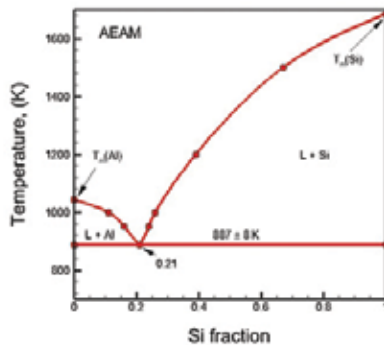
"A lot of studies using simulations have been done using only metallic systems. And a lot of studies have involved only ceramic systems," Dongare says. "The problem is a lot of new materials are being developed that are combinations of these. They might involve a metal that has been reinforced with some ceramics or vice versa, so it's a multi-component system. Basically, what I did was take a concept that works for metallic systems and one that works for ceramic systems and I found a way for them to talk to each other. There has been almost no modeling in that area."

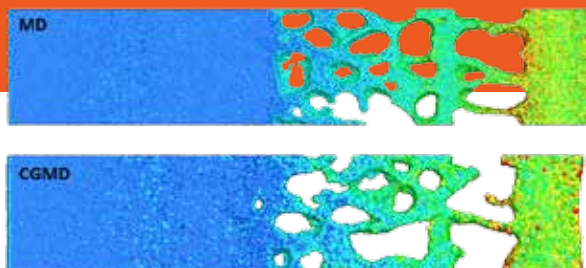
Dongare has developed new ways to achieve the same results from simulations faster by developing new algorithms on coarse graining. The top image is based on conventional molecular dynamics requiring 64 processors to be run in parallel for four days, and the lower image was obtained through coarse-grained molecular

dynamics using 16 processors in parallel for four hours.

Prior to coming to UConn, Dongare served as a senior research associate at North Carolina State University, where he was part of a team of researchers developing computer simulations to help scientists identify current degradation mechanisms and

provide solutions that will extend the life of the nation's nuclear reactors. This Consortium for Advanced Simulation of Light Water Reactors, or CASL, was the first national energy innovation hub supported by the U.S. Department of Energy.





Dongare has developed new ways to achieve the same results from simulations faster by developing new algorithms on coarse graining. The top image is based on conventional molecular dynamics requiring 64 processors to be run in parallel for four days, and the lower image was obtained through coarse-grained molecular dynamics using 16 processors in parallel for four hours.

Dongare earned his Ph.D. in materials science and engineering at the University of Virginia, Charlottesville in 2008. In 2007, he obtained a prestigious three-year National Research Council fellowship at the U.S. Army Research Office, where he helped develop material models for advanced ballistics and the next generation of military hardware.

Coming to UConn, Dongare says, was a perfect fit for his current career track. Dongare said the University's plans for a new technology park and its strong relationship with state industrial leaders – exemplified by its Pratt & Whitney Center of Excellence and recently announced advanced technology partnership with GE – reflect UConn's commitment to excellence and its rising status as a major research institution.

"UConn is a growing university that offers me a great place to grow as well," Dongare says. "I look forward to working with UConn's experimental scientists to expand the University's research capabilities and those of its corporate partners."

"Experimentalists have been designing new materials by themselves for the last two decades, now we have the capabilities to help them."

Dongare says this is a particularly exciting time in the materials science field. Advancements in nanotechnology have opened the way for a new generation of advanced materials that will be unlike anything seen before. Traditionally, the development of new materials has been stymied by the enormous amount of time – decades usually – and money necessary to bring them from the laboratory to the commercial market.

Last year, President Obama pushed scientists to double the speed at which new materials are developed with the launch of his Materials Genome Initiative. The initiative, like its biological counterpart the Human Genome Project, challenged researchers to unlock the potential of new materials through the development of new computational tools, software, and databases that will speed up the discovery process and help maintain America's competitiveness in the global economy.

"This is a very exciting time to be in the materials science community," Dongare says. "Things are changing as we speak: cars are faster, lighter, and more efficient, computers are faster and cheaper. The better simulation capabilities you have, the faster your evolution capabilities are in terms of technology. Experimentalists have been designing new materials by themselves for the last two decades, now we have the capabilities to help them."

By: Colin Poitras

Research Awards

Mark Aindow, U.S. Chrome Corporation, Processing/Microstructure/Property Relationships in Electroplated Cobalt-Phosphorus Hard Coatings, 1/13-12/14, \$154,348.

S. Pamir Alpay, Structured Materials Industries Inc., Materials Characterization of Complex Oxide Films for Acoustic Resonators, 2/13-1/14, \$120,000

S. Pamir Alpay and **Mark Aindow** GE Energy - Industrial Solutions, Metals and Alloys for Electrical Circuit Breaker Contacts, 1/13-12/14, \$581,753

C. Barry Carter, **Radenka Maric** and **Chris Cornelius**, Department of Education, Graduate Assistance in Areas of National Need: Nanostructures and Devices for Energy Production and Storage, 8/12-8/15, \$399,798.

Rainer Hebert, UTC/Pratt & Whitney, Electron Beam Melting Technology Development, 8/12-5/13, \$77,424.

Radenka Maric and **Ugur Pasaogullari** (Mechanical Engineering), Advent Technologies, One Step Direct Deposition of Durable Cathodes for High Temperature Proton Exchange Membrane Fuel Cells (PEMFC), 3/13-3/14, \$167,156.

Radenka Maric, **Armand Halter** (Sonalyt Inc.), **William Mustain** (Chemical & Biomolecular Engineering), National Science Foundation "Grant Opportunities for Academic Liaison with Industry" (GOALI), One Step Direct Deposition of Durable Cathode for High Temperature Proton Exchange Membrane Fuel Cell (PEMFC), 5/13-5/16, \$423,204.

Radenka Maric, **C. Barry Carter** and **William Mustain**, DoE/Proton OnSite, Single Step Manufacturing of Low Catalyst Loading Electrolyzer MEAs, 11/12-8/13, \$50,000.

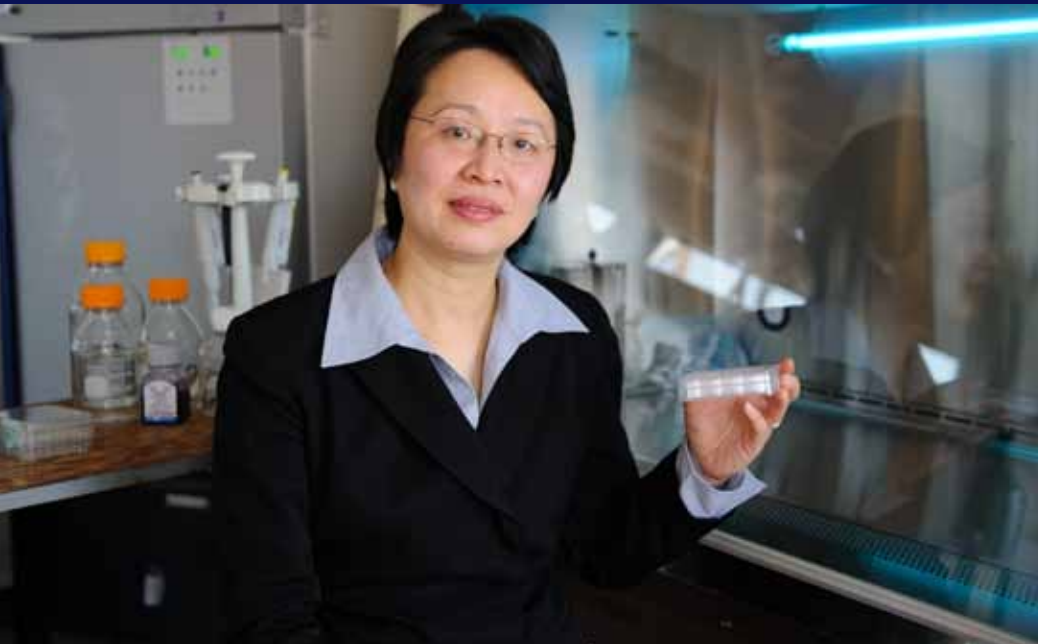
Ramamurthy Ramprasad and **Hom Sharma** (graduate student), EPA, Computational and Experimental Investigation of Catalyst Deactivation to Design Sulfur-Resistant Emissions Oxidation Catalysts, 8/12-8/15, \$51,000.

Prabhakar Singh, **Ramamurthy Ramprasad** and **Manoj Mahapatra**, DoE/National Energy Technology Laboratory, Study of the Durability of Doped Lanthanum Manganite and Cobaltite Based Cathode Materials under "Real World" Air Exposure Atmospheres, 10/12-9/14, \$499,372.

Prabhakar Singh, **Ugur Pasaogullari** (Mechanical Engineering) and **Steven Suib** (Chemistry), DoE/Fuel Cell Energy, Thermally Integrated Solid State Hydrogen Separator and Compressor Development Support, 9/12-9/14, \$205,593.

Prabhakar Singh, DoE/Praxair, Development of OTM Electrode Degradation Mechanism, 7/12-9/15, \$331,566.

Federal Grants to Fund Tissue Regeneration Research



Dr. Mei Wei, Professor and Associate Dean for Research and Graduate Education

Mei Wei, a professor in the Department of Materials Science and Engineering and the Institute of Materials Science, has recently received two large grants from the National Institutes of Health (NIH) and the National Science Foundation (NSF) that will allow her to expand upon her ongoing work in tissue regeneration and engineering.

She will work in collaboration with Dr. David Rowe, Director of the Center for Regenerative Medicine and Skeletal Development and professor of Reconstructive Sciences in the School of Dental Medicine at the UConn Health Center.



David W. Rowe, Director of the Center for Regenerative Medicine and Skeletal Development at the UConn Health Center.

For the NSF-funded study, she seeks to develop a scaffold that can mimic human tissue and encourage cartilage regeneration around joints. A project like this has important implications for joint disorders, especially osteoarthritis, a painful and debilitating disease.

The NIH-funded project involves the exploration of new bone imaging techniques that will offer researchers insight into the

interaction of scaffolds and cells at different stages of bone repair.

Osteoarthritis is the top cause of chronic disability in the U.S., costing billions of dollars every year and incalculable pain for millions of people. Wei hopes her work will ultimately enable sufferers to undergo a procedure that would reverse the progression of osteoarthritis and

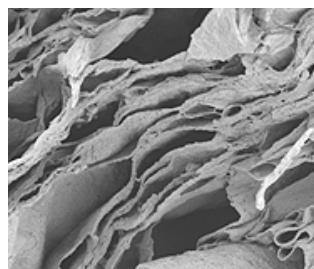
reclaim their quality of life.

“Damage to the articular cartilage surface and the underlying bone can easily progress to joint degeneration, especially osteoarthritis,” says Wei.

To relieve the effects of osteoarthritis, the damage to the articular cartilage must be reversed. “Extensive efforts have been made in osteochondral [cartilage] defect treatment, but there is still no widely accepted method which produces consistent satisfactory results,” she says. All previous attempts at repairing or regenerating the cartilage have produced a replacement inferior to articular cartilage.

“The goal of this NSF project is to use a combination of a novel scaffold and an optimal cell source to effectively regenerate osteochondral cartilage with excellent functionality and long-term stability,” says Wei.

Biological scaffolds are artificial structures that can provide stability to regenerating tissue, making it easier for the cells to proliferate and develop.



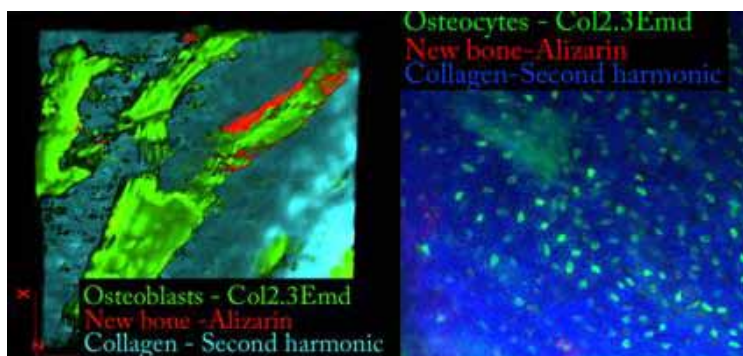
Tissue engineering scaffold.

This would then be seeded with chondroprogenitor cells, which are cells that can develop into cartilage. As the cartilage develops, the support and protection to joints will be enhanced, mitigating

the causes of osteoarthritis.

Wei's imaging project focuses on developing means to watch the progress of bone repair procedures. As with cartilage regeneration, in bone repair a scaffold is seeded with the proper donor progenitor cells and placed at the site of the injury, facilitating regeneration.

To evaluate and analyze a certain repair technique, researchers would find it helpful to determine how the different components involved in repair, namely the scaffold and the different cells, are interacting. Current imaging platforms, however, do not allow real-time imaging of cell-cell or cell-scaffold interactions in living animals. To overcome this problem, Wei and her team will be



Two-photon images of osteoblasts and osteocytes.

working with a transgenic mouse model to test a four-dimensional imaging technique that will be able to track the progression of different bone repair techniques. This technique takes advantage of the fact that every cell lineage shows a different color at different stages of development.

At the Health Center, Rowe will create transgenic mice in which a specific reporter protein is expressed when cells differentiate into a certain stage. These reporter proteins, called Green Fluorescent Proteins (GFP), give off a specific color when exposed to a specific wavelength of light. With the GFP-labeled cells, Wei and her team can visualize cell-cell and cell-scaffold interactions and identify whether the cells originated from the original bone or from donor cells; how each of those sources of cells contributes to bone repair; and how those cells interact over time. This information can provide important insights into the analysis and development of new and existing bone repair procedures.

In addition to these grants, Wei has also recently received funding to organize a symposium at the Materials Research Society fall meeting, titled "Biomaterials for Tissue Regeneration." This symposium will bring together 12 distinguished researchers in the field to present their work and facilitate the development of new, important research in the field of tissue regeneration.

By John Giardina

Professor Maric Receives GOALI Award



Dr. Radenka Maric, in close collaboration with MSE Industrial Advisory Board member Mr. Armand Halter and Dr. William Mustain of UConn Chemical Engineering, has received a prestigious National

Science Foundation "Grant Opportunities for Academic Liason with Industry" (GOALI) award. The GOALI award seeks to promote collaboration between universities and industry by funding research projects that operate across this divide. Such projects provide the opportunity for university faculty to gain valuable industry perspective and experience (and vice versa). These awards have always been competitive, but are even more so in the current economic climate. Thus, it is a significant and well-deserved honor for the team to be ranked first and funded by the NSF.

The team's project is entitled "GOALI: One Step Direct Deposition of Durable Cathode for High Temperature Proton Exchange Membrane Fuel Cell (PEMFC)." The importance of the proposed research lies in its position at the nexus of processing and microstructure with the activity, stability and utilization of catalysts using High Temperature Proton Exchange Membranes (HT-PEMFC).

This GOALI award will provide over \$423,204 to fund the proposal through May 2016.

Dr. Radenka Maric, the PI on this initiative, is the Connecticut Clean Energy Fund Professor of Sustainable Energy at UConn. She is the recipient of many prestigious awards, most recently being named a 2013 "Women of Innovation" Finalist in Research and Leadership of the Connecticut Technology Council.

Co-PI Mr. Armand Halter is an active member of the MSE Industrial Advisory Board. He is also the Vice President of Applied Sciences at Sonalysts, Inc., where his work includes the development of materials for alternative energy sources. Co-PI Dr. William Mustain is the soon-to-be Associate Professor of Chemical Engineering and Associate Department Head of CBE.

New Connecticut Academy of Science and Engineering (CASE) Members

Materials Science and Engineering (MSE) Professor Mei Wei, along with two members of the MSE Industrial Advisory Board — Dr. Dave Furrer, Senior Fellow Discipline Lead of Materials & Processes Engineering at Pratt & Whitney, and Dr. Joe Mantese, Research Fellow at the United Technologies Research Center—have been elected members of the Connecticut Academy of Science and Engineering (CASE). Founded in 1976 and managed by a council of 11 members, CASE is a non-profit institution modeled after the National Academy of Science. The Academy's main objectives are to provide information and unbiased expert advice on science and technology to government, industry, and people of Connecticut, and to initiate activities for youth that foster interest in science and engineering to promote the highest quality of education in these areas. The membership is limited to 400 distinguished scientists and engineers from Connecticut's academic, industrial, and institutional communities. The accomplishments of our three newest members in CASE are summarized below.



Professor Wei is an expert in biomaterials research. In the past ten years she has collaborated with faculty at the UConn Storrs Campus and the UConn Health Center, as well as local industry partners, to establish a world-renowned interdisciplinary biomaterials research program. She has raised nearly \$3M from a variety of fund-

ing agencies, including the National Science Foundation, the National Institute of Health, the Department of Defense, the State, private foundations and industry. Her current research group includes eight graduate students and eight undergraduates. Her research work has led to the publication of 70 refereed journal articles and six patents.

Professor Wei joined MSE at UConn in 2002. She was promoted to Associate and then full Professor in 2007 and 2012, respectively. She received her Ph.D. in Materials Science in 1998 from the University of New South Wales, Australia.

Dr. David Furrer has been an active researcher and champion of the development and application of materials and process modeling to support component design optimization. He organized several symposia in national and international conferences in the area of Integrated Computational Materials Engineering (ICME). In addition to computational materials and process engineering, Dr. Furrer has been active in the area of advanced materials data capture and utilization. He has also co-organized many National Institute of Standards and Technology and Air Force materials data management workshops.



Dr. Dave Furrer has more than 20 years of experience in

the areas of aerospace materials engineering and materials and process modeling. In his current position, Dr. Furrer's primary responsibility is leading other Materials Discipline Leaders and Materials Fellows in the development and improvement of technical strategy and engineering standards for the Pratt & Whitney Materials and Processes department. He received his B.S. and M.S. degrees in Metallurgical Engineering from the University of Wisconsin-Madison, and a Doctorate of Engineering from the Universität Ulm, Germany.

Dr. Mantese is well known for his development of innovative sensors, electronic materials, and devices. Specifically, he is recognized for his efforts in the implementation and productization of: plasma source ion implantation to create low friction, wear resistance coatings for automotive components such as pistons, graded ferroelectric structures, and transcapacitive devices in the advancement of



the understanding of multi-ferroic systems, and his numerous automotive and consumer sensors for safety, security, and energy harvesting, including low cost focal plane arrays for Night Vision applications related to the automobile and intrusion/security protection industries. Prior to his current position as Research Fellow at the United Technologies Corporation's research center, Dr. Mantese held the position of Department Head at Delphi Research Laboratories, where he was inducted into and then honored by the corporation's Hall of Fame. Previous to Delphi, Joe was section leader of sensor development at General Motors Research and Development Laboratories, where he twice won the General Motors Campbell Award and the R&D 100 Award. In his current position, Joe specializes in electronic materials, components, sensors and packaging. Dr. Mantese holds 32 patents and has authored over 90 peer-reviewed papers, one book, and three book chapters. Dr. Mantese received his Ph.D. in experimental solid-state physics from Cornell University in 1986.

Dr. Barry Carter to Receive Distinguished Scientist Award



Dr. C. Barry Carter, professor of Materials Science & Engineering, will receive the Microscopy Society of America's (MSA) 2013 Distinguished Scientist Award for the Physical Sciences in recognition of his internationally acclaimed research and distinguished contributions in the field of microscopy. He will be presented the award in August during the society's Microscopy & Microanalysis 2013 meeting in Indianapolis. Given annually since 1975, this Award is the highest honor bestowed by the Society.

Dr. Carter's current research work focuses on explorations of the role of defects, particularly dislocations and interfaces, and defect chemistry on properties of materials. An internationally recognized leader in the characterization and imaging of materials, Dr. Carter has co-written the textbooks *Ceramic Materials: Science & Engineering* (with M.G. Norton; 2nd ed., 2013) and *Transmission Electron Microscopy: A Textbook for Materials Science* (with D.B. Williams; 2nd ed., 2009). He has published more than 700 articles on a wide range of crystal defects, with 300 in archival journals. In addition, he is Editor-in-Chief of the *Journal of Materials Science* and the Chair of the Awards Committee of the Materials Research Society. He is also a CINT Distinguished Affiliate Scientist at Sandia National Laboratory.

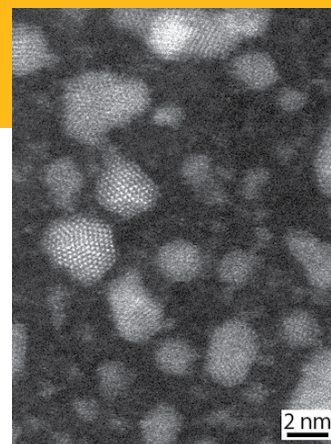
Dr. Carter is a Fellow of MSA, the Materials Research Society (MRS), the American Ceramic Society (ACerS), the Royal Microscopical Society (RMS), and the American Association for the Advancement of Science (AAAS). He is also an elected member of the Connecticut Academy of Science and Engineering (CASE).

His awards include the Berndt Matthias Scholar Award (Los Alamos National Laboratory), the 2004 Jubilee Professorship (Chalmers University), the Alexander von Humboldt Senior Award, and a John Simon Guggenheim Fellowship. In addition, he serves as the 2011-2014 President of IFSM, the International Federation of Societies for Microscopy, and is a past president of MSA.

Dr. Carter earned his D. Phil. in Metallurgy & Science of Materials at Oxford University in 1975, his M.Sc. from Imperial College London and in 2005 he received the Sc.D. degree in Natural Sciences from Cambridge University. This is the first time that the MSA Distinguished Scientist Award will be presented to a member of the UConn Faculty. Modern transmission electron microscopes can now almost routinely image materials with atomic resolution and picometer precision. As Dr. Carter often says: TEM is the essential tool for nanotechnology and for understanding all materials at the atomic level. He previously served as Head of the Department of Chemical, Materials & Biomolecular Engineering.

Since ending his 5-year term as Head of the combined MSE and Chemical Engineering Department formerly known as CMBE in 2012, Barry is on sabbatical. He has refocused on his research, outreach and teaching. During the coming year he plans to emphasize his role as a 'CINT Distinguished Affiliate Scientist' with frequent visits to

The image shows platinum nanoparticles on a carbon support film. Such materials are being explored for improved energy production and storage by Barry's group in collaboration with Prof. Maric's group and their collaborator Paul Kotula at Sandia National Laboratory.



the Sandia National Laboratory. CINT is the Center for Integrated Nanotechnology located partly at Sandia in Albuquerque and partly at Los Alamos and is one of the DOE's 5 Nanoscience Centers.

He has also been invited to spend time in Japan, Germany, India, and of course, the UK. In each case he will work with state-of-the-art TEMs. He won't always be traveling so far from home, and plans to continue to collaborate with TEM colleagues at the Center for Functional Nanomaterials (CFN—the DOE Nanoscience Center at Brookhaven) and at Harvard's CNS.

Barry will also work on further enhancing the reputation of the *Journal of Materials Science*, which has increased its impact factor every year since he became the Editor-in-Chief (it is now at 2.163—and we care about the 3!). The *Journal* was cited 31,538 times in 2012 – up by 3,500 over 2011, so his UConn co-Editors Pamir Alpay and Mark Aindow will hear from him quite often!

University Professor Cato Laurencin Receives The Technology Innovation and Development Award

Dr. Cato Laurencin, M.D., Ph.D., was presented the Technology Innovation and Development Award from the Society for Biomaterials. Dr. Laurencin is CEO of the Connecticut Institute for Clinical and Translational Science, Director of the Institute for Regenerative Engineering, the Van Dusen Endowed Chair in Academic Medicine and a professor of Materials Science & Engineering (MSE), and Chemical & Biomolecular Engineering (CBE). The award recognizes an individual or team who provided key scientific and technical innovation and leadership in a novel product in which biomaterials played an important and enabling role.

Dr. Laurencin also received the 2012 Mentor Award of the American Association for the Advancement of Science (AAAS) "for his transformative impact and scientific contributions toward mentoring students in the field of biomedical engineering."



Materials Science & Engineering Faculty



MARK AINDOW

Professor

Defects and Interfaces, Microstructural Development in Alloys and Thin Films & Electron Microscopy



S. PAMIR ALPAY

Professor

Department Head

Ferrous Materials, Thermodynamics & Kinetics of Phase Transformations, Conducting Oxides & Thin Film Deposits



HAROLD D. BRODY

Distinguished Professor

Alpha Sigma Mu Chapter Advisor

Materials Processing, Alloy Casting and Solidification & Process Models



C. BARRY CARTER

Professor

Interfaces & Defects; Metals, Ceramics, Materials and Semiconductors; Nanomaterials; TEM, SEM and AFM. Materials for Energy Products and Storage; MSE Education



AVINASH DONGARE

Assistant Professor

Computational Materials Science, Nanostructured Materials and Interfaces, Thin Film Growth, Mechanics of Materials, Corrosion, Nuclear Materials, Multi-Scale Modeling



PUXIAN GAO

Associate Professor

Nanomaterials Synthesis, Characterization and Manipulation, Nanotechnology for Energy, Environmental and Biomedical Applications



RAINER HEBERT

Associate Professor,

Director of Undergraduate Studies

Phase Transformations, Metals & Alloys, Metallic Glasses & Severe Plastic Deformation Processing



BRYAN HUEY

Associate Professor

Director of Graduate Studies

Scanning Probe Microscopy, Nanoscience, Electronic Materials, Textures & Ceramics



THEODOULOS Z. KATTAMIS

Professor

Solidification and Metals Joining, Materials Processing, Thin Coatings & Tribology



YUSUF KHAN

Joint Assistant Professor with Department of Orthopaedic Surgery, UConn Health Center

Tissue Engineering & Biocompatible & Biodegradable Scaffolds

**CATO LAURENCIN**

University Professor; Professor of CMBE; Albert and Wilda Van Dusen Distinguished Professor of Orthopaedic Surgery
Advanced Biomaterials, Tissue Engineering, Biodegradable Polymers, Nanotechnology

SYAM NUKAVARAPU

Joint Assistant Professor with Department of Orthopaedic Surgery, UConn Health Center
Biomaterials, Tissue Engineering & Biomedical Nanotechnology

**HARRIS L. MARCUS**

Professor
Freeform Fabrication, Mechanical Behavior, Fatigue, Nanotechnology & Photonic Crystals

RAMPI RAMPRASAD

United Technologies Corporation Associate Professor
Materials Modeling & Computation, Nanomaterials, Thin Films & Interfaces, Photonic Crystals & Metamaterials

**RADENKA MARIC**

CT Clean Energy Fund Professor of Sustainable Energy
Novel Materials for High Temperature Fuel Cells

GEORGE A. ROSSETTI JR.

Associate Professor
Electroceramic Materials, Crystal Chemistry and Physics & Ceramic Processing Science

**SERGE M. NAKHMANSON**

Associate Professor
Multiscale Modeling of Materials, Multifunctional Ferroics, Soft Materials

PRABHAKAR SINGH

Professor
Director, Center for Clean Energy Engineering (C2E2)
Fuel Cells & Energy

**LAKSHMI NAIR**

Joint Assistant Professor with Department of Orthopaedic Surgery, UConn Health Center
Injectable Hydrogels, Nanomaterials, Bioactive Biomaterials, Surface Modification, Tissue Engineering

MEI WEI

Professor
Associate Dean for Research and Graduate Education
Biomaterials, Ceramics, Coatings & Composites



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Contact Heike Brueckner at heike@engr.uconn.edu.

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