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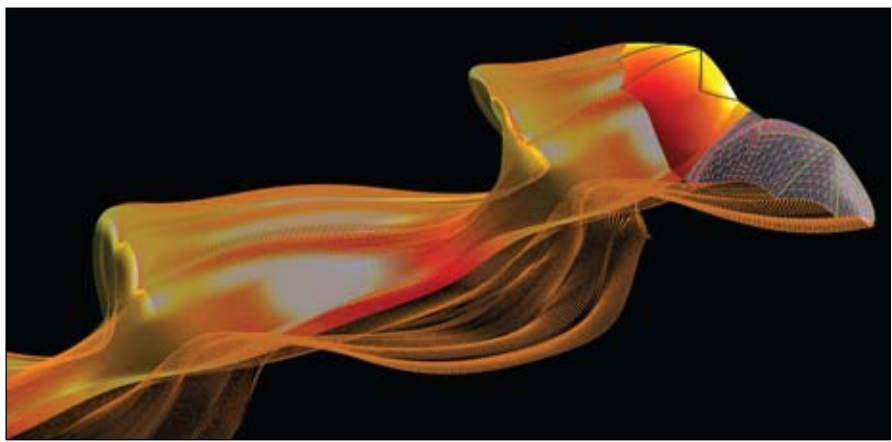


IMAGE COURTESY / DAVID J. WILLIS

## Batty image a tricked-out treat

Based on a computer model of a bat in flight, this image by MIT researchers won first place in the Informational Graphics category of the 2007 International Science and Technology Visualization Challenge, sponsored by Science magazine.

"When viewed in slow motion, bat flight is beautiful and complex. The goal of this illustration is to capture that beauty while also adding scientific merit," David J. Willis, a research scientist in the Department of Aeronautics and Astronautics, told Science.

Willis created the winning image with Professor Jaime Peraire of the Department of Aeronautics and Astronautics and several colleagues from Brown University, led by Professor Kenneth Breuer.

## Benedict to retire at end of academic year

Sarah H. Wright  
News Office

Dean for Student Life Larry G. Benedict, who has been instrumental in transforming MIT's approach to the living and learning environment for students, will retire at the end of the current academic year, Chancellor Philip L. Clay announced.

"There is no question that the MIT student experience has greatly improved over the last eight years due in large part to the vision, integrity and unwavering commitment of Dean Benedict," Clay said.

"He has engaged the entire community in important discussions about the living and learning environment and has empowered students to make the most of their MIT experience," the chancellor added.

Benedict, who joined MIT in 2000, said he considered himself fortunate to have played a role in the history of student life at the Institute. His tenure spanned a crucial and challenging time for MIT as freshmen, previously permitted to live off campus, were required to live in campus residences. New resources, programs and policies had to be developed and implemented.

"I am very lucky to have been at MIT at a time when the Institute was ready to make major investments in student life—building facilities, adding staff and resources and developing new programs," he told Tech Talk.

One of Benedict's first tasks upon arriving at MIT in 2000 was to build what is now known as the Division of Student Life (DSL) to reflect the changing demograph-

ics of students and the importance of aligning the educational agenda with learning outside the classroom. Prior to his arrival, the functions of DSL and DUE (Dean for Undergraduate Education) were housed in a single office.

Clay said that through Benedict's instinct and talent for understanding student perspectives, along with his keen appreciation for MIT's organization and culture, he reorganized many of the DSL offices and developed new models of leadership and operations. In the new configuration, DSL included oversight for housing, dining, counseling FSILGs, campus activities and athletics, among others.

Benedict also established the Office of Community Development and Substance Abuse. As part of this effort, he worked to launch the Campus Alcohol Advisory Board, an Institute-community coalition through which MIT's students, staff, and faculty collaborate with Cambridge officials and community members to develop programs on alcohol use and education.

Guided by the recommendations of the Committee for Student Life, Benedict also oversaw such improvements in the undergraduate student experience as the addition of dining halls in Simmons, Baker, Next House and McCormick.

While serving as dean, Benedict focused not only on undergraduate life but also on the changing needs of graduate students. He was a leader in the development of a graduate student residential area on the northwest side of campus, which



Larry Benedict

## MIT alumna commands space shuttle mission

John Tylko  
News Office Correspondent

Astronaut Pamela Melroy (S.M. 1984) became the first MIT alumna to command a space mission when the space shuttle Discovery lifted off Tuesday, Oct. 23, from Kennedy Space Center in Florida.

Discovery, which rocketed away despite the threat of poor weather, will deliver fellow MIT alum Daniel Tani (S.B. 1984, S.M. 1988) to the International Space Station where he will serve as flight engineer. Tani will perform three spacewalks and numerous robotic arm operations supporting space station assembly before his scheduled return to Earth in mid-December.

Tani will join ISS Expedition 16 commander Peggy Whitson and flight engineer Yuri Malenchenko, who were launched aboard a Soyuz spacecraft from the Baikonur Cosmodrome on Oct. 10. When Discovery reached orbit, it marked the first time women have simultaneously commanded two spacecraft.

Discovery's primary mission is to attach the Node 2 connecting module, Harmony, to the space station. Harmony will be utilized to attach two new scientific research laboratories—Columbus, built by the European Space Agency, and Kibo, built by the Japanese Space Agency—during the next two space shuttle missions.

"I'm just really excited to actually get going," Melroy said Friday during her crew's arrival at the Kennedy Space Center.

While pursuing her B.S. degree in physics and astronomy at Wellesley College, Melroy participated in the Air Force ROTC program at MIT, where she became ROTC cadet commander during her senior year.

"My ROTC experience at MIT was the groundwork for my leadership training," she said.

Her master's thesis under the direction

See **SHUTTLE**

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PHOTO / JOHN TYLKO

The space shuttle Discovery lifted off Oct. 23 from Kennedy Space Center, carrying a crew that included MIT alumni Pamela Melroy and Daniel Tani.



PHOTO / DONNA COVENEY

## Ship happens

Management senior Rebecca Oman, biology senior Chensi Ouyang and mechanical engineering senior Ellann Cohen together pilot the vessel Ship Happens. To find out who won the Head of the Zesiger cardboard boat regatta, please see page 8.

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Adam Boyles prepares for his MIT Symphony Orchestra debut.

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Troupe members to be artists-in-residence at MIT.

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# Poitras gift to support mental illness research at McGovern Institute

Charles Jennings

McGovern Institute for Brain Research

The McGovern Institute for Brain Research at MIT has received a \$20 million philanthropic commitment to support research into mental illness. The gift, from MIT alumnus James Poitras and his wife, Patricia, of Narcoossee, Fla., will be used to establish the James W. and Patricia T. Poitras Center for Affective Disorders Research.

The Poitras Center will support translational and clinical research on bipolar disorder, depression, schizophrenia and other major psychiatric diseases, including collaborative projects with the Broad Institute and with local clinical research institutions. It is expected that the first projects will be selected for funding within the next few months.

"We are extremely grateful to Jim and Pat Poitras for their support," said Robert Desimone, director of the McGovern Institute, who will head the new center. "Mental illnesses can have a devastating impact on both patients and their families, but with recent advances in neuroscience the field is now poised to make real progress."

"Psychiatric diseases are among the greatest clinical challenges of our time," said Susan Hockfield, president of MIT. "Through their generous gift, Jim and Pat have dramatically amplified the ability of MIT's neuroscientists to advance our understanding of these diseases."

"We are indebted to Jim and Pat for their generosity and are pleased that the Poitras Center will be part of the McGovern Institute," said Patrick and Lore McGovern, the cofounders of the Institute. "Our mission is to advance human welfare through brain research, and we are deeply gratified that others share this vision for a better future."

James Poitras retired in 2006 as President and CEO of Highland Laboratories, a family-owned medical products company based in Ashland, Mass., and continues to manage other family investments. Patricia Poitras is president of the Poitras Charitable Foundation, and both are members of the McGovern Institute leadership board. They are longstanding donors to MIT and have previously endowed

a professorship in the Department of Brain and Cognitive Sciences in the field of psychiatric research.

"We decided many years ago, when bipolar disorder first affected our family directly, that our philanthropic efforts would be directed towards this area of brain research," they said. "We could not have imagined then that this perfect synergy between research at MIT's McGovern Institute and our own philanthropic goals would develop. We are very hopeful for the future."

Affective disorders, including bipolar disorder (also known as manic depression) and unipolar depression, represent the most common class of psychiatric disease. In the United States alone, the National Institute of Mental Health estimates that depression affects 9.5 percent of the population, almost 21 million people, in any given year.

Despite their prevalence and societal cost, the underlying causes of bipolar disorder and other mental illnesses remain poorly understood. Although these diseases tend to run in families, environmental factors such as stressful life experiences are also important in triggering illness. Understanding how heredity and experience interact within the brain to produce the clinical manifestations of disease is a major challenge, given that the genes involved are largely unknown, and no physical abnormalities have yet been found within the brain

that can be used to diagnose these diseases. Although they can be treated, they cannot be cured; the available drugs are only partially effective, and ignorance of underlying biological mechanisms is a serious obstacle to the development of new therapies.

The Poitras gift is the second major philanthropic commitment to psychiatric research at MIT within the past year. In March, the Broad Institute of MIT and Harvard established the Stanley Center for Psychiatric Research with a \$100 million commitment from the Stanley Foundation. The two centers will coordinate closely, according to Desimone. "By combining MIT's strengths in neuroscience with the Broad Institute's expertise in genetics and chemical biology, we can now launch a multipronged attack on the underlying causes of mental illness. Only through a large multidisciplinary effort can we hope to understand the causes of these very complex diseases."



PHOTO / CHRIS CASLER

MIT alumnus James Poitras and his wife, Patricia, are donating \$20 million to the McGovern Institute for Brain Research at MIT to support research into mental illness.

## BENEDICT

Continued from Page 1

features new residence halls like the Warehouse, Sidney-Pacific, and the soon-to-be opened NW35.

In adding new housemaster programs to graduate residences and in appointing new housemasters across campus, Benedict's leadership has benefited MIT's entire student community.

According to Clay, Benedict's interest in student leadership has spurred the Division of Student Life to develop new programs for students, working closely with Student Activities, Residential Life, FSILGs, Athletics, and the Public Service Center.

In addition to organizational renewal, Benedict presided over such major building projects as the Zesiger Sports and Fitness Center and Simmons Hall. He also maintained a strong financial commitment to refurbishing residence halls and supporting the FSILG system, Clay said.

Clay said student surveys have shown growing satisfaction with campus life under Benedict's leadership.

"Our students are relaying what most of us already know: Dean Benedict has been an outstanding colleague and unusually creative leader. We will miss him greatly," Clay said.

Clay has appointed a search committee that will begin meeting shortly to identify a short list of candidates to suc-

ceed Benedict. Dean for Graduate Students Steven Lerman will chair the committee. Professors Kerry A. Emanuel of earth, atmosphere and planetary sciences, Ann E. McCants of history, Muriel Medard of electrical engineering and computer science, and Marcus A. Thompson of music will serve as members.

John diFava, director of security and chief of police, Alison Alden, vice president for human resources, Elizabeth Reed, senior associate dean in the Office of the Dean for Undergraduate Education, and Steve Baker, president of the Association of Independent Living Groups, will also serve on the committee.

The Undergraduate Association and the Graduate Student Council will each nominate a student to serve on the committee as well.

## Correction

A caption on page 8 of the Oct. 17, 2007, issue of Tech Talk mistakenly identified professors Seth Teller and John Leonard as "associate professors." Tech Talk regrets the error.

## HR @ Your Service



### Got Benefits?

Maybe you haven't thought about your benefits since you started working at MIT. Or maybe it's only during Open Enrollment—the two-week period each year when benefits-eligible employees can make benefit plan changes for the coming year. Either way, we hope you think about benefits all year round. You might be surprised by what MIT offers in the areas of promoting your health and well-being; protecting you against the unexpected; addressing your lifestyle needs; and planning for your future.

### Select your benefits for 2008

**Open Enrollment begins Nov. 14 at 9 a.m. and ends Nov. 30 at 4 p.m.**

During Open Enrollment you can:

- Change medical, dental and supplemental life insurance coverage
- Enroll in a Health Care and/or Dependent Care Flexible Spending Account for 2008
- Add additional dependents to coverage or discontinue coverage for current dependents
- Enroll in new benefits

This year's Open Enrollment offers some new and exciting options that reflect the diverse needs of the MIT community. Below are some highlights:

- We'll be moving from the two-tier format for health and dental coverage to four tiers. In addition to individual and family coverage, you can now choose employee and spouse/spousal-equivalent coverage or employee and child(ren) coverage.
- There will now be two options for your dental coverage through Delta Dental. The current plan will be renamed the MIT Comprehensive Dental Plan and will cover preventive, basic restorative and major restorative dental services, as it did in 2007, and also orthodontia for children through age 18. A second plan, called the MIT Basic Dental Plan, will cover only preventive and basic restorative dental services at a lower cost.
- We are adding a debit card for your Health Care Flexible Spending Account. The account can be used for medical and dental expenses that you and your family might have that are not covered by your health or dental plan. The contributions you make to this account can come through pre-tax payroll deductions. And now it just got easier to use this account—as the new debit card can be used directly in your health care provider's office and many pharmacies.
- A new vision plan that covers the cost of eyeglasses and contact lenses.

### Then there's everything else

There are numerous benefits that you can take advantage of all year round, not just during Open Enrollment. Here is just a sample:

- MIT matches employee 401(k) contributions dollar for dollar—up to 5 percent of your salary.
- If your child-care provider cancels at the last minute, MIT offers the Parents in a Pinch Program through the Center for Work, Family and Personal Life.
- The Center for Health Promotion and Wellness at MIT Medical offers classes during lunchtime and there are onsite health care and fitness facilities.

The list goes on. For more info on all MIT benefits, visit [hrweb.mit.edu/benefits](http://hrweb.mit.edu/benefits). Alternately, you can e-mail [benefits-www@mit.edu](mailto:benefits-www@mit.edu) or call 617-253-6151 from 9 a.m. to 4 p.m., Monday through Friday. Employee Benefits can answer all your questions about eligibility, coverage and dental plans, while your health plan provider is your resource for detailed questions concerning that plan.

Take note of upcoming benefits fairs:

- Haystack Observatory, Westford, Mass., Conference Room A, 10 a.m. to 11 a.m., Nov. 15.
- Bates Linear Accelerator, Middleton, Mass., Library, 2 p.m. to 3 p.m., Nov. 15.
- MIT Campus, Cambridge, Mass., W20 Mezzanine Lounge, 10 a.m. to 2 p.m., Nov. 16.
- Lincoln Laboratory, Lexington, Mass., Lincoln Lab Auditorium, 11 a.m. to 4 p.m., Nov. 19.

And check your mailbox in early November—you'll see an Open Enrollment benefits newsletter with lots more details.

*HR @ Your Service is a monthly column from Human Resources.*

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# \$30 million Jacobs gift to support graduate fellowships

## Focus is on electrical engineering and computer science

A \$30 million gift from Joan and Irwin Jacobs will support graduate fellowships for students in the School of Engineering, MIT announced Oct. 19. Irwin Jacobs, founder and chair of San Diego-based Qualcomm, a worldwide leader in digital wireless communication, received his master's and doctoral degrees from MIT in electrical engineering and computer science.

The Jacobs' gift creates the Irwin Mark Jacobs and Joan Klein Jacobs Presidential Fellowships. The \$30 million gift will support at least 15 Jacobs Presidential Fellows annually in the Department of Electrical Engineering and Computer Science, with the first Fellows to be named in fall 2008.

"We ourselves were the beneficiaries of undergraduate scholarships, and then when I applied for graduate school, I also received a fellowship. It was very important for me to have fellowship support, and if we benefited, we think there are many others who can benefit as well," Irwin Jacobs said.

This latest gift from the Jacobses to MIT is part of the couple's long history of philanthropy, which also includes the creation of an endowed chair at MIT, the Joan and Irwin Jacobs Professorship in the Laboratory for Information and Decision Systems. The Jacobs are also major supporters of the San Diego Symphony and the University of California, San Diego.

"I am enormously grateful to Joan and Irwin Jacobs for

their extraordinary generosity and support. MIT attracts some of the very best graduate students in the world, and Joan and Irwin Jacobs' magnificent gift ensures that those students will have the opportunity to pursue the cutting-edge education and research for which the Institute is known," said MIT President Susan Hockfield.

"As someone who has been an MIT student, MIT professor, inventor, entrepreneur and co-founder of a successful technology company, Irwin Jacobs stands as an extraordinary role model for engineering and for MIT," said Dean of Engineering Subra Suresh. "I add my gratitude for the Jacobs' exceptional gift to support graduate fellowships in electrical engineering and computer science, which will help prepare outstanding students to follow in his footsteps."

The MIT Presidential Fellowship Program recruits the most outstanding students worldwide to pursue graduate studies at the Institute. Presidential fellowships fund the tuition and living stipend of awardees for their first academic year at MIT. The fellows are selected by the president and provost from a pool of candidates nominated by the deans and heads of departments and interdisciplinary programs. The program was started in 1999.

The Jacobs' gift is the largest to date to MIT's Campaign for Students, a fundraising campaign that began in fall 2006 to support undergraduate and graduate education and student life. The campaign will fund undergraduate



PHOTO COURTESY / JOAN AND IRWIN JACOBS

A gift from Joan and Irwin Jacobs will support graduate fellowships for students in the School of Engineering.

scholarships, graduate fellowships, undergraduate education initiatives, and programmatic and capital investments in student life. The campaign's formal launch will be in October 2008 and will conclude in 2011 to coincide with the celebration of the 150th anniversary of MIT's founding.

## Family Weekend panel eyes competitive edge

Nancy DuVergne Smith  
MIT Alumni Association

MIT students need experiences beyond the classroom to prepare for career success, according to a Family Weekend panel that outlined ways students can enrich their personal and academic experiences—and get a leg up on their first job.

The panel, one of dozens of talks, tours and events that drew more than 2,300 parents, siblings and friends to campus Oct. 12-14, featured advice from the MIT Careers Office and the MIT Alumni Association, which hosts Family Weekend.

John Nonnamaker, MIT Careers Office associate director, described research and work opportunities that can help students develop assets beyond the technical and problem-solving skills that potential employers expect from an MIT graduate.

"In courses and outside, students can develop analytical skills that they can use in any path they follow," Nonnamaker said. "It's also important to acquire social skills or emotional intelligence in teamwork and communications skills."

In fact, emotional intelligence ranks high among the three qualities employers seek, he said. Hiring managers evaluate potential employees in these areas: Analytical acumen counts for about 40 percent of the decision and emotional intelligence, 50 percent. The final 10 percent is earmarked for clarity of purpose, the self-knowledge that individuals need to choose satisfying work.

Experiences that can hone all three skills range from the Undergraduate Research Opportunity Program, which involves students in faculty research, to global public ser-

vice projects, to the Alumni Association's January Externships, which match undergraduate and graduate students with alumni offering work experiences during IAP. Students can also take advantage of the Career Office panels where alumni describe their work in fields such as software engineering or international law, drop in for coaching on job and graduate school applications, and interview with the more than 540 companies that recruit on campus.

This year, nearly 280 alumni are offering more than 400 work opportunities for January 2008 through the Student-Alumni Externship Program, said Katie Casey, associate director of student/alumni relations for the Alumni Association. Externships, which may last a week or a month, include shadowing a surgeon, working on a business plan at a software start-up or conducting research at the National Institutes of Health. "It's a fantastic opportunity to begin to network not only with the alum sponsoring the externship but also the other alumni working in the company," says Casey. Another potential connection is the Institute Career Assistance Network (ICAN), which identifies alumni willing to share their career knowledge. Students need to sign up for Infinite Connection accounts to look up ICAN connections.

MIT students who used these extracurricular paths to success do very well. Nonnamaker noted that 45 percent of graduates go directly to graduate school, 44 percent go to work and 11 percent take an interim path such as traveling or earning a second undergraduate degree. Students apply to 5.9 graduate schools on average and receive 3.1 acceptances. Job hunters apply for 13.7 jobs and receive 2.3 job offers. Average starting salary is \$61,118 for undergraduates.



PHOTO / MING-TAI HUH '02

President Hockfield greets young Siva Sambasivam of Sarasota, Calif., who came with his mother, Nachiyar, and father, Chidambara, to Family Weekend, Oct. 12-13, to visit his sister, freshman Sivakami.

## Student inventors invited to apply for \$30,000 Lemelson-MIT prize

The Lemelson-MIT Program has invited currently enrolled MIT seniors and graduate student inventors to apply for its annual \$30,000 Lemelson-MIT Student Prize for inventiveness. The application deadline is Dec. 18.

Past Lemelson-MIT Student Prize winners have garnered national media coverage from outlets such as CNN, MSNBC, NPR, the Associated Press, the Boston Globe and Time magazine, which have served as valuable exposure to the investment community.

"From a head-on view, the prize money and publicity attached to winning the Lemelson-MIT Student Prize have been of incomparable benefit to my start-up company's efforts to commercialize the ATLAS Powered Rope Ascender," said 2007 winner Nathan Ball. "We believe the ATLAS will have immediate lifesaving benefits both for its military use and for fire and rescue workers, and the Lemelson-MIT Program's recognition launched our work further forward."

Interested students must complete an online application ([web.mit.edu/invent/a-student.html](http://web.mit.edu/invent/a-student.html)), which includes a description of their inventiveness while at MIT, two letters of recommendation, and a current resume or CV. Questions can be directed to Lemelson-MIT Program Officer at [lemelson\\_awards@mit.edu](mailto:lemelson_awards@mit.edu). The winner will be announced at a press conference on Feb. 27, 2008.

The Lemelson-MIT Program recognizes outstanding inventors, encourages sustainable new solutions to real-world problems, and enables and inspires young people to pursue creative lives and careers through invention. The program was established in 1994 at MIT by one of the world's most prolific inventors, Jerome Lemelson (1923-1997), and his wife, Dorothy. It is funded by the Lemelson Foundation and administered by MIT's School of Engineering. More information is online at [web.mit.edu/invent](http://web.mit.edu/invent).

## Possible retirement incentives outlined at faculty meeting

MIT faculty members heard about planning for a new program of incentives for voluntary retirement, the status of several initiatives recommended by the Task Force on the Undergraduate Commons and strategic planning in the Graduate Students Office at their regular Oct. 17 meeting.

Associate Provost Lorna Gibson outlined proposals being considered for a faculty renewal program that would provide incentives for faculty to retire. Emphasizing the commitment and enthusiasm MIT faculty express about their work, Gibson focused on both financial and non-financial issues in faculty retirement planning.

Gibson outlined nonfinancial incentives that generally offer sustained connections to MIT, including postretirement office space, parking, administrative and IT support, resources to attend conferences, and an appropriate title, other than emeritus, to reflect the retirees' ongoing professional activity and personal dignity. She also reviewed financial incentives for retirement at such peer institutions as Stanford, Yale and the University of Pennsylvania.

Gibson invited faculty to discuss all aspects of the renewal program, to be launched in spring 2008.

Dean of Undergraduate Education Daniel Hastings and Professor of Electrical Engineering and Computer Science Dennis Freeman described progress in implement-

ing recommendations of the task force that were released in October 2006. Hastings cited the opening of iHouse, the residence for students interested in international development, and the launch of goglobal, a central web site for students to learn about global opportunities at MIT, as meeting task force goals.

Hastings also noted that the number of faculty now engaged in freshman advising had risen from 66 to 88 in a year; that resources for advisors had been improved; and that a committee to implement a strategy for updating classrooms and making policy recommendations on scheduling had been formed.

Freeman described new cross-disciplinary courses and new project-based subjects launched for first-year students. Both received favorable reviews from students, with women students reporting growth in confidence and self-advocacy skills, especially, he said.

Freeman also noted that the first-year project-based courses, while useful, are enormously costly and would be difficult to launch Institute-wide.

To read the Task Force recommendations, please visit [web.mit.edu/fnl/volume/194/hobbs\\_sive.html](http://web.mit.edu/fnl/volume/194/hobbs_sive.html).

Dean for Graduate Students Steven Lerman said current challenges facing his office included whether the numbers of MIT graduate students (more than 6,000 this

year) are sustainable and how fellowships and other financial resources could be expanded. Lerman also noted the new graduate student residences and highlighted the success of MIT's Summer Research Program in recruiting underrepresented minority undergraduates to come to MIT.

President Susan Hockfield convened the meeting and concluded its scheduled portion by reviewing activities of the last month, noting the success of the Alumni Leadership Conference and Family Weekend. She also described the recently announced \$100 million gift from David Koch (S.B. 1962, S.M. 1963) to establish the David H. Koch Institute for Integrative Cancer Research, and the 10-year, \$65 million research partnership with Novartis that will create the Novartis-MIT Center for Continuous Manufacturing.

The faculty also heard a resolution, presented by Thomas Meloy Professor of Rhetoric and of the History of Science Kenneth Manning and Ford Professor of Engineering Patrick Winston, that the MIT administration refrain from characterizing "the behavior and motives of members of the MIT community whose actions are the subject (real or potential) of pending criminal investigation."

Faculty members discussed the resolution, and the topic will be visited again at a future faculty meeting.

# MIT gel changes color on demand

## Material could lead to fast, inexpensive sensors

Anne Trafton  
News Office

MIT researchers have created a new structured gel that can rapidly change color in response to a variety of stimuli, including temperature, pressure, salt concentration and humidity.

Among other applications, the structured gel could be used as a fast and inexpensive chemical sensor, said Edwin Thomas, MIT's Morris Cohen Professor of Materials Science and Engineering. One place where such an environmental sensor could be useful is a food processing plant, where the sensor could indicate whether food that must remain dry has been overly exposed to humidity.

Thomas is senior author of a paper on the work published in the Oct. 21 online edition of *Nature Materials*.

Structured gels are those that feature an internal pattern such as layers. A criti-



IMAGE / JOSEPH WALISH

Photonic gel crystals demonstrate the 'tunability' of materials made from alternating layers of hard and soft polymers. The soft polymers are easily swollen with liquid or vapor, causing the materials to reflect different colors of light based on the way their molecules are chemically "tuned."

cal component of the structured gel developed at MIT is a material that expands or contracts when exposed to certain stimuli. Those changes in the thickness of the gel cause it to change color, through the entire range of the visible spectrum of light.

Objects that reflect different colors depending on which way you look at them already exist, but once those objects are manufactured, their properties can't change. The MIT team set out to create a material that would change color in response to external stimuli.

"We wanted to develop something that was 'tunable,'" said Thomas, who is head of MIT's Department of Materials Science and Engineering.

To do that, they started with a self-assembling block copolymer thin film made of alternating layers of polystyrene and poly-2-vinyl-pyridine. The thickness of those layers and their refractive indices determine what color light will be reflected by the resulting gel.

By keeping the thickness of the polystyrene layer constant and altering the thickness of the poly-2-vinyl-pyridine layer with external stimuli such as pH and salt concentration, the researchers were able to change the gel's color in fractions of a second.

"This is an ingenious and easy-to-implement method for making photonic materials whose optical properties can be readily tuned over a wide range," said Andrew Lovinger, director of the Polymers Program at the National Science Foundation, which funded this research.

The key to manipulating the thickness of the poly-2-vinyl-pyridine (2VP) layer is to give the nitrogens on each segment of the 2VP block a positive charge, yielding a polyelectrolyte chain that can swell to more than 1,000 percent of its volume in water.

If the charges along the chain's backbone are electrically shielded from each other—by adding a high concentration of salt ions to the water that has permeated the gel, for example—the 2VP chains collapse into disordered tangles, like balls of string. When the salt ions are washed away, the 2VP positive charges again repel

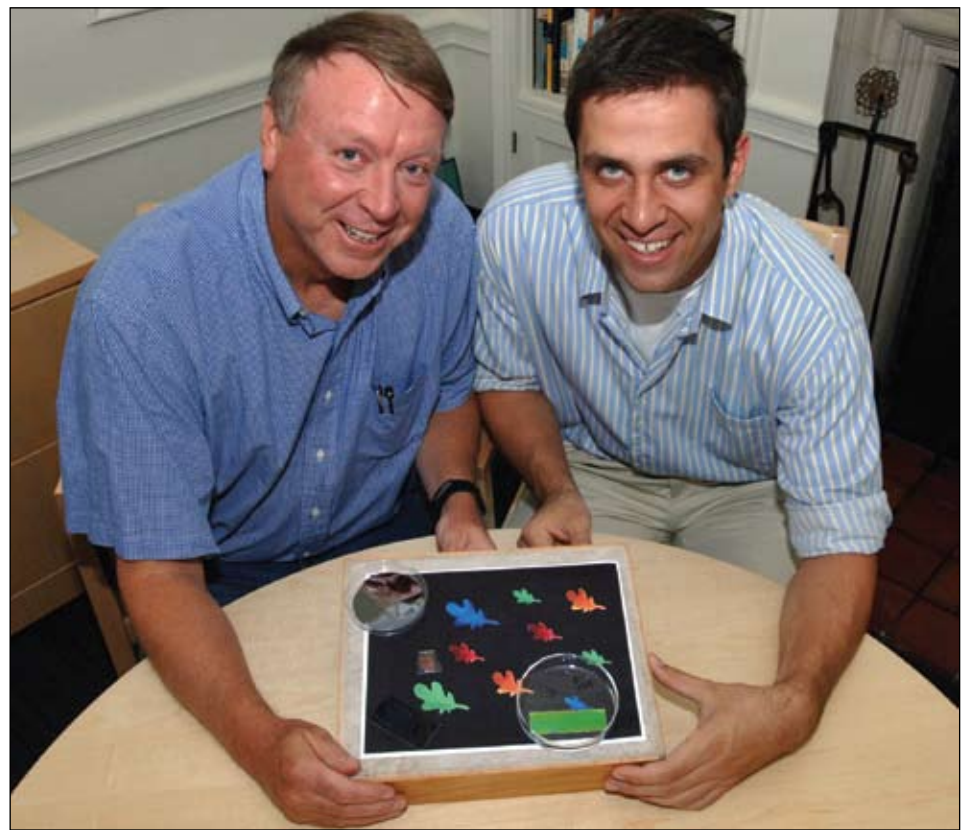


PHOTO / DONNA COVENEY

Ned Thomas, Morris Cohen Professor of Materials Science and Engineering and head of the department, left, and Joseph Walsh, graduate student in materials science and engineering, with a new structured gel that can rapidly change color in response to a variety of stimuli.

each other and the chain extends, causing each 2VP layer to expand and the material to reflect a different color.

Because the diblock polymer film is a one-dimensional periodic stack, swelling is limited to one dimension, yielding a color shift of 575 percent in the reflected wavelength, a dramatic improvement over earlier color-changing gels that are made of charged colloids in a 3-D lattice structure. Those gels expand in three dimensions, giving a much smaller range of color change.

The new gels are also sensitive to changes in pressure, humidity and temperature. "You can use mechanical or chemical forces to get really big responses,

going through the entire range of light from ultraviolet (300 nanometers) to infrared (1600 nanometers)," Thomas said.

The research team is also working on a gel that changes color in response to applied voltages.

The lead author of the *Nature Materials* paper is former MIT postdoctoral associate Youngjong Kang, now a professor at Hanyang University in Seoul, Korea. Other authors are Joseph Walsh and Taras Gorishnyy, MIT graduate students in materials science and engineering.

The work was funded by the Defense Advanced Research Projects Agency and the National Science Foundation.

## Adult stem cells lack key regulator

Eric Bland  
Whitehead Institute

The protein Oct4 plays a major role in embryonic stem cells, acting as a master regulator of the genes that keep the cells in an undifferentiated state. Unsurprisingly, researchers studying adult stem cells have long suspected that Oct4 is also critical in allowing these cells to remain undifferentiated. Indeed, more than 50 studies have reported finding Oct4 activity in adult stem cells.

But those findings are misleading, according to research in the lab of Whitehead Member and MIT biology professor Rudolf Jaenisch.

In a paper published online in *Stem Cells* on Oct. 10, postdoctoral fellow Christopher Lengner has shown that Oct4 is not required to maintain mouse adult stem cells in their undifferentiated state and that adult tissues function normally in the absence of Oct4. Furthermore, using three independent detection methods in several tissue types in which Oct4-positive adult stem cells had been reported, Lengner found either no trace of Oct4 or so little Oct4 as to be indistinguishable from background readings.

This means that pluripotency, the ability of stem cells to change into any kind of cell, is regulated differently in adult and embryonic stem cells.

"This is the definitive survey of Oct4," said Jaenisch. "It puts all those claims of pluripotent adult stem cells into perspective."

Oct4 is essential in maintaining the pluripotency of embryonic stem cells, but only for a short time before the embryo implants in the uterine wall. After implanta-

tion Oct4 is turned off, and the cells differentiate into all of the 200-plus cell types in the body.

"We have convincingly shown that Oct4 has no role in adult stem cells," said Lengner.

Jaenisch initially set out to determine how tissues previously shown to express Oct4 (the intestinal lining, brain, bone marrow, and hair follicle) functioned without the protein. To do so, he bred mice in which the Oct4 gene had been deleted from a given tissue type.

Next, Lengner stressed the tissue in several ways, forcing the adult stem cells to regenerate the tissue. All regenerated normally. Lengner and his fellow researchers then tested to confirm that Oct4 had indeed been deleted from these cells. Finally, the researchers set out to validate the previously published reports claiming Oct4 was expressed in these adult stem cell types. Using highly sensitive tests that could detect Oct4 at the single-cell level, they were unable to confirm the earlier reports.

"This is a cautionary tale of believing what you read in the literature," said Lengner, who suggests that earlier studies may have misapplied tricky analytical techniques or worked with cell cultures that had spent too much time in an incubator.

"We now know that adult stem cells regulate their pluripotency, or 'stemness,' using different mechanisms from embryonic stem cells, and we're studying these mechanisms," he said. "Is there a common pathway that governs stemness in different adult stem cells, or does each stem cell have its own pathway? We don't yet know."

Other authors of this paper are from Massachusetts General Hospital, the Max Planck Institute for Molecular Biomedicine, and the Russian Academy of Science.

*This is the definitive survey of Oct4. It puts all those claims of pluripotent adult stem cells into perspective.*

Rudolf Jaenisch  
MIT biology professor

## Bazant among Popular Science's 'Brilliant Ten'

Popular Science has named Martin Bazant, associate professor of applied mathematics, one of its "Brilliant Ten" scientists for 2007.

Bazant was awarded the distinction for his theoretical work on microfluidics, which can be used to build portable diagnostic labs, also called "labs on a chip."

On a microfluidic chip, biological fluids are pumped through channels only millionths of a meter wide. Such chips could be used as miniature laboratories, running hundreds or thousands of experiments at once, or as portable diagnostic devices.

Bazant's work focuses on using electrokinetics to control the flow of fluids through the channels. He created a mathematical structure showing how electrodes placed along a channel can control the direction of fluid flow, much like a conveyor belt.

The "Brilliant Ten" list appears in the October issue of *Popular Science*. According to *Popular Science*, the "brilliant" designation means that the scientists on the list "have the gall to ask the big questions, even if those happen to be outside the traditional areas of inquiry. It means they challenge what we thought it possible to know. It means their answers are opening up ever more perplexing questions."

Another member of the "Brilliant Ten," Yoky Matsuoka, earned her Ph.D. in electrical engineering and computer science at MIT. While at MIT, Matsuoka built the hands for the robot COG. Now an associate professor at the University of Washington, Matsuoka is working on an artificial hand that can be controlled by brain signals.

—Anne Trafton



Martin Bazant

# MIT works toward novel therapeutic device

Elizabeth Dougherty

Harvard-MIT Division of Health Sciences

MIT and University of Rochester researchers have reported important advances toward a therapeutic device that has the potential to capture cells as they flow through the blood stream and treat them. Among other applications, such a device could zap cancer cells spreading to other tissues or signal stem cells to differentiate.

Their concept leverages cell rolling, a biological process that slows cells down as they flow through blood vessels. As the cells slow, they adhere to the vessel walls and roll, allowing them to sense signals from nearby tissues that may be calling them to work. Immune cells, for example, can be slowed and summoned to battle an infection.

"Through mimicking a process involved in many important physiological and pathological events, we envision a device that can be used to selectively provide signals to cells traveling through the bloodstream," said Jeffrey M. Karp of the Harvard-MIT Division of Health Sciences and Technology. "This technology has applications in cancer and stem cell therapies and could be used for diagnostics of a number of diseases."

The team, led by Karp, started with technology to induce cell rolling for research. With an implantable therapeutic device in mind, they improved that cell-rolling technology to make it safe, more stable and longer lasting.

The improvements were described in the Oct. 20 online issue of the journal *Langmuir*, published by the American Chemical Society.

In the body, P-selectin and other selectin proteins regulate cell rolling in blood vessels. When P-selectin is present on a vessel's inner wall, cells that are sensitive to it will stick to that patch and begin to roll across it.

To induce rolling in the laboratory, the original technology weakly adheres P-selectin to a glass surface and flows cells across it. This surface treatment remains stable for several hours, then breaks down. "While this method is useful for experiments, it's not good for long-term stability," said Karp. An implantable device needs a coating that lasts weeks or even months so that patients won't need to come in frequently for replacements.

To improve the technology, the team experimented with several chemical methods to immobilize P-selectin on a glass surface. They identified a polyethelene glycol (PEG) coating that strongly bonded to P-selectin. This

coating is also "nonfouling," meaning it does not react with or accumulate other proteins, so it is potentially safe for use in an implant.

P-selectin remains stable on this coating for longer than the original technology. In tests with microspheres coated with a molecule that interacts with P-selectin, these spheres slowed down significantly as they flowed over the surface coated with layers of PEG and P-selectin. The effect was stable past four weeks, the longest the devices have been tested.

To validate that this technology works with cells that are sensitive to P-selectin, the team flowed neutrophils (white blood cells) across the coated surface. They too slowed and rolled on surfaces treated with the new coating, and the effect again lasted for at least four weeks.

The next step is translating these results to animal studies and using the technology to slow and capture stem cells and cancer cells circulating in the blood stream.

Ultimately, CellTraffix, a sponsor of this technology and its licensee, wants to apply the technique to a device that is either implanted into the blood stream or appended as a shunt. In addition to PEG and selectin molecules, the device would also include a therapeutic agent.

Such an agent would interact only with certain cells for a specific purpose.

According to University of Rochester biomedical engineering professor Michael King, who developed the concept for adhesive capture and reprogramming of cells, the device could, for example, slow down and kill metastatic, or spreading, cancer cells.

Karp also has appointments at Harvard Medical School and Brigham and Women's Hospital. King is also a member of the scientific advisory board of CellTraffix (formerly Stem Capture), a funder of the work. Their coauthors include first author Seungpyo Hong, a postdoctoral associate in MIT's Department of Chemical Engineering; MIT undergraduates Huanan Zhang, Jennifer Q. Zhang and Jennifer N. Resvick, also of chemical engineering; graduate student Dooyoung Lee of the University of Rochester; assistant professor Ali Khademhosseini of the Harvard-MIT Division of Health Sciences and Technology and Brigham and Women's Hospital; and MIT Institute Professor Robert Langer.

In addition to CellTraffix, the work was also funded by the Materials Research Science and Engineering Center Program of the National Science Foundation.

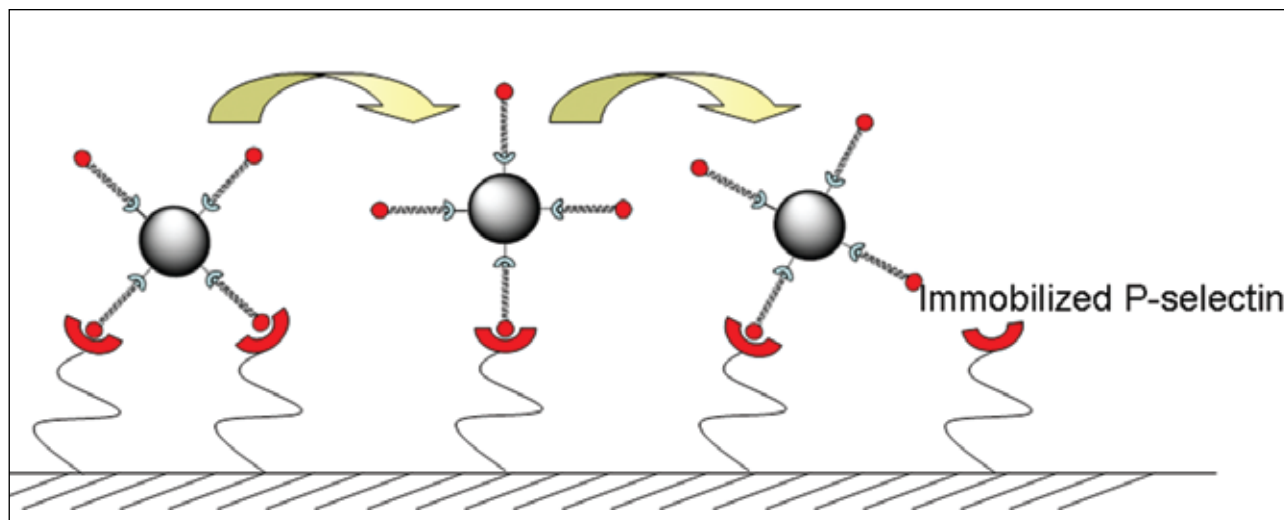


IMAGE COURTESY / SEUNGPYO HONG, MIT

Microspheres coated with certain molecules stick to the protein P-selectin on a glass surface and begin to roll across that surface. Microspheres without the coating did not stick and roll.

## SHUTTLE

Continued from Page 1

of Professor James Elliot involved studying the atmosphere of Neptune by observing the occultation of stars by the planet.

She was commissioned as an Air Force officer after graduation from MIT in 1984 and received her pilot wings in 1985. Melroy flew the KC-10 tanker in the Persian Gulf War and was a test pilot for the C-17 cargo aircraft. She has flown more than 5,000 hours in 45 different aircraft. Melroy retired earlier this year from the U.S. Air Force with the rank of colonel.

Melroy was selected as a NASA astronaut in 1994 and became the third woman to pilot a space shuttle in 2000. In 2002, she piloted her second space shuttle mission and has logged more than 562 hours in space. Melroy is the second woman astronaut chosen to command a U.S. space mission. Eileen Collins previously commanded missions in 1999 and in 2005.

"I think the future of human space exploration is never ending," Melroy said in a preflight interview. "I think there's

something that is profoundly moving about the idea of exploring. I find the exploration of space to be so inspirational and fascinating."

In addition to Melroy, four other MIT-educated astronauts have commanded U.S. spaceflights.

Astronaut David Scott (S.M. and E.A.A. 1962) was the first MIT graduate to command a space mission. He led the Apollo 15 lunar landing mission and spent more than 18 hours exploring the lunar surface in 1971.

In 1984, Frederick Hauck (S.M. 1966) became the first MIT graduate to command a space shuttle mission. He also led a mission in 1988, which successfully returned the shuttle to flight after the Challenger disaster.

Kenneth Cameron (S.B. 1978, M.S. 1979) commanded two space shuttle missions in 1993 and 1995.

William Shepherd (S.M. 1978) commanded the crew that began the permanent human presence onboard the International Space Station in November 2000.



PHOTO / JOHN TYLKO

MIT alumnus Pamela Melroy, far right, led her crew to the van that took them to the space shuttle Discovery. Melroy is the first MIT alumna to command a space shuttle mission. Discovery will deliver fellow MIT alum Daniel Tani, far left, to the International Space Station where he will serve as a flight engineer.

## MIT finds new role for well-known protein

Research could lead to treatments for Alzheimer's, Parkinson's

Deborah Halber

News Office Correspondent

In a finding that may lead to potential new treatments for diseases such as Alzheimer's and Parkinson's, researchers at the Picower Institute for Learning and Memory at MIT report an unexpected role in the brain for a well-known protein.

A study by Morgan H. Sheng, Menicon Professor of Neuroscience and a Howard Hughes Medical Institute investigator, and colleagues appearing in the Oct. 23 issue of *Current Biology* shows that the same protein that enables a yeast cell to bud into two daughter cells also helps neurons sprout the branch-like protrusions used to communicate with other neurons.

The work revolves around septins—proteins known since the 1970s to play an essential function in the process through which the cytoplasm of a single yeast cell divides. "In yeast, septin is localized exactly at the neck between the yeast mother cell and the bud or emerging daughter cell," Sheng said. "Amazingly, we found septin protein localized at the base of the neck of neuronal dendritic spines and at the branchpoint of dendritic branches."

Nine of the 14 septins found in mammals are found in the brain. One of them, Sept7, appears the most, but its role was unclear. Septins form long filaments and act as scaffolds, recruiting other proteins into their assigned roles of builders of the cell infrastructure.

While neurons don't divide, they do form protrusions that eventually elongate into dendritic branches. Dendrites, from

the Greek word for "tree," conduct electrical stimulation from other neurons to the cell body of the neuron from which the dendrites project.

Electrical stimulation is transmitted via synapses, which are located at various points along the dendritic branches. Dendrites play a critical role in receiving these synaptic inputs. "Because dendritic spines are important for synaptic function and memory formation, understanding of septins may help to prevent the loss of spines and synapses that accompanies many neurodegenerative diseases," said co-author Tomoko Tada, a postdoctoral associate in the Picower Institute. "Septin could be a potential target protein to treat these diseases."

Moreover, in the cultured hippocampal neurons the researchers used in the study, septin was essential for normal branching and spine formation. An abundance of septin made dendrites grow and proliferate, while a dearth of septin made them small and malformed.

"Boosting septin expression and function would enhance the stability of spines and synapses and therefore be good for cognitive functions such as learning and memory," Sheng said. His laboratory is now exploring ways to prevent septin degradation and loss.

In addition to Sheng and Tada, authors are MIT affiliates Alyson Simonetta and Matthew Batterton; Makoto Kinoshita of Kyoto University Graduate School of Medicine; and Picower postdoctoral associate Dieter Edbauer.

This work is supported by the National Institutes of Health and the RIKEN-MIT Neuroscience Research Center.

Nine of the 14 septins found in mammals are found in the brain. One of them, Sept7, appears the most, but its role was unclear.

## NEWS YOU CAN USE

**Nominations open for Doherty Professorship**

Nominations are now open for the Doherty Professorship in Ocean Utilization. All nontenured MIT faculty members from any department are eligible.

Endowed by the Henry L. and Grace Doherty Charitable Foundation, the two-year chair opens the way for promising, nontenured professors to undertake marine-related research that will further innovative uses of the ocean's resources.

The person appointed to the chair will receive \$25,000 per year for two years, beginning July 1, 2008.

The deadline for nominations is Nov. 6. For more information, contact Kathy de Zengotita at x3-9305 or kdez@mit.edu.

**Committee on Animal Care**

The Committee on Animal Care is soliciting information that would aid MIT's effort to maintain the humane care of animals used in research.

Established to ensure that MIT researchers working with animals comply with federal, state, local and institutional regulations on animal care, the Committee on Animal Care inspects animals, animal facilities and laboratories, and reviews all research and teaching exercises that involve animals before experiments are performed.

If you have information about inadequate animal care or treatment, please call x3-9436 or call Professor Claude Canizares, vice president for research and associate provost, at x3-3206. All concerns about animal care will be handled confidentially and will be investigated by the committee. The panel will report its findings to anyone who has such concerns, as well as to the vice president for research and associate provost.

**Redefining the MIT Classroom**

On Oct. 26, from 12:30 p.m. to 4 p.m., the Office of Faculty Support and Alumni Class Funds will host an afternoon of panel discussions and information about recent pedagogical and curricular innovations, by and for MIT faculty. Titled "Redefining the MIT Classroom: Award-Winning Experiments in Curricular Change," the event will feature members of the History, EECS and STS faculties. For information on the event, which will be held at the Bartos Theater, please call 617-253-6776 or e-mail [alumnifunds@mit.edu](mailto:alumnifunds@mit.edu).

**Flu clinics underway at MIT Medical**

As the flu season approaches, MIT Medical reminds you to consider getting immunized. MIT Medical/Cambridge will hold immunization clinics from Oct. 22 to Oct. 26; Oct. 29 to Oct. 31; and Nov. 6 to Nov. 7. To schedule an appointment for your flu shot at MIT Medical/Cambridge, please call 617-253-4865.

Clinics at MIT Medical/Lexington will be held Nov. 7 from 8:30 a.m. to noon (Lincoln Laboratory employees only); Nov. 1 from 11 a.m. to 3 p.m.; Nov. 15 from 11 a.m. to 3 p.m.; Dec. 6 from 11 a.m. to 3 p.m.; Dec. 20 from 11 a.m. to 3 p.m.; and Dec. 27 from 11 a.m. to 3 p.m. To schedule an appointment for your flu shot at MIT Medical/Lexington, please call 781-981-7080.

To use Patient Online to request an appointment, please visit [web.mit.edu/medical/login.html](http://web.mit.edu/medical/login.html). Flu shots will be administered subject to vaccine availability.



PHOTO / DONNA COVENEY

**The spin on IS&T's new tricycle**

Jerry Grochow, vice president for Information Services and Technology (IS&T), took a celebratory lap on Oct. 17 around Building N42 using the department's new Haley urban cargo tricycle. While the trike may bring back visions of ice cream vendors cycling through neighborhoods, IS&T will use it to deliver laptops and other equipment around campus.

Grochow said that as a full participant in MIT's Walk the Talk Energy Task Force, IS&T wants to increase its energy efficiency and lessen its impact on the environment. The tricycle will help toward those aims.

"Staff in IS&T deliver computers, carry large tools to repair phone and network cables, and perform other tasks that require a vehicle," Grochow said. "Last year we purchased a hybrid van and this year we decided to invest in a human-powered vehicle."

The new tricycle lends itself well to MIT's campus, which is compact and urban, with lots of pavement and relatively short distances between buildings. The weather-proof trike has special alloy wheels so that it can be ridden in the rain. The attention-getting cargo box, painted apple green, is lined with extra padding.

IS&T's Ryan Flanagan, a consultant with the Departmental IT Resource (DITR) Team, will initially use the trike to deliver laptops for the student Laptop Loaner program ([web.mit.edu/lcp](http://web.mit.edu/lcp)). IS&T also plans to explore other ways to use the trike for on-campus deliveries.

In support of the IT Energy@MIT initiative, many IS&T staff put in time making the trike a reality—from those who worked on the custom order with Haley Tricycle Company to those who assembled it on its arrival. Pictured here in front of N42 are Ryan Flanagan, on the tricycle, and IS&T's vice president, Jerry Grochow.

**FutureBOSTON kicks off**

Patti Richards  
News Office

FutureBOSTON, an ambitious project that examines some of the major urban challenges facing the Boston region, kicked off a four-part series on Oct. 9 on local television station WCVB's "Chronicle" show. The project, directed by Tom Piper, senior research scientist in the Department of Planning and Urban Studies, looks at how the Boston region can remain competitive with other world-class cities, with a particular focus on health, design and energy.

This is Piper's fifth FutureBOSTON project in 23 years. While previous projects focused on the physical development of the city, including topics such as the Big Dig and creating a master plan for the Boston seaport, this year's undertaking focuses on the innovation economy and how Boston can remain relevant in the age of globalization.

"Boston has always been a great intellectual, cultural and financial hub, but we can't rest on our laurels," commented Piper. "Other cities are catching up in areas like economic development, affordability and quality of life."

Piper is particularly concerned about retaining talent. "I see young people come to Boston for an education so that they can get a job in Portland, Oregon, after graduation. We need to tap into a new generation of young people who are committed to shaping the future of the city."

FutureBOSTON will allow participants to submit their own ideas for improving Boston by utilizing IdeaJam, a new

online collaborative tool being developed by IS&T. The best ideas will be chosen next May by a panel of judges including Carleton "Carly" S. Fiorina, former CEO of Hewlett-Packard; Rep. Edward J. Markey; and Yung Ho Chang, head of the MIT Department of Architecture.

"The goal of FutureBOSTON is to spark a worldwide interactive dialogue about key aspects of urban life in the coming century," said MIT Chancellor Phillip Clay. "We also hope to illustrate the significance of the research university to the economic life of the Boston region."

The project will also host three interactive symposia early next year on each of the project's three focus areas. The first, the HealthBoston Symposium on Feb. 14, will look at how Boston can become a national testbed for delivering better health care to its citizens using high-speed wireless.

The final show in the "Chronicle" series will run Tuesday, Oct. 30, at 7:30 p.m. The series has explored urban development in three cities around the globe: Dublin, Ireland; Vancouver, Canada; and Portland, Ore. The final episode will focus upon Seoul, Korea.

"We've learned a lot in the process of producing these shows," said Piper. "Vancouver does design and development so well that it is now an export commodity, and Dublin has made itself into a high-tech center. This is a wake-up call for Boston. We need to redefine ourselves in the global economy."

FutureBOSTON is principally underwritten by State Street Corporation, Distrigas/Suez, Blue Cross Blue Shield and the Boston Foundation.

## DIGITALK: Where IT's at

**Copyright Corner**

An interview with  
Larry Benedict and  
Jerry Grochow

Digitalk interviewed Larry Benedict, dean for Student Life, and Jerrold "Jerry" Grochow, vice president for Information Services and Technology, for a high-level view of how MIT is responding to concerns about peer-to-peer (p2p) file sharing and copyright infringement.

**Digitalk:** The digital environment has made it easy to infringe on copyrights. Peer-to-peer sharing of music and videos is very common. Can you describe the situation today at MIT and other colleges?

**JG:** MIT is not unique in having students and other members of the community who have access to the Internet and various opportunities for getting and sharing music, videos and other copyrighted materials. It is certainly true that there have been a number of instances of MIT students downloading or sharing files, possibly in violation of copyright laws.

**LB:** Again, this problem is not unique to MIT or its students. Colleges around the country are dealing with this issue, as are high schools. And it's also an issue for faculty and staff.

**Digitalk:** How is MIT responding to the Recording Industry Association of America (RIAA) and its aggressive campaign of suing copyright infringers—especially students?

**LB:** MIT is working to make the community aware of copyright laws, that copyright infringement is illegal, and that if community members do infringe on copyrights, there's a possibility they will be caught and identified by the recording industry, among others. We want to help people understand that they may be putting themselves at legal and financial risk. Lawsuits have been filed. Some MIT students have ended up settling with the RIAA for thousands of dollars—to avoid going to court.

We also want to be clear about MIT policies and communicate that there are resources for learning about and responding to these issues. That was the purpose of the letter that Jerry and I sent out to students in early October. [Note: This letter, "MIT Warns on Unauthorized File Sharing," is posted at [web.mit.edu/ist/topics/security/copyright/2007\\_letter.html](http://web.mit.edu/ist/topics/security/copyright/2007_letter.html).]

Another point: This is not just about the RIAA, we're not just talking about music. MIT has gotten take-down notices from a number of different kinds of business and industries.

**JG:** It could be motion pictures, photographs, text. If we get a complaint that someone at MIT has posted a photograph or other copyrighted material without permission, we tell the person to take it down from his or her web site.

**Digitalk:** Will MIT block p2p traffic on MIT's network or put other restrictions in place?

**LB:** MIT is not playing the role of Big Brother. We are not monitoring hard drives or network traffic, nor are we going to.

**JG:** Given the very legitimate uses of MITnet, some involving peer-to-peer software, MIT has no plans to block or restrict traffic. We rely on students and others to be responsible in their use of the network.

**Digitalk:** Ultimately, who does the MIT community look to for leadership on this very thorny issue?

**LB:** As with many other issues at MIT, we look to community members for personal responsibility and accountability. Ultimately, each individual has to make a decision about what he or she is going to do. MIT gives its guidance, but after that, it's really the person's decision.

**JG:** Like many things in society, your personal actions can affect others as well. If the actions of community members don't conform to the law and accepted standards, this can affect the perception of MIT in the larger world. These actions have a societal impact, not just a personal impact.

For a statement of the Institute's policies on copyright, go to [web.mit.edu/copyright](http://web.mit.edu/copyright).

Digitalk is compiled by Information Services and Technology.

## Deshpande Center announces fall 2007 research grants

The Deshpande Center for Technological Innovation at MIT has announced it is awarding \$1,030,000 in grants to 10 MIT research teams currently working on emerging technologies.

"MIT faculty and students constantly demonstrate amazing creativity," said Leon Sandler, executive director of the Deshpande Center. "We give the researchers working on these high-risk, high-potential projects the resources and assistance to prove their technologies."

Each spring and fall, the Deshpande Center awards Ignition Grants and Innovation Grants, which fund proof-of-concept explorations and validation. Since 2002, it has funded 68 MIT research projects with approximately \$8 million in grants, acting as a catalyst for innovation and entrepreneurship. Eleven projects have spun out of the center as independent start-ups, having collectively raised more than \$90 million in outside financing from investors.

The fall 2007 grant recipients are:

**Yet-Ming Chiang**, professor of materials science and engineering: continuous drug delivery—a new device to provide medicine through a portable delivery device to assist individuals with chronic diseases (renewal from fall 2006 grant round).

**Utkan Demirci**, affiliated faculty at the Harvard-MIT Division of Health Sciences and Technology: CD-4 T lymphocyte-counting microchip—a disposable CD-4 T lymphocyte-counting microchip providing fast, cost-effective, on-site HIV virus monitoring to improve patient care in the developing world.

**Elazer Edelman**, Thomas D. and Virginia W. Cabot Professor of Health Sciences and Technology: drug delivery for heart surgery patients—a unique means of safely administering perioperative drugs for heart failure patients.

**Gerald Fink**, professor of biology and Whitehead Institute member: compound to enhance immune stimulation—a compound to stimulate a more powerful immune response to specific monoclonal antibodies, potentially enabling development of effective new disease therapies.

**Carol Livermore**, assistant professor of mechanical

engineering, and Timothy Havel, principal research scientist in nuclear science and engineering: energy storage in carbon nanotube super-springs—a dramatically improved mechanical energy storage system that could lead to new products such as mechanical watches that run for a month between windings (renewal from fall 2006 grant round).

**Keith Nelson**, professor of chemistry: power source for terahertz imaging—a compact power source enabling safe and efficient terahertz imaging for explosive detection and other applications.

**Donald Sadoway**, professor of materials science and engineering: high-amperage energy storage device—a new technology to store high-amperage energy for industrial settings (renewal from fall 2006 grant round).

**Henry Smith**, professor of electrical engineering and computer science, and Rajesh Menon, research engineer in the Research Laboratory of Electronics: high-throughput nanoscale imaging—an absorbance modulation technique enabling economical high-resolution, high-throughput, nanoscale imaging for faster, more-flexible analysis of nanostructures.

**Jefferson Tester**, H.P. Meissner Professor of Chemical Engineering: renewable propane from biomass—technology to allow the production of propane from biomass, such as sugar, starches, or cellulose.

**Ioannis Yannas**, professor of mechanical engineering, and François Berthiaume, lecturer, mechanical engineering: drug delivery system to enhance healing of wounds and burns—novel skin substitutes designed to accelerate blood vessel growth, improve wound and burn healing, and reduce the risk of infections.

The Ignition and Innovation grants help recipients assess and reduce the technical and market risks associated with their innovations. In addition to financial support, the Deshpande Center's network of entrepreneurs, venture capitalists and academic and legal experts helps recipients assess the commercial potential of their innovations and make decisions that accelerate progress toward the development of business plans or licensing strategies.

## Boyles' MITSO debut set for Friday

Sarah H. Wright  
News Office

For his debut concert this Friday, MIT Symphony Music Director Adam Boyles has selected three classical compositions that reflect turning points in the artistic lives of well-known composers and one contemporary piece that reflects a turning point in recent history.

Boyles was named director of the MIT Symphony Orchestra, known as MITSO, in February 2007. In his debut, he will lead its 80 musicians from MIT and Wellesley in performing Edward Elgar's "The Wand of Youth, Suite No. 1," Johann Sebastian Bach's "Brandenburg Concerto No. 3," Sergei Rachmaninov's "Symphonic Dances" and Kevin Puts' "Millennium Canons."

"Although it was not a conscious decision from the outset to give this concert a 'theme,' the common thread that runs through the program is one of examining the past and how it affects one's look at the future," he said.

The most dramatic classical example of this is in the concert's final piece, the "Dances" by Rachmaninov. According to Boyles, Rachmaninov knew the "Dances" would be his final work, and he wove quotations from earlier pieces into this one as a way of coming to terms with his past, particularly the disastrous critical reaction to his "First Symphony."

Audience members might listen for instrumentation that sounds like a child's music box—a glockenspiel's nostalgic note—to know when Rachmaninov is quoting from "First Symphony," Boyles suggested. Themes from his "All-Night Vigil" and the "Dies Irae" chant that plays an enormous role in many of Rachmaninov's works also occur in "Dances."

The pieces by Bach and Elgar have similar, yet rosier, reflections on past and future, Boyles said.

"The Brandenburg concerti came at a time in Bach's life after his discovery of the music of Vivaldi, and all six concerti use the conventions of Vivaldi while at the same time expanding the possibilities of the form," Boyles noted.

"As a child, Elgar wrote music for plays that his siblings and childhood companions would create. Years later, as a man then entering his fifties, he reworked some of that music into what we now know as the 'Wand of Youth' suites," Boyles said.

The Boston Pops Orchestra commissioned Puts' "Millennium Canons," the program's contemporary piece, which was completed in 2001 and premiered after Sept. 11, 2001.

"The title has a double meaning, which persists throughout the piece. It's both dense and lyrical, and it gels into a big fresco of sound. 'Canons' embodies the spirit of innocent, yet powerful, optimism that we now associate with our country prior to September 11, 2001," Boyles said.

A native of Tucson, Boyles moved to Brookline this past summer—just in time to get caught up in Boston's annual baseball mood swing. "I grew up a Cubs fan, so I feel for the underdog. I knew I'd be a Red Sox fan when I got here; now I live 10 minutes from Fenway Park.

"This is a wonderful experience—a warm welcome from the MIT faculty and staff; talented, dedicated students, and now, a World Series! I'm very grateful," he said.

Boyles made his New York debut with the Manhattan School of Music Orchestra in the 2004 Kurt Masur Conducting Seminar. He has participated in the Oregon Bach Festival and has guest-conducted with the Muncie Symphony Orchestra, the Austin Chamber Ensemble and the University of Arizona Opera Theater.

As staff conductor at Opera in the Ozarks for two summers, he led performances of "Into the Woods" and "Carmen"; Boyles has also held instructor positions at the University of Texas at Austin and the University of Arizona.

Boyles earned a B.A. in voice from Indiana University in 2001 and a master's degree from the University of Arizona, where he helped form and conducted the school's second orchestra, the UA Philharmonic. He received his Ph.D. in musical arts from the University of Texas at Austin in 2005.

Boyles succeeds Dante Anzolini, who served as MITSO's conductor from 1999 to 2006. Paul Biss has served as interim conductor for the 2006-07 season. A full-sized orchestra, MITSO is comprised of MIT and Wellesley students who are accepted by audition; MITSO performs four concerts annually in Kresge Auditorium.

Boyles' debut concert with MITSO begins at 8 p.m. Friday, Oct. 26, in Kresge Auditorium, 84 Massachusetts Ave. in Cambridge, which is handicapped accessible. The event is open to the public, and admission is \$5 at the door.



Adam Boyles

## Nappy Grooves to visit

Lynn Heinemann  
Office of the Arts

Nappy Grooves, an all-black drag king troupe will be artists-in-residence at MIT from Oct. 31 to Nov. 3. They will hold a public talk entitled "Too Hot to Handle: A Lecture/Demonstration by Nappy Grooves" on Wednesday, Oct. 31, from 7:00 p.m. to 8:30 p.m., at the Broad Institute Auditorium.

Founded in 2004 by Nia Hamilton, Mattie Richardson and three other Bay Area residents, and based in Oakland, Calif., Nappy Grooves was formed to give black drag kings an opportunity to perform.

Dedicated to fun, sexy, antiracist, feminist gender performance, the troupe has performed a variety of genders and sexualities for audiences across California and New York.

Nappy Grooves' residency is sponsored through the MIT Office of the Arts' Alan W. Katzenstein Memorial Fund, established in 1998 in memory of Alan Katzenstein (S.B. 1942), a long-time supporter of the arts at MIT.



PHOTO COURTESY / NAPPY GROOVES

The all-female drag king troupe Nappy Grooves at the 2007 Gay Pride Festival in San Francisco.

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The crew of the Black Pearl goes down with their ship in the inaugural Head of the Zesiger cardboard regatta. From bow to stern, crew members are juniors Gavin Cotter, Stephen Fournier and Alan Foreman.



PHOTOS / DONNA COVENEY

# That sinking feeling...

Anne Trafton  
News Office

The Head of the Charles may have been last weekend, but the real nautical excitement was found in the Zesiger Center swimming pool Friday afternoon.

Four teams of MIT students took to the pool in cardboard crafts of varying seaworthiness, in the inaugural Head of the Zesiger cardboard regatta. Participants were given kickboards to paddle the length of the pool and back—but few teams made it that far.

The afternoon was punctuated with mock shrieks as all but one of the challengers eventually sank.

A team of three seniors built a boat of incomparable sturdiness. The vessel, Ship Happens, built only a couple of days before the race, easily outlasted all other competitors. The sleek ship was built of extra-thick cardboard and sealed with paper tape and caulking. Oil-based paint added further waterproofing.

Team captain Ellann Cohen said her team got design ideas by checking out ships entered in other cardboard regattas around the country. The team made a trip to Lowe's Home Improvement early one morning last week to pick up the cardboard, which had to be specially

requested.

"They don't sell it, but they use it to ship things," Cohen said.

Ship Happens took home first place in three categories: fastest, best-looking, and best technical construction. Other team members were Rebecca Oman and Chensi Ouyang.

In the first heat, Ship Happens took on a boat with the misnomer Unsinkable II. The vessel sank at the starting line, then crew members bailed it out and tried again, with the same result.

Meanwhile, Ship Happens made it to the end of the pool and back in 1:58.47.

Freshman Christina Jaworsky, one of the Unsinkable II crew, said her team heard about the regatta during orientation and started planning right away. The team gathered cardboard from a few sources, including the boxes Jaworsky used to move into her dorm at MIT.

The team's tape and caulking could not hold up once the boat entered the pool, however. "It was fine until it split in half and the water came in," Jaworsky said.

Unsinkable II took home the prize for "Best Sinker," also known as the Titanic Award. Other team members were freshmen Justin Lan and Alex Vai.

The second heat pitted two pirate-themed boats against

each other. Conner 4 Pirates made it about halfway across the pool before sinking spectacularly, while Black Pearl (shown above) completed the course in 3:32.08, setting up a showdown in the finals against Ship Happens.

However, Black Pearl had taken on too much water in its first heat and sank shortly after launching in the final heat. The crew, however, won the award for "Most Spirited."

Judges for the regatta were Wesley Harris, head of the Department of Aeronautics and Astronautics; Kim Blair, research engineer in the Department of Aeronautics and Astronautics; Ari Epstein, lecturer in the Earth System Initiative; Donald Sadoway, professor of materials science and engineering; and Thomas Allen, Howard W. Johnson Professor of Management and professor emeritus of engineering systems.

A few dozen enthusiastic spectators attended the race, which the Department of Athletics, Physical Education and Recreation (DAPER) hopes to make an annual event. DAPER staff conceived the event as a way for MIT students to have some fun while putting their engineering skills to use.

"We try to be a learning lab, where people can come and do recreational things that help you learn and also provide stress relief," said Jennifer Gallagher, DAPER's assistant director of marketing and public relations.