Science News

June 2009

Vol. 3
No. 6

THE MONTHLY NEWSLETTER OF RENSSELAER POLYTECHNIC INSTITUTE'S SCHOOL OF SCIENCE

The Travelstead Institute Chair

Gwo-Ching Wang, Professor of Physics and Head of the Department of Physics, Applied Physics and Astronomy has been appointed to The Travelstead Institute Chair. G. Ware Travelstead '60 in 1983 endowed the chair.

Professor Wang received her B.S. in Physics from Cheng-Kung University, Taiwan, her M.S. from Northern Illinois University and her Ph.D. from the University of Wisconsin-Madison in 1978. Subsequently, she was a Physicist in the Electron Physics Group at the National Institute of Standards and Technology and in the Surface Physics Group in the Solid State Division at Oak Ridge National Laboratory. She joined the Rensselaer faculty in 1984 and has been Head of the Department of Physics, Applied Physics and Astronomy since 2000.

Dr. Wang has made pioneering and sustained contributions in the development of the theory and practice of electron diffraction techniques to study surface and growth front ordering. She has produced seminal work in quantitative measurements of surface and overlayer phase transitions. She has over 220 in refereed journals, has published two books and has given very numerous invited and contributed presentations.

Dr. Wang is a dynamic leader and educator. She has been Head of the Department of Physics, Applied Physics, and Astronomy department since 2000. Her drive and enthusiasm has been responsible for recruiting outstanding faculty, including Constellation Professors as well as junior faculty. She created the Center for Terahertz Research, widely recognized as one of the best in the world.

Dr. Wang has directed three research programs: the REU, IGERT and GAANN. The National Science Foundation (NSF) sponsored REU (Research Experience for Undergraduates) program has consecutively run for the past 15 summers at Rensselaer. Over 170 students from all over the U.S. graduated from this program. She supervised over 20 REU and RPI students in the past 15 years. She teaches a wide variety of courses ranging fro Physics I to Surface Physics.

The NSF sponsored IGERT (Integrative Graduate Education and Traineeship) fellowship program entitled, "THz science and technology – a studio approach" provides 15 fellowships each year for five years.

The Department of Energy sponsored GAANN (Graduate Assistant in the Area of National Need) fellowship program entitled, "Terascale electronic and photonic material and devices" provides eight fellowships each year for three years.

Both the IGERT and GAANN programs involve faculty from multiple departments in SOS and SOE, minority institutes, and international partners. She is the first to receive both fellowship grants at Rensselaer.

Dr. Wang is a fellow the AAAS, American Physical Society and the American Vacuum Society, as well as a member of the Materials Research Society. She was a recipient of the William A. Wiley Distinguished Faculty Award from Rensselaer in 2006.

COMMENCEMENT 2009
May 16, 2009

Six Science majors graduated with perfect 4.0 averages at Rensselaer's Commencement held on May 16, 2009. They were **Eric Townsend** (Chemistry), **Matthew Fyffe** and **Jonathan Zolle** (Computer Science) and **Michel Lucking**, **Mark Mislin** and **Joshua Sauppe** (Physics). A total of thirteen students across the Institute graduated with 4.0 averages.

Nobel Prize Winning Physicist Awarded Honorary Degree

ROBERT C. RICHARDSON is the F.R. Newman Professor of Physics and senior vice provost for research, emeritus, at Cornell University. Richardson's collaborative research in low temperature physics has been recognized with numerous prestigious prizes and awards, including the Nobel Prize in Physics in 1996. Richardson is a fellow of numerous professional societies and his service on many national governing boards has helped set research and higher education policy. Of his many accomplishments, Richardson often highlights his 30 years of teaching college physics.

Degrees Awarded

Doctoral:	**56**	
Masters:	**51**	**Hartford: 6**
Bachelor's:	**277**	**Information Technology: 20**

(65 students earned dual degrees, i.e. satisfied the requirements for two different degrees at the same time.)

Science Faculty Awards

WI LLIAM H. WI LEY ’1866 DISTINGUISHED FACULTY AWARD

This prize, honoring those who have won the respect of the faculty, was established in 1977 by the late Edward P. Hamilton '07, a trustee of Rensselaer for 34 years. He set up an endowment in memory of his uncle, William H. Wiley, Class of 1866. The recipient is chosen by the Faculty Committee on Honors by nomination of the faculty. The award is based on excellence in teaching, productive research, and interest in the totality of the educational process. The 2009 award is presented to:

Xi~Cheng Zhang, J. *Erik Jonsson* '22 *Distinguished Professor; Professor of Physics, Applied Physics, and Astronomy*

TRUSTEES' OUTSTANDING TEACHER AWARD

Established in 1994 through the generosity of members of the Board of Trustees, this award recognizes outstanding accomplishments in classroom instruction. Selection is made based on evidence of sustained outstanding teaching as reflected by student evaluations, peer evaluations, and letters of support from colleagues, alumni and students. Nominations are sought from the Rensselaer community and reviewed by a selection committee, with final selection made by the President. The award is presented by the Board of Trustees at the Fall meeting. The 2008 award was presented to:

George E. Plopper, Jr., *Associate Professor, Biology*

Awards to Graduating Seniors in Science

RENSSELAER CLASS OF 1902 RESEARCH PRIZE (1927)

The Class of 1902 Research Prize is awarded at Commencement to the senior who presents the best thesis involving research in any branch of engineering or science. This year the award was shared by ***Andrew Schwendeman*** (Biology) for his thesis entitled ‘*Studies of the Mechanism of the Light-Driven Water Oxidation Reactions of Photosystem II*’ done with **Professor K. V. Lakshmi** and ***Matthew Harrigan*** (Physics) for his thesis entitled ‘*The Big Toe of Hercules, A Moving Group 44 KPC from the Sun*’ done with Professor **Heidi Jo Newberg**.

WILLIAM PITT MASON PRIZE (1939)

To a senior in the Department of Chemistry. who has demonstrated outstanding ability in academic work and gives promise of outstanding professional success.

Ashley June Tennyck

G. HOWARD CARRAGAN AWARD (1961)

To a senior in the department of Physics for outstanding scholarship.

Ryan Casey Badeau
Marc Zachary Miskin

MAX HIRSCH PRIZE (1972)

To a senior in the Department of Mathematical Sciences who has demonstrated outstanding ability in academic work and gives promise of outstanding success in a career of mathematics.

Daniel Joseph Hathaway

JOSEPH L. ROSENHOLTZ PRIZE (1963)

An annual award based on the income from funds contributed by friends and former students of Prof. Rosenholtz, the prize is awarded to a senior for outstanding work in earth sciences. Should no student qualify for the prize in any one year, the funds available for the prize may be used for related purposes as determined by the Board of Trustees.

Riley Scott Gannon

RALPH ERNEST HUSTON PRIZE (1973)

To the first~ or second ~year graduate student in the Department of Mathematical Sciences who has demonstrated unusual promise and ability as a teacher.

Kara Grace McMahon

JOHN AND MARY CLOKE PRIZE (1964)

To a graduating senior in the Department of Chemistry who is continuing in a graduate school of chemistry or in a school of medicine or biological science, and who has made a distinguished record, especially in the department.

Erik Matthew Townsend

JOAQUIN B. DIAZ PRIZE (1978)

Established by friends, family and colleagues in memory of Dr. Joaquin B. Diaz, the Albert Einstein Professor of Science at Rensselaer from 1967 to 1978, this award is presented to a graduate student who shows ability and enthusiasm for research in mathematics.

Jing Hu

Kui Lin

W. H. BAUER DOCTORAL PRIZE IN CHEMISTRY (1981)

To the candidate who has an exceptional graduate record, has carried out meritorious doctoral thesis research, and shows outstanding promise in the field of chemistry.

Ke Xia

KAREN AND LESTER GERHARDT PRIZE (1982)

To a full-time engineering or science doctoral candidate, who by the originality and insight of his or her work emphasizes the tradition of excellence that is Rensselaer.

Nicholas Eugene Karpowicz

Amanda Waite Lund

ROBERT MCNAUGHTON PRIZE (J989)

An annual prize established in honor of Professor Robert McNaughton, scholar and teacher in the Computer Science and Mathematical Sciences Departments from 1976 to 1989, The prize is given to an outstanding senior in Computer Science.

Konstantin Mertsalov

PAUL A. MCGLOIN PRIZE (1989)

An annual prize established in honor of Professor Paul McGloin, scholar and teacher in the Computer Science and Mathematical Sciences Departments from 1955 to 1989. The prize is given to an outstanding senior in Computer Science.

Evan William Patton

ROLAND WALKER PRIZE (1989)

Established by friends and fonner students of Roland Walker, Professor Emeritus of Biology. The prize is awarded to a senior in Biology for outstanding scholarship.

Aniga Anwar
Jeffrey Alan Bush
Johanna Danielle Carroll
Alyssa Marie Stewart

WALTER EPPENSTEIN '52 TEACHING ASSISTANT AWARD (1991)

Established by friends and colleagues of Walter Eppenstein, Professor Emeritus of Physics, to honor his many contributions to education at Rensselaer. It is awarded to one or two graduate students for outstanding contribution to our teaching program.

Paul Anthony Mayeur

ROBERT G. LAFLEUR GEOLOGY PRIZE (1993)

The prize was established by the friends of Professor Robert O. Lafleur for students demonstrating an excellent record in, commitment to, and promise in the field of environmental geoscience.

Monica Calph Blount

W.A. TARR AWARD

The Society of Sigma Gamma Epsilon, national Earth Sciences Honor Society, presents the W.A. Tarr Award annually to each society chapter. Scholarship, leadership, and contribution to the school provide the primary basis for the award. RPI's Delta Theta Chapter 2009 recipient is

Jenna Clark.

JACK HOLLINGSWORTH PRIZE (1999)

An annual prize to honor Jack Hollingsworth, Professor of Mathematics. The prize is given to a computer science student who made a major contribution to the educational program at Rensselaer.

Stephen George Berard

GEORGE H. HANDELMAN AWARD FOR GRADUATE STUDY IN APPLIED MATH (2000)

This award is given to a graduating senior (in any field) who shows promise in applied mathematics and has been admitted to a graduate program in Applied Mathematics,

Pamela* Beth *Fuller
Daniel Christopher Johnson
***Heather Shannon* Palmeri**

DR JOHANNA MAAS CHEMISTRY TEACHING ASSISTANT AWARD (2000)

Presented annually to one or more graduate students for outstanding service in the teaching program of the Chemistry Department. Established by Sonja Krause, Class of 1954, and others in memory of Dr, Johanna Zelie Maas, chemist, physician, Holocaust survivor, and humanitarian,

Sayaka Masuko
James Robert Porambo

STANLEY l. LANDGRAF PRIZE (1998)

An annual prize established to honor Stanley Landgraf, Rensselaer trustee, Acting President and friend of the Computer Science Department. The prize is given to a Computer Science major who

excels in leadership skills and academic achievement,
John Elias Lazos

GLENN MARTIN MUELLER '64 PRIZE (2000)

Established to honor Glenn Martin Mueller, Rensselaer Trustee and Graduate, Class of 1964. A leading venture capitalist in Silicon Valley, Mueller was a champion of the entrepreneur, funding many successful start-up companies. This prize is given to a Computer Science major who is deemed to be the most entrepreneuriaL
Anthony John Waters

Science Staff and Faculty on Commencement Brunch Cruise

Faculty Honors and Awards

Ana Milanova was promoted to Associate Professor of Computer Science and granted tenure. Her research interests are in the areas of software engineering, compilers, and programming languages.

"Affinity Protein Capture by Immobilized DNA at Surfaces," has been recommended for funding by the Division of Chemistry of NSF to **Linda McGown**, William Weightman Walker Professor of Chemistry and Head, Department of Chemistry.

The NSF Chemical and Biological Separations (CBS) Program in the Chemical, Bioengineering, Environmental, and Transport Systems (CBET) Division is recommending **Linda McGown's** Collaborative Proposal "Collaborative Research: New medium for DNA separation of microbial communities" for a maximum funding at the level of $350,000 for two years.

Christain Wetzel, Wellfleet Constellation Professor, has been elected to serve as Vice-Chair/Program Chair of the Electronic Materials Conference Committee, starting at the June conference. He will serve two years in this position, then two years as Chair, then two years as Past Chair.

Douglas Swank, Assistant Professor of Biology, has been awarded a two-year ARRA-funded grant from the National Institutes of Health to promote summer research opportunities for science educators and undergraduate students. This is a supplement to Dr. Swank's NIAMS R01 grant "Myosin structural and kinetic mechanisms that differentiate fast and slow muscle fiber types". For the summer of 2009, RPI undergraduates Jeremie Carlson and Georgia Yalanis, and Troy City High School Biology Teacher Justin Haviland will be employed in the Swank laboratory. The Swank lab investigates how muscle has evolved to perform different functions using the model organism *Drosophila melanogaster* (fruit fly). The students and educator will learn standard molecular biology techniques for the generation of transgenic fruit flies expressing altered myosin, the molecular motor that powers muscle contraction. They will also perform locomotion assays to test the effects of these mutations on muscle function.

US Patent#7531802 awarded. May 12, 2009 to **Xi-Cheng Zhang, Jianming Dai, and Xie Xu** for "Method of analyzing a remotely-located object utilizing an optical technique to detect terahertz radiation."

Faculty News and Notes

Scientific American Magazine - May 18, 2009

Scientific American 10: Guiding Science for Humanity

Ten researchers, politicians, business executives and philanthropists who have recently demonstrated outstanding commitment to assuring that the benefits of new technologies and knowledge will accrue to humanity

By The Editors

"The ethical and policy ramifications of deploying science and technology in the service of society hold the same importance as the act of invention itself. Getting antiretroviral treatments to HIV/AIDS patients in sub-Saharan Africa. Ensuring that the world's largest chip manufacturer takes every possible step to reduce the company's environmental footprint. Lending the currency of one's celebrity (as well as cold, hard cash) to a global campaign to abolish smoking.

Leadership in these realms requires vision and imagination that transcends mere engineering ingenuity. This year's Scientific American 10 pays tribute to the exceptional foresight and accomplishment of a select group whose achievements, particularly during the past year, stand out from those of their peers. The 10 winners have demonstrated that establishing a public health program or running a green business requires more than administrative efficiency and good public relations. Bringing creativity to bear in overcoming institutional and bureaucratic impediments to

adoption of not just new technology but innovative procedural methods is crucial for improving health care and the environment.

One winner helped to build an incubator for newborns that could be fashioned from car parts so that it could be easily repaired in rural areas of developing countries. Another realized that an innovative infrastructure for recharging and swapping out large batteries might offer a way to route around the technological obstacles that have held up commercial electric cars. Pure technological inspiration is also honored in the form of a practical means of taking a few skin cells from, say, a person's arm and converting them to the equivalent of embryonic stem cells.

This combination of leadership and inventiveness exhibited among the Scientific American winners for 2009 serves as a template for how we might consider tackling the most seemingly intractable problems of resource depletion, inadequate health care and desperate educational need. —*The Editors*

Todd Brady – Corporate environmental manager Intel, Santa Clara, Calif. *A chip company makes expansion of its environmental footprint a priority*

Shai Agassi – Founder and chief executive Better Place, Palo Alto, Calif. *A wonderfully simple recharging scheme may ensure a future for electric vehicles*

Wafaa El-Sadr – Chief Infectious Disease Division, Harlem Hospital Center, New York City *The physician leads a multipronged public health campaign to fight the scourge of HIV*

Robert J. Linhardt – Professor of Biocatalysis and Metabolic Engineering Rensselaer Polytechnic Institute . *A chemical sleuth unravels the cause of deaths from a tainted drug*

When Americans began dying in January 2008 from the effects of contaminated heparin—a complex carbohydrate that has been a key component of medical blood thinners since the 1930s—the U.S. Food and Drug Administration asked Robert J. Linhardt, who is a chemist at the Rensselaer Polytechnic Institute, to help it identify the culprit. Linhardt not only succeeded, he also devised a solution that may one day prevent such scares from occurring again.

The problem was rooted in the burgeoning demand for blood thinners: the U.S. uses 300,000 doses of heparin a day to prevent blood clots during procedures such as heart-bypass surgeries and kidney dialysis. U.S. pharmaceutical companies mainly buy heparin that has been isolated from the intestines of pigs grown on American farms, but the nation uses more heparin than it can make, so drugmakers here also have to import it.

When heparin complications began surfacing in early 2008, the FDA fingered products imported from China's Changzhou SPL Company. At that point the FDA, along with an American firm that sold Changzhou's tainted product, asked Linhardt for help. Within weeks, Linhardt and his colleagues had painstakingly separated out the heparin's components and identified the source: oversulfated chondroitin sulfate (OSCS), a chemical based on a drug used to treat osteoarthritis. The OSCS may have been added to the heparin as a cheap filler, but it ultimately killed 81 Americans by causing inflammation and dangerous blood pressure drops.

Tracing the reason for the deaths wasn't good enough for Linhardt, though—he also wanted a solution. By August he and his colleagues had announced that they had synthesized a dose of pure heparin a million times larger than any lab-made dose before it. Their secret: using Escherichia coli bacteria as tiny chemical factories. And although the synthetic form is still a long way from hospital shelves, Linhardt's work represents a giant step toward a future in which heparin saves lives as it

should—and never again takes them. —*Melinda Wenner*

Eugenie Scott – Executive director National Center for Science Education, Oakland, Calif. *A champion for the teaching of evolution steps up her advocacy*

Bill Gates/Michael Bloomberg – Co-chair Bill and Melinda Gates Foundation Mayor of New York City *Celebrity heft propels a campaign to limit smoking*

Bryan Willson – Professor of mechanical engineering Colorado State University *An engineer facilitates clean energy technology for the developing world*

Kristian Olson – Program Leader Center for Integration of Medicine and Innovative Technology, Boston *Simple, low-cost resuscitators and incubators can save newborns in the developing world*

Andras Nagy – Senior investigator Mount Sinai Hospital, Toronto *A biologist discovers a practical method of making stem cells from mature cells*

Barack Obama – President of the U.S. *The new chief executive begins his term by initiating a radical shift in science policy*

A New Way of the Treating the Flu

Approach targets both the H and N portions of the virus

Promising new research announced by Rensselaer Polytechnic Institute could provide an entirely new tool to combat the flu. The discovery is a one-two punch against the illness that targets the illness on two fronts, going one critical step further than any currently available flu drug.
"We have been fortunate with H1N1 because it has been responding well to available drugs. But if the virus mutates substantially, the currently available drugs might be ineffective because they only target one portion of the virus," said **Robert Linhardt**, the Ann and John H. Broadbent Jr. '59 Senior Constellation Professor of Biocatalysis and Metabolic Engineering at Rensselaer. "By targeting both portions of the virus, the H and the N, we can interfere with both the initial attachment to the cell that is being infected and the release of the budding virus from the cell that has been affected."

The approach can also be modified to specifically target the neuraminidase or the hemagglutinin, or both, depending on the type of mutation that is present in the current version of the flu, according to Linhardt. The research was funded by the National Institutes of Health. Linhardt was joined in the research by Michel Weïwer, Chi-Chang Chen, and Melissa Kemp of Rensselaer.

Michael Shur appointed as a Technical Committee Member of the International Semiconductor Device Research Symposium-09.

Michael Shur co-chaired the Solid State Lighting Symposium at the Annual ECS meeting in San Francisco.

"Dehalococcoides sp. Strain CBDB1 Extensively Dechlorinates the Commercial Polychlorinated Biphenyl (PCB) Mixture Aroclor 1260." Adrian L, Dudková V, Demnerová K, Bedard D, L. Appl Environ Microbiol. 2009 May 8. [Epub ahead of print]

Donna Bedard, Research Professor of Biology has published a paper describing extensive dechlorination and detoxification of commercial PCB mixtures such as that found in the Housatonic River in western Massachusetts by a pure bacterial culture. This is the first such demonstration with a pure bacterial culture. The pattern of dechlorination matches the pattern of PCB dechlorination previously observed in situ in New Bedford Harbor and in some regions of the Upper Hudson River and, thus, suggests that *Dehalococcoides* bacteria are responsible for PCB dechlorination in the environment. This research proves for the first time that a single bacterial strain can simultaneously carry out extensive dechlorination of at least 43 different types of PCB molecules. This has important implications for understanding the fate of PCBs in the environment and for developing cost effective and environmentally friendly bioremediation methods for PCBs.

Faculty Retirements

As members of our faculty retire, we recognize them for their dedication and service to the Institute and to their profession. In appreciation of many years of contributions to students, colleagues, and staff, the Board of Trustees recognizes the following as Emeritus faculty:

Charles W. Gillies, Associate Professor Emeritus, Chemistry
Timothy M. Hayes, Professor Emeritus, Physics, Applied Physics and Astronomy
Leonard V Interrante, Professor Emeritus, Chemistry
Carl N. McDaniel, Professor Emeritus, Biology

Department Donation

Mrs. Terri Cosma Boor, local sculptress, has graciously donated a sculpture, Copernicus' Death Mask, to the Department. The sculpture will be housed in the Huntington Lab in the Science Center, room 1C28. Mrs. Boor resides in Loudonville and is an accomplished sculptress - her works range from human figures almost abstract in their simplicity to finely detailed, lifelike busts.

2009 Summer Lecture Series

Darrin Fresh Water Institute

A Research Center of Rensselaer Polytechnic Institute

Rensselaer's Darrin Fresh Water Institute, located on Route 9N in Bolton Landing, and the Historical Society of Bolton are pleased to co-host a series of distinguished presentations on the natural and cultural history of Lake George and the Adirondacks.

July 6 Deformed Amphibians: Harbingers of Doom or Chicken Little in the Mine Shaft? *Stanley Sessions,* Department of Biology, Hartwick College, Oneonta, NY

July 13 Lake George's FORWARD Shipwreck: Its History, Archaeology, and Educational Significance. *Joseph W. Zarzynski,* Underwater Archaeologist, Bateaux Below, Wilton, NY

July 20 Irving Langmuir – Lake George's Nobel Laureate
Roger Summerhayes, Chemistry Teacher & Film Maker, U. S. Virgin Islands and Crown Island, Bolton Landing, NY

July 27 The History, the Present and the Future of Electric Boats
Charles Houghton, The Rensselaerville Institute, Rensselaerville, NY

August 3 The Forest Floor: Ferns and Fern Allies of the Lake George Basin
Thomas Lord, Department of Biology, Indiana University of Pennsylvania, Indiana, PA

August 10 Turning Points in Adirondack History: Events that Shaped the Adirondacks We Know Today
Andy Flynn, Regional Historian & Author, Saranac Lake, NY

August 17 Invasive Plants in the Lake George Region: What's All the Fuss About?
Leslie Mehrhoff, Invasive Plant Atlas of New England (IPANE) *&*
University of Connecticut, Storrs, CT

August 24 Adirondack Stories, Historical Sketches
Marty Podskoch, Regional Historian & Author, Colchester, CT

Programs are on Monday evenings beginning at 7:30 PM. The public is cordially invited free of charge. Funding for this series is provided by generous gifts from The Knapp Fund and numerous individuals. For more information visit our website www.rpi.edu/dept/DFWI or phone 518-644-3541.

This newsletter is prepared monthly during the academic year and distributed to School of Science faculty, staff, students and alumni to highlight accomplishments and events within the school. Please submit news items for the next newsletter to Samuel Wait, Associate Dean of Science, at waitsc@rpi.edu.