

SYNERGY

BECKMAN INSTITUTE FOR ADVANCED SCIENCE AND TECHNOLOGY

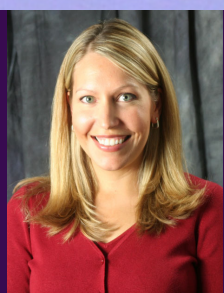
ISSUE 16 • FALL 2010

BIOSENSORS

Innovative new technologies for medicine, industry, and home *page 2*



Many Beckman Institute researchers find their children also choose careers in science.
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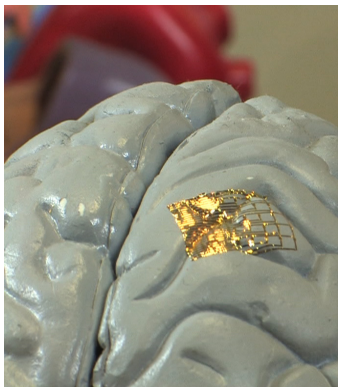
Amy Alexander is continuing the kind of aviation-related research she did at Beckman in her professional career.
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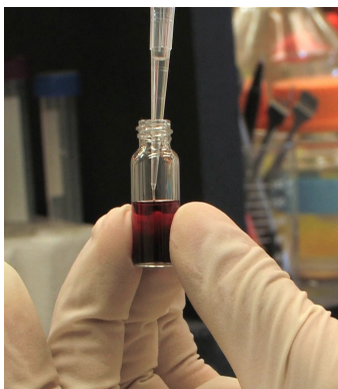
Harley Johnson of Beckman's Computational Multiscale Nanosystems group is this issue's Faculty Profile.
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BIOSENSORS!

Beckman Researchers Create Innovative New Technologies for Medicine, Industry, and Home



The development of biological sensors, or biosensors, is a rapidly growing field and Beckman Institute researchers are in the forefront of these developments. Scientists in areas as diverse as chemistry, mechanical engineering, and electrical engineering are working to create biosensors that have medical, research, and industrial applications. These researchers employ technologies as cutting edge as stretchable electronics and as simple as dipstick tests, using materials as exotic as silk and as 21st Century as gold nanoparticles. They are creating biosensors that could one day be used to monitor the heart of a patient with arrhythmia, detect toxins such as lead in the home or laboratory, or be used in futuristic brain-machine interfaces. There are several research lines at Beckman developing intriguing new biosensing technologies, often using completely different approaches. One researcher, John Rogers, is applying his groundbreaking work with flexible and stretchable electronics to the world of biomedicine while another, Yi Lu, is harnessing the power of DNA biomolecules for detection of toxins.



*Top image shows a model of a human brain with one of the biosensors from John Rogers's research group.
Bottom image shows a vial containing the mixture of gold nanoparticles and DNA used in Yi Lu's biosensor.*

JOHN ROGERS

3-D Micro- and Nanosystems Group

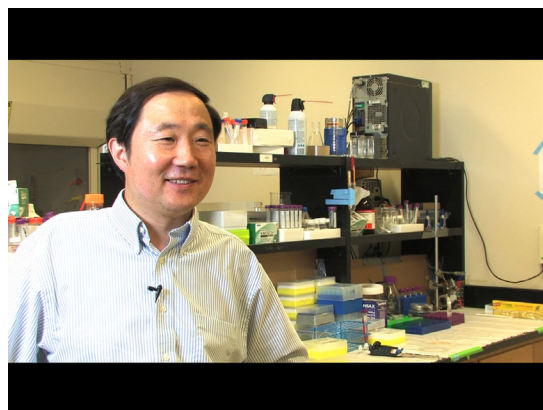
When *Science* magazine recently did a profile on the Beckman Institute's John Rogers, they described him as a scientist who could "change the way we light our homes, treat diseases, and power the planet." Rogers has been a pioneer in creating novel semiconductor and electronics applications, including developing optical and electronic technologies for potential biomedical uses. Recently Rogers was part of collaborations that used a special "silicon-on-silk" electronic technology developed by his lab to create biologically compatible sensors for possible use as a heart monitor in one project and as a brain monitor in another. He also has developed flexible LEDs that could be used as wearable health monitors.



YI LU

3-D Micro- and Nanosystems Group

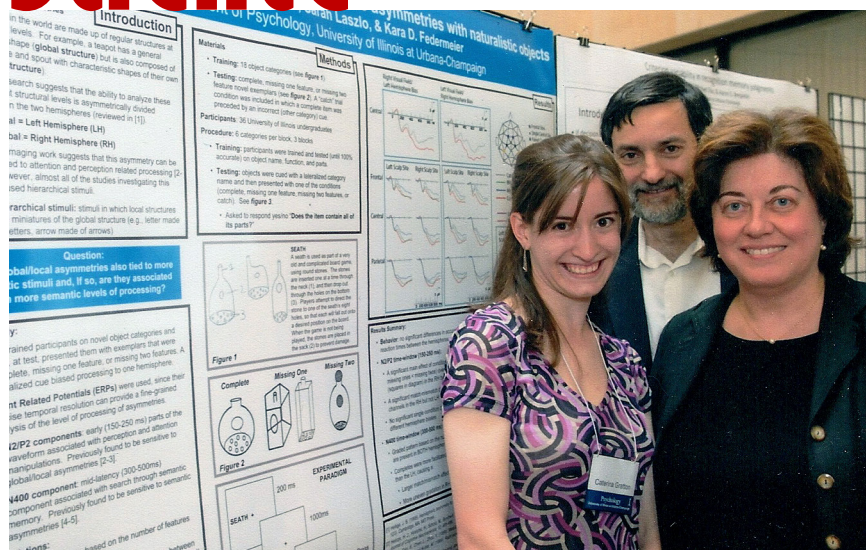
Yi Lu is a leader in employing chemical approaches to gain an understanding of biological structures and functions and in applying that knowledge, using biomolecules like DNA enzymes coupled to nanomaterials like gold nanoparticles, to develop real-world medical, industrial, and home use technologies. One intriguing aspect of Lu's work combines biology, chemistry, and engineering toward the creation of functional devices like biosensors. Lu has developed practical applications such as simple fluorescent sensors and colorimetric dipstick sensors for detection of toxic metals like lead in paint or for drug testing.



Children of Science

Beckman Researchers See Offspring Follow in their Footsteps

Beckman researchers Monica Fabiani (right) and Gabriele Gratton (center) are shown with their daughter Caterina Gratton during one of her poster presentations.



“I’m happy my daughters are going into the sciences but if they made another choice I would be happy just as well.” – Gabriele Gratton

Like many parents, scientists at the University of Illinois often see their children follow them into their chosen profession. William Bardeen, son of two-time Nobel Prize for Physics winner and Illinois faculty member John Bardeen, went on to become a renowned physicist at Fermilab.

So it is with many Beckman Institute researchers. Some of their children follow in the same discipline as their parents while others choose another field of study in science. Others make completely different choices in college while some take circuitous routes to a career once they leave the nest.

Beckman Institute researchers Tom Huang and Michael Insana each have four children, but while all four of Huang’s children began their college careers in their father’s field of electrical engineering, it wasn’t until his last child entered college four years ago that Insana saw one of his children follow in his footsteps.

Insana’s first three children chose diverse career paths – one is a recording engineer, another a teacher, and a third a computer programmer – but it wasn’t until his

youngest, Greg, enrolled at Illinois that another engineer in the family looked like a possibility.

“Kids are all over the place,” Insana said. “They have the same genes and the same environment and yet they go off in dramatically different directions. How does that happen? I have no clue. I provided very little guidance in terms of where they wanted to go, just sort of encouragement for whatever it was they wanted to do.”

Still, he was happy that Greg chose a similar career path. Greg is a senior in Electrical Engineering and is set to graduate this coming May.

“He decided he didn’t like the biology side of things and I think you get those experiences in high school and taking classes,” Insana said. “But he always liked math and physics so I talked to him a little bit about electrical engineering, which seemed to be good for him.”

Insana said the Engineering and Beckman Institute open houses also played a role in his son’s choice of college majors.

“He came to two open houses while he was in high school and he got to go

around and sense what everybody was doing,” Insana said. “And that was pretty influential.”

Insana, who is head of the Bioengineering department at Illinois and leader of the Bioimaging Science and Technology group at Beckman, said the Engineering program at Illinois is one of the best in the country and one of the most difficult. But it was a challenge his son rose to meet.

“It’s a tough school and the level of expectation goes way up,” Insana said. “So it was really enjoyable to see him come down, then pull up to where he is right now, feeling very good and confident. Things are going well. This place was really, really good for him, given his interests.”

While his oldest son is working in Nashville as a recording engineer, Insana’s other three children are nearby. In addition to Greg, his oldest daughter is a computer programmer in the Physics department at Illinois while his youngest daughter came here to earn a Ph.D. in Education after working as a teacher in San Diego.

“So I have three of my kids close by now,

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which is terrific,” Insana said.

Huang is the William L. Everitt Distinguished Professor in the Department of Electrical and Computer Engineering at Illinois and Co-chair of the Human-Computer Intelligent Interaction research theme at Beckman. While all four of his children began college in electrical engineering, Huang said only one is still in the field.

“I did not at all encourage them to study EE when they entered college, at least not explicitly,” Huang said.

Huang said that growing up, his children were interested in many different areas, so he’s not sure why they all originally chose electrical engineering to start college.

“For example, Thomas was good at math and sciences, but also an award-winning debater,” Huang said. “So making a choice is both easy and difficult, depending on one’s point of view. Then, perhaps they saw me really enjoying my work. I may have told them – I do not remember for sure – that no matter what you are going to do in life in the future, studying EE is always a good starting point.”

Huang said his daughter Caroline and son Gregory earned Ph.D.s at MIT in electrical engineering and computer science but Caroline is the only one who is still working in that area.

Gregory works with a web-based technology and business reporting company while Thomas is an editor with the *Dallas Morning News* and daughter Marjorie is a housewife after earning a degree in labor relations.

“My wife and I are very happy and proud that our children are doing what they are passionate about, and doing well,” Huang said.

Researchers Gabriele Gratton and Monica Fabiani from Beckman’s Cognitive Neuroscience group are married and the parents of two daughters: Cristina, a senior at University High School who has an interest in biology, and Caterina, who is earning a

Ph.D. at Cal-Berkeley in her parent’s field of neuroscience.

“I’m happy my daughters are going into the sciences but if they made another choice I would be happy just as well,” Gratton said. “I just think it’s nice to be able to talk to your children about many different things, including your work, your shared interests. Just as I like that they share my interest in soccer, I like that they share my interest in science.”

Fabiani was not expecting her oldest daughter to go into the field of neuroscience.

“We were very surprised because she kept telling us ‘anything but the brain’ growing up,” she said. “So that was a surprise.”

Sometimes researchers end up working with their children on projects. Benjamin Suslick, the son of Ken Suslick of the Bioimaging Science and Technology group, was lead author on a paper with his father for *Analytical Chemistry* that was written while Benjamin was still in high school. The paper described the development of a coffee

analyzer that was able to distinguish between different varieties of coffee based on their aroma.

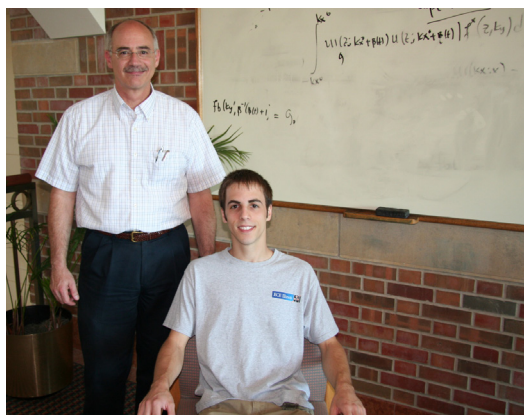
The project took “electronic nose” technology developed in his father’s lab and applied it to coffee, but it was Benjamin who led the effort. After years of Benjamin working in his father’s lab, doing

mostly data analysis, Ken Suslick decided to let his son tackle a project.

“During his junior year Benjamin discovered coffee,” Suslick said with a laugh. “We could have had him work on toxic industrial chemicals but ... ummm, high school student ... toxic chemicals, maybe not a great idea, even if he is the boss’s son.”

The project earned Benjamin a semifinalist award in the Intel Science Talent Search, a high-level science research competition for high school seniors.

“I’m exceedingly proud of Ben,” Suslick said.



Beckman researcher Michael Insana (left) is shown with his son Greg, a senior in electrical engineering at Illinois.



*Ken Suslick and his son, Benjamin, co-authored a paper in *Analytical Chemistry* that described the development of a coffee analyzer that is able to distinguish between different varieties of coffee based on their aroma. Benjamin was in high school at the time the paper was published.*

During her undergraduate days at Illinois, Caterina Gratton worked with researcher Kara Federmeier, also of the Cognitive Neuroscience group. Fabiani said it was good for a budding scientist like her daughter to begin her research career with someone other than her parents.

“She needs her independence from us,” Fabiani said.

But a collaboration could still happen once Caterina earns her Ph.D.

“It would be fun if it happened but there are no plans for it right now,” Fabiani said. “That would be fun though. We could look forward to a paper with Gratton, Gratton as authors. Our youngest daughter is interested in biology so maybe we would have two eventually.”

ALUMNI PROFILE

Amy Alexander



Amy Alexander grew up in a city steeped in aviation history, Dayton, Ohio, and earned an Engineering Psychology Ph.D. at Illinois that had a focus on aviation human factors. Alexander also took advantage of the Beckman Institute's Flight Simulator during her time at Illinois, but it wasn't until after leaving college that she could realize a longtime desire, going from a virtual cockpit to the controls of a real airplane.

Alexander did her research by using the flight simulator of Beckman's Illinois Simulator Laboratory (ISL), interviewing pilots and air traffic controllers, and generally becoming immersed in the world of aviation. With her background it was only natural that Alexander would want to learn to fly, but time and financial constraints delayed the opportunity until after her doctoral work was finished.

When she did finally begin training for her pilot's license last summer, Alexander came to the task with much more knowledge than the usual student learning to fly. And that fact wasn't necessarily a good thing.

"I guess I had been doing the research for about nine years prior to getting my own pilot's license," Alexander said. "It's interesting, because you learn a lot through aviation human factors research about the things that can go wrong in flight.

"So it was exciting and intimidating to know too much," she added with a laugh.

That knowledge turned out to be a good thing, however.

"That was certainly something I talked about with my instructor," Alexander said. "From his perspective, he was like 'well that will probably make you a better pilot; you won't take certain risks and you will be a little more cautious.'"

Alexander earned her pilot's license in November while working in her current position as a human factors scientist for Aptima, a firm that specializes in the design of user-centered technology and training systems and organizations. She is Team Lead of the Human Systems Design Team in Aptima's Cognitive Systems Engineering Division in Woburn, Mass. It's a position that allows her to continue much of the work she did at Beckman and Illinois.

"The research I conducted at Beckman was fundamental in preparing me for my job at Aptima in a variety of ways," Alexander said.

As examples, Alexander mentioned the experiences she gained presenting her work in publications and at conferences and working in ISL's flight simulator.

"Working in the flight simulation facility afforded me the opportunity to develop practical skills that I've continued to improve at Aptima," she said. "And, finally, my passion for aviation grew steadily throughout my time at Beckman, and I think this passion underlies a great deal of my success here at Aptima."

Alexander says former Beckman researcher Chris Wickens also had a lot to do with her successful transition from academic research to the corporate world.

"Chris always emphasized the importance of bridging the gap between theory and application – this is something I do in all of my work at Aptima," she said. "Chris has made tremendous contributions to the field of human factors and it was such an honor for me to be accepted into the program and to work with him directly.

"I also have to credit my dad – he attended Illinois as an undergraduate and he brought me there for a visit as I was getting ready to apply to graduate school."

Alexander's work at Aptima focuses on human performance and cognitive assessment, advanced flight deck display design and evaluation, and human factors in complex systems. Much of

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it is directly related to what she did at Beckman, which included examining the effects of display design on pilot performance while working with advanced flight deck displays.

“Aptima is such a wonderful place to work,” Alexander said. “What I enjoy most is certainly the fellowship that exists among the staff, as well as the many opportunities to learn, participate, and lead. I have tremendous respect for my co-workers and the leaders of this company. The environment and culture that have been cultivated here are both challenging and motivating – a combination that I simply thrive in and am proud to be a part of.”

At the heart of all of Alexander’s current and past interests and successes is a love of aviation.

“I developed a fascination for aviation pretty early in life – growing up near the Air Force Museum and going to the Dayton

Air Show,” Alexander said. “It wasn’t until my junior year at Ohio State, though, that I realized I could apply my interests in psychology and human behavior to the aviation domain.”

An internship at the Air Force Research Laboratory at Wright-Patterson Air Force Base during her senior year sealed the deal.

“We focused on examining situation awareness and mental workload in conventional and virtually-augmented cockpits, and I was hooked!” she said.

Alexander has this advice to current students who would like to follow in her footsteps.

“Be open to exploration – sometimes you find your career path and what you’re most passionate about in very opportunistic ways,” she said.

“Look at each course you take and professor you encounter as an opportunity to introduce you to a new skill or domain, and don’t be afraid to pursue those paths that seem interesting to you.”

“... my passion for aviation grew steadily throughout my time at Beckman, and I think this passion underlies a great deal of my success here at Aptima.”

– Amy Alexander

Children Learn about Science from TCB Group

Angela Weiss, a researcher with the Beckman Institute’s Theoretical and Computational Biophysics (TCB) group, found out that her child’s summer camp group was about to spend a week learning about science without the benefit of talking to actual scientists.

Since the children had learned about other professions from the professionals themselves during the camp, Weiss thought it only made sense for them to get insight on science from scientists – and she was in a position to do something about it. TCB is a world leader in creating molecular scale dynamic computer simulations of biological processes, which means the group produces the kind of standard and three-dimensional images and videos that can impress even an eight-year-old.

So Weiss arranged to have three groups of 75 total students in the 5- to 10-year-old range visit TCB’s space on Beckman’s third floor in August and listen to the group’s scientists describe amazing biological processes

using even more amazing images and videos. The 3-D images required the children to don special viewing glasses and had many of them leaning forward in their chairs for up close views of biological processes such as protein folding.

“I heard a lot of oohs and ahs, particularly when they saw our 3-D images and videos,” Weiss said. “Our group in particular is good for little kids because it’s safer than a wet lab. We could show them how science works in a safe environment. And we can visualize it for them, impress them. We have images and videos that make it easier to explain to little kids. Here pictures can tell the whole story.”

Ross Bodnar is a Ph.D. student with the TCB group who enjoyed communicating science to the children, who were part of a summer learning camp at Next Generation School in Champaign.

“We love science and we like to share it with others,” Bodnar said. “Talking to kids about science means to show them that their everyday life is ‘scientific’ as they are trying to figure out how the world works, and that this can be a lifelong endeavor whether you actually work in science or not.”

Another researcher who spoke to the

group, Melih Sener, echoed those sentiments.

“Science, like art, can affect the lives of ordinary people – even those who are not professionally trained in it,” Sener said. “Science does this not only through indirect benefits via technology but also through the impact it has on the way we perceive the universe and our place in it.”

Bodnar also thinks that outreach efforts such as this will show people that scientists have the same kind of passion for their work that people in other professions do.



Children wear 3-D glasses and listen to Melih Sener talk about a computer simulation.

“I believe that activities such as the one with Next Generation Summer Camp allow us to reach young people and their teachers at a time when our efforts have the most impact,” Bodnar said. “They allow us to challenge negative stereotypes

about who can become a scientist and what scientists do. They allow us to share the excitement of science with those who have not yet discovered it for themselves.

“They allow us to build fruitful partnerships with those who teach and mentor our children every day. And, for me personally, these activities serve as a reminder of why all of the training and hard work needed to succeed in science is worthwhile.”

Nadine Barrie Smith Memorial Fund Established

Dr. Andrew Webb, former Director of the Beckman Institute's Biomedical Imaging Center and professor in the Department of Electrical and Computer Engineering at Illinois, together with his former colleagues at the University of Illinois, have established a fund to honor Andrew's wife, Dr. Nadine Barrie Smith, in recognition of her accomplishments in science, engineering, and education.

Nadine Barrie Smith, a University of Illinois alumna and postdoctoral researcher at the Beckman Institute (1987-1995), died very suddenly at the age of 48. She was a professor in Bioengineering and Acoustics at Penn State University. Throughout her career she was a renowned leader in medical imaging and therapeutic ultrasound. In addition to her research, Nadine was a major contributor to women in engineering initiatives, and a national figure in establishing undergraduate research programs, as well as actively mentoring numerous graduate students in her field.

The Nadine Barrie Smith Memorial Fund will initially support the installation of a memorial bench in the Beckman Institute Garden. Future funds will be used to support and promote the role of women in engineering through education and research, and to support graduate and postdoctoral research in biomedical imaging at the Beckman Institute for Advanced Science and Technology.

Dr. Webb is currently a professor of Radiology at the Leiden University Medical Center and Penn State University. In 1991 he came to the University of Illinois as a postdoctoral researcher in Electrical and Computer Engineering. From 1992 to 2003 he moved up the ranks from assistant to associate to full professor in Electrical and Computer Engineering. In 1992 Andrew also joined the Beckman Institute and was an instrumental contributor and leader of the growing Biomedical Imaging Center. In 2005 Andrew left Illinois for Penn State University to join Nadine.

Haferkamp Memorial Scholarship to Honor Student

Students like Erik Haferkamp are the engines who make science possible at academic research facilities like the Beckman Institute. So it was fitting that the Erik Haferkamp Memorial Scholarship was created in 2010 by his parents, David and Bonnie Haferkamp, and other family members and friends to both honor Erik's memory and benefit student researchers in the future.

Erik was a graduating senior at the University of Illinois with a double major in molecular and cellular biology and psychology who passed away in March of 2010 at the age of 22. He served in the lab of Beckman researcher Justin Rhodes for three years, going from student researcher to lab technician.

"He proved to be an outstanding student and dedicated a large amount of his time in the lab from 2007 up until his death in 2010," Rhodes said. "Erik quickly became competent

at many of the technical procedures in the lab. He also made substantial contributions collecting data for a paper currently in the late stages of the review process examining the effects of exercise on the growth of new nerve cells in the brain.

"For his technical and intellectual contributions, Erik is a co-author on a paper recently accepted in *Behavioral Brain Research* on exercise-induced neurogenesis. Thus, Erik was a key member of the Rhodes lab and is terribly missed."

Erik was a native of Palatine, Illinois, graduating from Fremd High School in 2005. He was an artist, writer, and environmentalist.

The Erik Haferkamp Memorial Scholarship will support two undergraduate research assistants in the summer of 2011 in the area of neuroscience, with future plans to support one full-time student per summer.



How to Support the Funds

Donations to the Nadine Barrie Smith Memorial Fund or the Haferkamp Memorial Fund can be made by visiting the Beckman Institute's Giving page:

<http://www.beckman.illinois.edu/giving/gifts.aspx>

When completing the secure giving form, please check "yes" in the "special instructions" field and enter: Nadine Barrie Smith Memorial Fund or Haferkamp Memorial Fund.

Gifts by check or money order should be made payable to the University of Illinois Foundation. Please also include a short note (or memo on your check) stating the purpose of your gift as: Nadine Barrie Smith Memorial Fund or Haferkamp Memorial Fund and mail to: University of Illinois Foundation, 1305 West Green Street, Urbana, IL 61801. If you would like to make a gift by phone, please call 217.333.0810.

If you have any questions please contact Tim Montague, Director of Development, at 217.244.2887 or via email at tgmontag@illinois.edu.

FACULTY PROFILE



That was something I became fascinated with in graduate school, bridging that gap between this very traditional science and high tech, cutting edge, next generation technology.

Harley Johnson

Harley Johnson's research at the Beckman Institute and the University of Illinois has its foundations in one of the oldest sciences, mechanics, but the applications he is working toward are truly 21st Century.

"I try to better understand how materials work in high-tech, next generation applications," Johnson said. "Some of the things I'm interested in right now are microelectronics, lasers, and most recently photovoltaics, solar cells."

Johnson is a member of Beckman's Computational Multiscale Nanosystems group who has research interests in the areas of the mechanics of quantum dots, and the micro- and nanomechanics of electronic materials, nanostructures, and photonics materials.

"My degrees are in mechanics, which are in some ways a very traditional field," Johnson said. "In graduate school I was exposed to how we apply solid mechanics to new technologies, things like microelectronics. I found that really stimulating, to take the principles that we learn when we study, for example, bridge design, which has been around for hundreds of years, and apply that to developing new materials for microelectronics or lasers."

"That was something I became fascinated with in graduate school, bridging that gap between this very traditional science and high tech, cutting edge, next generation technology."

Johnson received his Ph.D. in Engineering from Brown University in 1999 and taught at Boston University prior to coming to Illinois. He is a Cannon Faculty Scholar and an Associate Professor in the Mechanical Science and Engineering Department at the University of Illinois. His research interests include futuristic concepts and potential applications such as optical cloaking and solar cells with as much as 10 times the efficiency as current photovoltaic cells.

"We're working on quantum dots that could potentially make solar cells much more efficient," Johnson said. "We use a particular semiconductor alloy that absorbs part of the sun's energy that otherwise wouldn't be absorbed by the conventional solar cell in which only a very small fraction of the light that comes into the cell is converted to electricity, maybe five to 10 percent. By tinkering with the composition of the material using these particles it is possible, in principle, to get that efficiency number up to 30, 40, or 50 percent."

Johnson is also involved in a new project funded by a Beckman seed grant to make materials for higher energy density batteries. This new project and the one involving solar cells are energy-related research lines he believes could have an important impact in the future.

"The main thing is it's exciting to work on something that we think could make a big difference in getting away from fossil fuels,"

Johnson said.

This past year has been a banner one for Johnson, both professionally and personally.

Johnson had won a prestigious NSF Faculty Early Development (CAREER) Award in 2001 and this year he was named as the 2010 winner of the Thomas J.R. Hughes Young Investigator Award from the Applied Mechanics Division of the American Society of Mechanical Engineers. The award is for special achievement for young investigators in Applied Mechanics and is given to just one winner each year.

"The NSF Career Award was a great thing because I was fortunate to get it very early on in my career and that set me up to build on," Johnson said. "The Thomas J. Hughes Young Investigator Award is from ASME, my professional society, and is recognition for achievement in mechanics and is based on the things I am working on now."

Earlier in 2010, Johnson became a naturalized American citizen during a swearing-in ceremony at Lincoln Square Mall in Urbana. He is from western Canada originally but had been living in the United States since elementary school and always planned on becoming a citizen of this country.

"It's something I always figured I would do having been educated here, built my career here and now I've young kids, so I have roots here," he said. "It was very meaningful. My
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Imaging in Atmospheric and Earth Sciences

Biological Imaging

Biomedical Imaging

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Johnson Profile

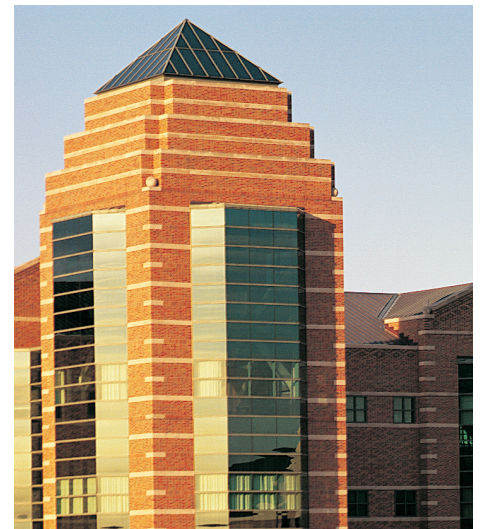
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wife and kids are American and, even though I've always felt part of this community since I moved here 10 years ago, it made me feel more connected."

Johnson has been at Beckman for three years and feels very connected to the Institute as well.

"To me the clear number one thing about being at Beckman is the automatic interaction you get with other people here," he said. "On this hallway there are people in materials science, aerospace engineering, and mechanical engineering. You get people who are like-minded but with different disciplinary backgrounds here.

"I think having a central, focused institutional mission toward several critical research areas drives things forward much more rapidly than you would get in a conventional departmental setting."



SYNERGY is a publication of the Communications office of the Beckman Institute for Advanced Science and Technology at the University of Illinois at Urbana-Champaign. Each issue spotlights the people and science that make the Institute one of the premier facilities for interdisciplinary research in the world.

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Imaging Conference Set, Oct. 14-15

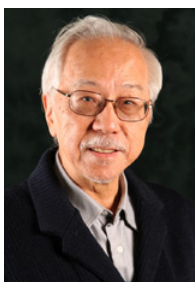
The Strategic Initiative on Imaging at the University of Illinois will hold its second annual conference Oct. 14-15 at the Beckman Institute and the National Center for Supercomputing Applications. The theme of the conference is "Exploring the Science, Technology, and Applications of Imaging and Visualization."

The conference will feature speakers from universities, research centers, and planetariums, giving presentations on topics ranging from imaging in the arts and society, to astronomical imaging, to biomedical imaging. Stephen Boppert, Co-chair of Beckman's Integrative Imaging research theme, will give the opening remarks.

The conference is open to students, faculty, and staff members. Deadline to register for the conference is Oct. 10, 2010. For more information, go to the conference website www.imaging.beckman.illinois.edu/imaging2010 or e-mail Darold Spillman at dspillm2@illinois.edu or Marina Marjanovic at marinam@illinois.edu.



HONORS & AWARDS



Huang

HUANG RECEIVES MOST CITED PAPER OF THE DECADE AWARD

Beckman Institute researcher Tom Huang and his co-authors recently received the “Most Cited Paper of the Decade Award” from the Journal of Visual Communication and Image Representation. The paper, *Image Retrieval: Current Techniques, Promising Directions, and Open Issues*, was authored by Huang, his student at the time, Yong Rui, and collaborator Shih-Fu Chang of Columbia University. It has been cited 564 times

in the journal and more than 1,000 times in Google Scholar since first appearing in 1999.

In announcing the award, the journal’s publishers write that the Most Cited Paper of the Decade Award “offers an alternative to committee-selected ‘best papers’. The only objective and transparent metric that is highly correlated with the quality of a paper is the number of citations.”

Huang, who is Co-chair of Beckman’s Human-Computer Intelligent Interaction research theme, has published more than 21 books and 600 papers in his research areas of image processing and computer vision.



Pop

POP CHOSEN FOR ONR AWARD

Eric Pop of the Beckman Institute’s Nanoelectronics and Nanomaterials group has won an Office of Naval Research Young Investigator Award. Pop was one of 17 winners chosen from 211 applicants nationwide.

Pop will receive a three-year, \$510,000 research grant to put towards his project, “Reprogrammable Carbon Electronics.” The research will be aimed at developing reprogrammable, low-power memory and circuits that have a range of Naval and civilian applications.

POP WINS EARLY CAREER AWARD

Beckman Institute faculty member Eric Pop has won a prestigious National Science Foundation Faculty Early Career Development (CAREER) Award. Pop, a member of Beckman’s Nanoelectronics and Nanomaterials group, received the award for his research involving energy dissipation toward creating energy-efficient materials for use in electronics and other applications.

GRUEBELE ELECTED TO AAAS

Martin Gruebele, a member of the Beckman Institute’s Nanoelectronics and Nanomaterials group, was elected to the American Acad-



Gruebele

emy of Arts and Sciences.

Gruebele was among 229 new members named to the American Academy of Arts and Sciences. The academy, founded in 1780, is one of the longest-standing honorary societies in the nation. Members join the ranks of Albert Einstein, Ralph Waldo Emerson, Benjamin Franklin, George Washington and many others.

Gruebele is the James R. Eiszner Endowed Chair in Chemistry and professor of physics. His research involving chemical and biological physics with laser manipulation techniques and computational modeling has advanced our understanding of protein folding, chemical bonds and molecular energy flow.



Braun

BRAUN WINS HUMBOLDT AWARD

Beckman Institute researcher Paul Braun has won the Friedrich Wilhelm Bessel Research Award from the Humboldt Foundation. The Humboldt Foundation gives the Bessel Research Award to scientists and scholars who are internationally renowned in their field, completed their doctorates less than 18 years ago, and who in the future are expected to continue producing cutting-edge achievements which will have a seminal influence on their discipline beyond their immediate field of work.

As part of the award, Braun will collaborate with colleagues at the Max Planck Institute for Solid State Research at the University of Stuttgart.

Braun, leader of Beckman’s 3-D Micro- and Nanosystems group and Associate Professor of Materials Science and Engineering at Illinois, has a research focus on the formation and study of nano- and microstructures.



Ha

HA NAMED UNIVERSITY SCHOLAR

Beckman Institute faculty member Taekjip Ha has been recognized as a University Scholar. Ha is a Professor of Physics at the University of Illinois.

The program recognizes excellence while helping to identify and retain the university’s most talented teachers, scholars and researchers.

A Howard Hughes Medical Institute investigator, Ha applies the tools of physics to important problems in biology and medicine.

RECENT BECKMAN INSTITUTE RESEARCH IN THE NEWS



WALKING BOOSTS BRAIN ACTIVITY, FUNCTION FOR COUCH POTATOES

August 26 – Beckman Institute Director Art Kramer, Ed McAuley of Beckman's Human Perception and Performance group, and doctoral student Michelle Voss are co-authors of a study showing that moderate exercise can enhance the connectivity of important brain circuits, combat declines in brain function associated with aging, and increase performance on cognitive tasks in older adults who had been living a sedentary lifestyle.

U of I News Bureau

HA RESEARCH GIVES INSIGHT INTO IMPORTANT DNA ENZYME

August 20 – Beckman Institute researcher Taekjip Ha used fluorescence resonance energy transfer to study how an important DNA enzyme regulates damaged sections of DNA.

U of I News Bureau

KRAMER TALKS DIGITAL DEVICES AND NEUROSCIENCE ON CNN

August 17 – Beckman Institute Director Art Kramer appeared on CNN's Anderson Cooper 360 with guest host Sanjay Gupta and fellow neuroscience researcher David Strayer of the University of Utah to talk about the effects digital devices may be having on human cognition and behavior.

CNN

WANG ON PIONEERING LEUKEMIA DRUG STUDY

July 29 – Yingxiao Wang of the Bioimaging Science and Technology group wrote an accompanying editorial in *Clinical Cancer Research* commenting on a new study involving the leukemia drug imatinib.

Science Centric

SIMONS WRITES ABOUT POLITICIANS AND “MISREMEMBERING”

July 28 – Dan Simons of the Human Perception and Performance group and his collaborator and co-author Chris Chabris provide a cognitive psychology perspective on recent incidents of politicians who seemed to have embellished their records in an opinion piece for the *Chicago Tribune*.

Chicago Tribune

WHY FINANCIAL REFORM WILL FAIL

July 16 -- Beckman researcher Dan Simons and Christopher Chabris, co-authors of the book, *The Invisible Gorilla*, write about proposed financial reform and how the reform package's likely passage will do nothing to

improve our poor understanding of the complicated financial system that caused the meltdown.

The Daily Beast

SMALL WIRES MAKE BIG CONNECTIONS FOR MICROELECTRONICS

July 15 – Researcher Min-Feng Yu, a member of the Beckman Institute's Nanoelectronics and Nanomaterials group and professor of mechanical science and engineering, and his graduate student have developed a novel approach for manufacturing metal interconnects that could shrink integrated circuits and expand microelectronics.

U of I News Bureau

SCIENCE PROFILES JOHN ROGERS AND HIS RESEARCH

July 13 – *Science* magazine profiled John Rogers of the Beckman Institute's 3-D Micro- and Nanosystems group, including his trailblazing research path that is saying farewell to the traditional flat world of rigid silicon-based electronics.

Science

EXPECTING THE UNEXPECTED DOESN'T HELP

July 12 – Dan Simons, a full-time member of the Human Perception and Performance group, modified his famous Gorillas in our Midst experiment to show that even when test subjects were prepared for the possibility of seeing unexpected events in a video, such as a person in a gorilla suit, that preparation did not enhance their ability to notice other unexpected events.

U of I News Bureau

MA GIVES VIEWS ON FACE RECOGNITION TECHNOLOGY

July 9 – Beckman Institute researcher Yi Ma of the Image Formation and Processing group talked to CNN about using current face recognition technology for security purposes.

CNN International

POP GOES THE PLASMA

June 28 – Beckman Institute researcher Ken Suslick led a project that has been able to quantify the temperature and pressure properties of a phenomenon called sonoluminescence.

U of I News Bureau

NEW METHOD DEVELOPED FOR MAKING SOLAR ENERGY SEMICONDUCTORS

June 28 – Beckman Institute researchers John Rogers and Xiuling Li have developed a novel

manufacturing method that uses gallium arsenide instead of silicon to create semiconductor chips that could greatly improve the efficiency of solar energy devices. They report their work in the journal *Nature*.

U of I News Bureau

SIMONS BOOK EXPLORES PEOPLE'S EVERYDAY ILLUSIONS

May 18 – Beckman Institute researcher Daniel Simons and his frequent collaborator Christopher Chabris have written a new book, *The Invisible Gorilla*, arguing that our cognitive abilities aren't nearly as reliable as we think they are. Simons and Chabris use scientific research, including their famous Ig Nobel-prize winning Gorillas in our Midst study, and anecdotal evidence in a psychological science book that takes on everyday illusions involving such things as confidence and memory, as well as some controversial topics in popular culture.

U of I News Bureau

HOW EXERCISE MIGHT HELP KEEP ALZHEIMER'S AT BAY

April 29 – Beckman Institute Director Art Kramer said an increasing number of studies have found physical exercise is good for the brain and may help prevent Alzheimers disease.

NPR Morning Edition

POPESCU LEADS RESEARCH REVEALING MECHANICS OF RED BLOOD CELLS

April 28 – Beckman Institute researcher Gabriel Popescu led a team that developed a novel measurement technique which provides new insight into the mechanics of red blood cell membranes. Popescu, a member of the Bioimaging Science and Technology group, and his collaborators published their findings in the *Proceedings of the National Academy of Sciences*.

U of I News Bureau

NEW DRUG TARGET FOUND FOR ALZHEIMERS DISEASE

April 21 – Researchers Kevin Xiang, a professor of molecular and integrative physiology, and Charles Cox, a professor of pharmacology in the College of Medicine and Beckman Institute faculty member, have identified a potential drug target for Alzheimer's disease – a receptor embedded in the membrane of neurons and other cells.

UPI

RECENT BECKMAN INSTITUTE RESEARCH IN THE NEWS



STUDY: BRAIN GAMES DON'T MAKE YOU SMARTER

April 21 – Beckman Institute Director Art Kramer comments on wordplay computer games: “There is precious little evidence to suggest the skills used in these games transfer to the real world.”

AP

SILK BRAIN IMPLANT COULD AID SPINAL INJURIES, EPILEPSY

April 19 – Beckman Institute researcher John Rogers, a professor of materials science and engineering at the U. of I., and colleagues at the University of Pennsylvania and Tufts University in Boston have devised electrode arrays using protein from silk and thin metal electrodes.

U of I News Bureau

EXERCISE AND PROBLEM SOLVING

April 15 – Research by Charles Hillman, a Beckman Institute affiliate and professor of kinesiology and community health at Illinois, shows that after a 30-minute stint on the treadmill, students do up to 10 percent better at problem solving.

ABC News

PRINTED ORIGAMI OFFERS NEW TECHNIQUE FOR SMALL, COMPLEX STRUCTURES

April 14 – Although it looks small and unassuming, the tiny origami crane sitting in a sample dish in Beckman Institute researcher Jennifer Lewis's lab heralds a new method for creating complex three-dimensional structures for biocompatible devices, microscuffolding, and other microsystems.

U of I News Bureau

POWERS ELECTED TO AMERICAN ACADEMY OF ARTS AND LETTERS

April 13 – Richard Powers, a member of the Beckman Institute's Cognitive Neuroscience group, has been elected as a member of the prestigious American Academy of Arts and Letters.

U of I News Bureau

HUMANOID ROBOT LEARNS LIKE A CHILD

April 7 – Beckman Institute researcher and U. of I. electrical and computer engineering professor Steve Levinson and colleagues are conducting studies with a robot called the iCub.

Discovery News

KRAMER TALKS ABOUT THE BRAIN

April 5 – Beckman Institute researcher Art Kramer appeared on the WILL Radio program Focus recently, talking about brain plasticity across the lifespan, the effects of exercise on cognitive health, and many other topics during the interview with WILL host David Inge.

WILL Focus

DEPRESSION AND ANXIETY

April 1 – A new study of brain activity in depressed and anxious people, conducted by Beckman Institute researchers Gregory A. Miller and Wendy Heller at the Institute's Biomedical Imaging Center, indicates that some of the ill effects of depression are modified – for better or for worse – by anxiety.

U of I News Bureau

CLAYTON LEADS ANALYSIS OF SONGBIRD GENOME

March 31 – David Clayton of the Beckman Institute's NeuroTech group has played a leading role in a project that sequenced the genome of the zebra finch songbird. Now, Clayton and collaborators from more than 20 institutions are reporting on their analysis of the sequencing effort in the journal *Nature*, including some intriguing findings about vocal communication in animals.

U of I News Bureau

ELECTROSPINNING SELF-HEALING POLYMER COATING SYSTEMS

March 29 – Researchers at the Beckman Institute at the U. of I. have now proposed a new approach to self-healing polymer coating systems based on an electrospun coaxial healing agent. Paul Braun, a professor of materials science and engineering, together with Jeong-Ho Park, the paper's first author, point out that the fibers are electrospun before the matrix is applied.

Nanowerk News

FLEXIBLE ELECTRONICS USED FOR TREATING HEART PROBLEMS

March 24 – The work of Beckman Institute researcher John Rogers involving flexible electronics has led to the creation of sensor arrays that can wrap around the heart in order to treat arrhythmia. Rogers said the device is just one of many possible biomedical uses for the technology.

U of I News Bureau

HELPING THE VISUALLY IMPAIRED LEARN MATH

March 18 – Beckman Institute faculty member Deana McDonagh and student Sheila Schneider have created a series of sculptures with mathematical equations that help children with visual impairments learn math.

U of I News Bureau

LONG POLYMER CHAINS DANCE THE CONGA

March 17 – Beckman Institute researcher Steve Granick of the 3-D Micro- and Nano-systems group led a study showing that long chains of the actin molecule form filaments that move like a conga line.

U of I News Bureau

SCIENTISTS OBSERVE PROTEIN FOLDING IN LIVING CELLS FOR THE FIRST TIME

March 1 – A team of scientists at Illinois led by Beckman Institute faculty member and U. of I. chemistry professor Martin Gruebele has created a technique to study protein dynamics in living cells.

Scientific American

THE AGING BRAIN

March 1 – Research by Beckman Institute Director and U. of I. neuroscientist Art Kramer highlights the plasticity – the ability to grow and change – of the aging brain.

Morning Edition (NPR)

NEW TECHNIQUE DEVELOPED FOR DIRECTLY WRITING COMPOSITES OF NANOPARTICLES AND POLYMERS

February 25 – Scientists at the U. of I. and at the Naval Research Laboratory have reported a new technique for directly writing composites of nanoparticles and polymers. “Our ability to control nanometer-scale heat sources allows local thermal processing of these nanocomposites,” says William King, a Beckman Institute faculty member and professor of mechanical science and engineering at Illinois.

Nanowerk News