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# TechTalk

S E R V I N G   T H E   M I T   C O M M U N I T Y

## WAVE of the future

MIT to graduate first class of biological engineering majors

by Anne Trafton,  
News Office

Linda Griffith, left, stands with Course 20 graduating seniors Lissa Riley, Mike Yee and Andrzej Wojcieszynski as they meld their knowledge of thermodynamics and laboratory savvy to derive festive experiments in celebration of the first graduating class of biological engineers.



PHOTO / DONNA COVENEY

When Alice MacDonald arrived at MIT four years ago, the biological engineering major did not exist. But this Friday, MacDonald and 22 other adventuresome MIT students will become the Institute's first graduates from the new biological engineering program.

"I kind of lucked into it," said MacDonald, who originally planned to study biology. "It turned out to be even more interesting than I thought it would be."

Trying out a brand new major might have scared

off some students, but MacDonald and her classmates welcomed the chance to be part of something new and help shape the direction of the program.

"That's one of the great things about having a new major," said senior Michael Yee. "The curriculum's fluid. It's not set in stone, so you can have a voice in what you're learning."

MIT has had a PhD program in biological engineering (BE) for 10 years, but the undergraduate degree program was approved just three years ago, making it the first new

major course of study at MIT in 39 years.

Faculty and student interest in an engineering program underpinned by biology has been growing for many years, said Linda Griffith, chair of the BE Undergraduate Programs Committee, who spearheaded the efforts to develop the undergraduate major.

The undergraduate BE minor, established in 1995, quickly became the most popular minor at the Institute, and students clamored for it to become a major.

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### Red Coats Return

Tech Reunions 2008 will bring more than 3,240 alumni and guests from 44 states and 44 countries to campus this weekend. The legendary red coats, worn by alumni beginning at their 50th reunions, will be in great profusion as the 50th reunion class leads faculty and students into Commencement on Friday. Last year's class, including Ray Stata, right, are pictured during their walk down Memorial Drive. Weekend festivities for alumni include more than 56 Alumni Association events, from Tech Night at the Pops to Technology Day, and 97 class activities. Find out more at <http://alum.mit.edu>.



PHOTO / JUSTIN KNIGHT

### HOWARD HUGHES MEDICAL INSTITUTE

## 5 MIT scientists named HHMI investigators

Elizabeth Thomson  
News Office

Five MIT faculty have been named Howard Hughes Medical Institute investigators, bringing the total number of current MIT professors holding the distinction to 19.

With the new additions, MIT now has more active investigators than any other single institution, according to an HHMI official.

"This is an enormous honor for these individuals and a powerful expression of the concentration of talent and creativity at MIT. That their groundbreaking work crosses so fluidly between science and engineering is a hallmark of the Institute," said President Susan Hockfield.

HHMI investigators remain at their original institutions, but HHMI pays their salaries and funds the bulk of their research. As a result, HHMI investigators have the freedom to explore and, if necessary, to change direction in their research. Moreover, they have support to follow their ideas through to fruition—even if that process takes many years.

See profiles of the five new HHMI investigators—*Irvine, Drennan, Bhatia, Sabatini and Newman.*

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### Eradicating TB with ... cell phone minutes?

Anne Trafton  
News Office

One of the biggest challenges in fighting tuberculosis is simply getting patients to take their medicine.

MIT students have come up with a possible solution: A new testing and reporting system that is easy for patients to use and offers economic incentives such as free cell phone minutes.

Tuberculosis kills an estimated two million people every year, and treating the disease requires a strict six-month regimen of antibiotics. If patients abandon the treatment early, the TB bacteria survive and can become resistant to first-line antibiotics.

"TB is a massive problem, and it's exacerbated by the fact that people have a lot of trouble staying on their meds," says Elizabeth Leshen, an MIT sophomore

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### COMMENCEMENT

#### Congratulations graduates!

MIT gears up for its 142nd Commencement exercises being held this Friday.

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### PEOPLE

#### Lerman named vice chancellor

Dean for Graduate Education Steven R. Lerman '72, SM '73, PhD '75, will become the Institute's vice chancellor on July 1.

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### NEWS

#### EAPS celebrates its birthday

Twenty-five years ago MIT combined the Earth and the sky to form the Department of Earth, Atmospheric and Planetary Sciences.

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## BIOLOGICAL ENGINEERING: First class of Course 20 students will graduate on Friday

Continued from Page 1

"There was incredible student demand," said Griffith.

Unlike biomedical engineering programs at other schools, which focus on applying engineering to medicine, MIT's BE program applies engineering analysis and design to the molecular and cellular building blocks of life in all its diverse forms, to create blueprints for how to build new things from biology. The program fuses molecular biology with engineering to create a new discipline that has applications in not just medicine but also electronics, ocean ecology and other fields.

"We can really start thinking about biology in an engineering sense," said Griffith. "We know a lot about cells and molecules, but how do they work together as machines?"

Many of the faculty who teach core BE classes have joint appointments in other departments, including chemical engineering, mechanical engineering and electrical engineering and computer science.

"You get a taste of a lot of different disciplines and really get to see the connections between them," said Yee.

In its first year, the new major drew so much interest that Griffith planned to hold a lottery to keep the class size to 24. Thirty-three students ended up applying, and with some addition of teaching resources, the BE faculty were able to accept all of those students.

Since then, with the addition of more lab space and rearranging of course schedules, the major has roughly doubled in size, to about 50 students each in this year's junior and sophomore classes.

This year's graduating seniors say that the small size of the BE program built camaraderie among the students and allowed them to have a great deal of interaction with faculty.

"It was really fun having these classes with such a small group and really getting to know everyone," said Justin Lo, a senior graduating in BE.

About a third of this year's 23 graduates are going to graduate school, including Lo, who plans to pursue an MD/PhD at the Harvard-MIT Division of Health Sciences and Technology; Yee, who will study biomedical engineering at the University of Michigan; and MacDonald, who is headed to the University of Pennsylvania to earn a PhD in bioengineering.

Other graduates will be going to medical school, while some have accepted jobs at biotechnology companies or consulting firms.

Griffith credits the seniors with helping to make the new program a success.

"They knew going into this that it was an experiment," she said. "They really rose to the occasion, went with the flow and helped us make the program better."

# Blanchard appointed IMF chief economist

Sarah H. Wright  
News Office

MIT economist Olivier Blanchard has been appointed chief economist of the International Monetary Fund, effective Sept. 1.

A macroeconomist specializing in monetary policy, global imbalances, labor-market performance and speculative bubbles, Blanchard PhD '77 has taught at MIT since 1982.



Olivier Blanchard

James Poterba, chair of the MIT economics department, described Blanchard as one of the world's leading macroeconomists.

"He is completely comfortable discussing both practical policy recommendations and the latest conceptual frameworks. He brings to the IMF an extraordinary set of tools for fashioning sensible and effective policies and a commitment to use economic analysis to

improve economic performance around the world. He is a superb choice for this very important policy position," Poterba said.

In addition to teaching at MIT, Blanchard, 59, serves on advisory panels for the Federal Reserve Banks of New York and Boston and he has served as a member of the French Economic Advisory Council to the French Prime minister.

Blanchard said he is looking forward to the challenge of his new role.

"The world is a complex place and the IMF is in a unique position to follow and analyze events, and provide expert advice," he noted.

A French citizen, Blanchard is the author of numerous books and articles in French and in English. His textbook on macroeconomics, first published in 1997, has been reprinted four times and translated into 11 languages, including Chinese, Greek, Japanese and Spanish.

Blanchard will succeed Simon Johnson, the Ronald A. Kurtz Professor of Entrepreneurship at the MIT Sloan School of Management, who served as IMF chief economist for the past 14 months.

## Garvin named vice president for institutional engagement at RISD

Elizabeth A. Garvin, executive vice president and CEO of the MIT Alumni Association, has been appointed vice president for institutional engagement at the Rhode Island School of Design (RISD). She will assume her new responsibilities there Aug. 1.

"It has been an extraordinary privilege to serve MIT for so many years. The Institute is a rare and wonderful place, and I will greatly miss all of my colleagues in the Alumni Association and across MIT who have made my work here so gratifying," said Garvin.

Harbo Jensen PhD '74, president of the MIT Alumni Association Board of Directors, said the Alumni Association had flourished during Garvin's tenure. "Her commitment and enthusiasm to MIT and the Alumni Association show in outstanding results. Students, alumni, and parents are engaged as

never before, which is demonstrated in increased participation in almost every dimension."

Garvin began her career at MIT more than 20 years ago as a research analyst in Resource Development, and subsequently held a number of key positions for the Alumni Association, including director of reunion giving, director of class programs, alumni fund director, and managing director.



Elizabeth A. Garvin

As CEO of the MIT Alumni Association, Garvin restructured the organization to enhance alumni activities, communications, and fundraising and to maximize association resources, while remaining dedicated to its original mission "to further the well-being of the Institute and its graduates by increasing the interest of members in the school and in each other." In 2002, the

MIT Alumni Board recognized her as an Honorary Member of the Alumni Association, the highest award given to non-alumni at MIT.

Jensen added that a search committee for a new executive vice president of the MIT Alumni Association is being formed, and that Scott Marks '68, who was president of the Alumni Association two years ago, has agreed to chair the panel.

## Faculty Renewal Program established

MIT Provost L. Rafael Reif announced on May 19, 2008, that the Executive Committee of the Corporation had approved the establishment of a Faculty Renewal Program at MIT. Participation in the program is completely voluntary and enables eligible senior faculty members to retire with a choice of retirement incentives.

The program will be in effect for a

defined period of three years, with the earliest retirements beginning July 1, 2009, although faculty eligible to retire in the first year of the program may begin on July 1, 2008, to make an election to retire. Tenured faculty who are age 68 and above by June 30, 2008, and have accumulated at least 10 years of MIT service at the time that they retire will be eligible to participate in the program.

The program details were outlined at the faculty meeting on May 21. Visit <http://web.mit.edu/facultyrenewal> for more information.

## AWARDS & HONORS

**Hyunjune Sebastian Seung**, a professor in the Department of Brain and Cognitive Sciences, has been honored with the Ho-Am Prize for his pioneering work on developing the Nonnegative Matrix Factorization (NMF) for unsupervised learning in artificial intelligence. The prizes are given to individuals who have contributed to academics, the arts and social development.

Harvard-MIT Division of Health Sciences and Technology faculty member **Steven E. Locke** was awarded the Ronnie Stangler Award for Innovation by the American Association of Technology in Psychiatry, an affiliate of the American Psychiatric Association, at its annual meeting held May 3 in Washington, D.C. The AATP Technology Innovation Award is presented to "individuals who have shown creativity and innovation in applying technology to the practice of psychiatry and medicine."

Two MIT professors—**John Charles Marshall**, professor of atmospheric and oceanic sciences, and **Roger Everett Summons**, professor of geobiology—were among the 44 newly elected fellows of Britain's Royal Society.

MIT Federal Credit Union recently announced the recipients of its People Helping People Award and Memorial Scholarships, which included two current members of the MIT community.

**Marta Fernandez Suarez**, a doctoral candidate in chemistry, is this year's People Helping People Award recipient. While conducting important cellular imaging research within the chemistry department, she also serves as a formal mentor for other MIT students. In addition, she volunteers her time as a teaching assistant at science labs in the Cambridge Public Schools.

**Troy Rurak**, an MIT sophomore, received one of six \$1,000 Memorial Scholarships from MIT's Credit Union. Rurak plans to spend the summer in Thailand conducting biological research. After completing graduate and medical school down the line, he intends to become an anesthesiologist at a Boston-area hospital. The other five scholarship winners included high school students from across the country.

Arthur J. Conner Professor of History **Harriet Ritvo '68, PhD '75**, will be honored with a Graduate Society Award from the Radcliffe Institute for Advanced Study at Harvard University during its annual Radcliffe Day, which is the Institute's annual celebration of women, as well as the alumnae and fellows of Radcliffe College and the Radcliffe Institute.

The American Society for Microbiology has presented MIT professors **Dianne K. Newman** and **Edward F. DeLong** with the Eli Lilly and Company Research Award and the Procter & Gamble Award in Applied and Environmental Microbiology, respectively.

Newman, the Wilson Professor of Biology and Geobiology, was recognized for fundamental research of unusual merit in microbiology or immunology by an individual on the threshold of his or her career.

DeLong, a professor of civil and environmental engineering and biological engineering, was recognized for distinguished achievement in research and development in applied and environmental microbiology.

The MIT weather forecasting team again won first prize in the national collegiate weather-forecasting contest, WxChallenge, run by the University of Oklahoma. This year's team was young, including nine undergraduates, four graduates and two staff members. For more details see <http://paoc.mit.edu/synoptic/miscellaneous/events.htm>.

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# Lerman to become MIT's vice chancellor



Steven R. Lerman

Dean of Graduate Education Steven R. Lerman '72, SM '73, PhD '75 will become MIT's vice chancellor, effective July 1, Chancellor Phillip L. Clay announced last week.

In his role as vice chancellor, Lerman will serve as a full deputy in support of the chancellor on operational issues across all student and education areas for which the chancellor is responsible. Lerman will also continue as dean for graduate education.

"Steve's leadership and support will be invaluable as we seek to enhance operations and engage faculty and staff in all areas of education and student life," Clay said. "His contagious enthusiasm will also be a tremendous asset in our collaborations with students and in our outreach to alumni and supporters of MIT."

"I am honored to take this new position in the MIT administration," Lerman said. "I look forward to working closely with the Chancellor to advance MIT's goal of integrating student life and learning for

*[Lerman's] background will be invaluable as MIT seeks to build on its strength and face new opportunities in student life and education*

Phillip L. Clay  
Chancellor

all of our students."

Lerman, the Class of 1922 Professor of Civil and Environmental Engineering and a member of the MIT faculty since 1975, brings considerable experience and deep knowledge of MIT culture and the range of issues of student life and learning. Beyond specific initiatives he will undertake, Lerman will work directly with the DUE and DSL on a variety of

areas, Clay said.

Lerman has been a leader in educational innovation for many years—from pioneering leadership in Project Athena to his current leadership of the Center for Educational Computing Initiatives, to chairing the committee on MIT OpenCourseWare. Clay noted that Lerman has built a reputation for fresh thinking, technical knowledge, skillful management and great prowess in pulling various stakeholders together to advance MIT goals.

"This background will be invaluable as MIT seeks to build on its strength and face new opportunities in student life and education," Clay said.

Lerman has authored more than 50 publications, including two books. He has held several chairs at MIT and has been recognized with awards for his teaching, including the chair he now holds. His department and the Graduate Student Council have both honored him for excellence in teaching.

## Bras wins faculty's Killian Award

Anne Trafton  
News Office

Rafael Bras, a professor of civil and environmental engineering who pioneered the field of hydrologic science, is MIT's James R. Killian Jr. Faculty Achievement Award winner for 2008-2009.

The award was announced at the Wednesday, May 21, faculty meeting.

Bras is "an internationally acclaimed researcher in surface hydrology and hydro-meteorology whose work encompasses many aspects of the Earth's water cycle," said Wanda Orlikowski, chair of the Killian Award selection committee, reading from the award citation.

Established in 1971 as a tribute to MIT's 10th president, the Killian Award recognizes extraordinary professional accomplishment by an MIT faculty member. The winner is asked to deliver a lecture in the spring term.

"The Killian Award is, for me, a culmination of a wonderful career and a very happy life at MIT," said Bras, the Edward A. Abdun-Nur Professor in the Departments of Civil and Environmental Engineering and Earth, Atmospheric and Planetary Sciences.

Bras, who has been on the MIT faculty for 32 years, was recently appointed dean of the Henry Samueli School of Engineering at the University of California at Irvine, effective Sept. 1.

Born in San Juan, Puerto Rico, he came to MIT in 1968 as a freshman and stayed for his master's degree and PhD, joining the faculty in 1976. He has served as head of civil and environmental engineering and chair of the faculty.

"Never in my wildest dreams did the scared 17-year-old freshman of 1968 ever imagine, 40 years later, receiving such a recognition from the MIT faculty," said Bras. "I am terribly proud, enormously grateful and absolutely humbled. MIT has been home and will always be home. I look forward to delivering the lecture in the spring of 2009."

Early in his career at MIT, Bras and MIT colleague Peter Eagleson "spearheaded a fundamental rethinking of the crucial role of water in all the various components of the Earth system, resulting in the creation of a new discipline—hydrologic science—formed from the innovative integration of traditional land hydrology with such Earth sciences as atmospheric science, ecology, geology and geomorphology," according to the award citation.

Bras has contributed to significant international projects, including chairing a panel of experts overseeing the development and construction of tidal gates to protect the city of Venice against flooding.

## MIT prepares for 142nd Commencement

### Nobel winner and microlending pioneer Yunus to speak

Muhammad Yunus, winner of the 2006 Nobel Peace, will deliver the principal address at MIT's 142nd Commencement exercises at 10 a.m., Friday, June 6, in Killian Court.

Yunus won the Nobel Prize for pioneering the microlending movement, which seeks to improve the lives of the poor by offering credit without collateral. The bank he founded, Grameen Bank, has provided credit to millions of poor people in villages in Bangladesh.

Admission to MIT's Commencement exercises for ticketed guests begins at 7:30 a.m. Graduates will robe and assemble on the second floor of Johnson Athletic Center beginning at 7:30 a.m.

Following the exercises, a reception will be held for graduates and their guests on the Kresge Oval.

In all, 983 undergraduate students and 1,352 graduate students are scheduled to receive 1,140 bachelor's degrees,

936 master's degrees, 407 doctorates and nine engineer degrees.

A special hooding ceremony for PhD recipients will take place at 11 a.m. on Thursday, June 5, in Rockwell Cage.

For guests attending the Commencement exercises on Friday, complimentary parking will be available in the Albany Garage, the N10 Annex Lot and the N10 Lot.

Parkers with North Area permits are urged to use alternate modes of transportation on the day of Commencement. For those who must drive, parking will be available in the 158 Mass. Ave. Lot, N42 Lot, 70 Pacific St. Lot, 65 Waverly St. Lot and the West Garage.

In the event the Commencement exercises in Killian Court are canceled due to severe weather conditions, the speeches will be held in Rockwell Cage for the stage assembly and graduates only. Guests may view the speeches on closed-circuit television in viewing locations throughout the campus.

Complete Commencement information is available at <http://web.mit.edu/commencement/2008/>.



PHOTO / JASON DORFMAN

Randy Shults, top left, a FACT coordinator, works with one of the program's clients, Nicole Doctor, bottom.

## COMMUNITECH

# Helping MIT neighbors cross the 'digital divide'

Even though close to half of all Americans have broadband access in their home, the digital divide—the gap between those who have access to information technologies and those who do not—continues to grow both at home and abroad.

A group of MIT volunteers hopes to close that gap through CommuniTech, a program that started in 2000 by focusing on refurbishing older donated computers and giving them to economically disadvantaged people in the area. Since its inception, however, it has broadened its goals to teach the recipients of its computers how to use the technology comfortably.

Today, CommuniTech has two branches: The MIT Used Computer Factory (UCF), coordinated by electrical engineering and computer science senior Henry Wu, which refurbishes donated computers; and Families Accessing Computer Technology (FACT), coordinated by management sophomore Randall Shults, which handles the software-training side. Each year since 2000, more than 20 MIT community members have donated their time to the program.

The UCF is also always looking for computer donations—PCs only, with Pentium IV processors or better. Flat-screen LCD monitors in full-working order are also welcome. Those interested in donating a computer can do so by filling out a form available at <http://imara.csail.mit.edu/>.

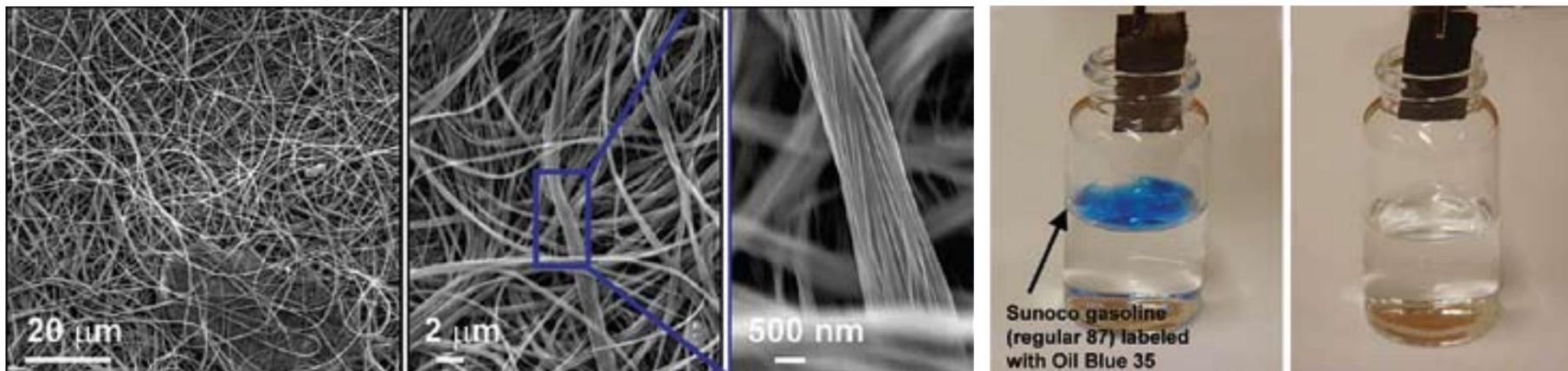
MIT departments can also donate used comput-

ers. Contact MIT Property Manager Michael McCarthy—so that he can deactivate the computers and keep a record of the donation—at [mmccarth@mit.edu](mailto:mmccarth@mit.edu) or 617-253-2779. UCF has placed more than 200 computers in local homes since 2000. About half of the recipients sign up for Internet service (56K dialup). The connections are provided at the significantly discounted price of \$5 per month by Elirion.

The FACT course portion of CommuniTech covers hardware basics and word processing, spreadsheet, web-browser and e-mail applications. Each volunteer is matched with a client and works with him or her for two hours on Saturday mornings over six weeks. Shults, the FACT program coordinator, relishes making a difference in the local community: "I was given an amazing opportunity when MIT accepted me. This is my way of giving back and using the skills I've acquired to help others improve their lives."

For more information on how to get involved with the CommuniTech program, contact CSAIL staff members Karla Mansur and Jason Dorfman at [communittech-staff@mit.edu](mailto:communittech-staff@mit.edu), call 617-324-8364 or stop by Room 32-268 in the Stata Center. IMARA, the organization in CSAIL that sponsors CommuniTech, strives to empower underserved communities through sustainable technology and education.

—Robyn Fizz and Karla Mansur



# MIT scientists develop a 'paper towel' for oil spills

Nanowire mesh can absorb up to 20 times its weight in oil

Elizabeth Thomson  
News Office

A mat of nanowires with the touch and feel of paper could be an important new tool in the cleanup of oil and other organic pollutants, MIT researchers and colleagues report in the May 30 online issue of *Nature Nanotechnology*.

The scientists say they have created a membrane that can absorb up to 20 times its weight in oil, and can be recycled many times for future use. The oil itself can also be recovered. Some 200,000 tons of oil have already been spilled at sea since the start of the decade.

"What we found is that we can make 'paper' from an interwoven mesh of nanowires that is able to selectively absorb hydrophobic liquids—oil-like liquids—from water," said Francesco Stellacci, an associate professor in the Department of Materials Science and Engineering and leader of the work.

In addition to its environmental applications, the nanowire paper could also impact filtering and the purification of water, said Jing Kong, an assistant professor of electrical

engineering in the Department of Electrical Engineering and Computer Science (EECS) and one of Stellacci's colleagues on the work. She noted that it could also be inexpensive to produce because the nanowires of which it is composed can be fabricated in larger quantities than other nanomaterials.

Stellacci explained that there are other materials that can absorb oils from water, "but their selectivity is not as high as ours." In other words, conventional materials still absorb some water, making them less efficient at capturing the contaminant.

The new material appears to be completely impervious to water. "Our material can be left in water a month or two, and when you take it out it's still dry," Stellacci said. "But at the same time, if that water contains some hydrophobic contaminants, they will get absorbed."

Made of potassium manganese oxide, the nanowires are stable at high temperatures. As a result, oil within a loaded membrane can be removed by heating above the boiling point of oil. The oil evaporates, and can be condensed back into a liquid. The membrane—and oil—can be used again.

Two key properties make the system work. First, the nanowires form a spaghetti-like mat

with many tiny pores that make for good capillarity, or the ability to absorb liquids. Second, a water-repelling coating keeps water from penetrating into the membrane. Oil, however, isn't affected, and seeps into the membrane.

The membrane is created by the same general technique as its low-tech cousin, paper. "We make a suspension of nanowires, like a suspension of cellulose [the key component of paper], dry it on a non-sticking plate, and we get pretty much the same results," Stellacci said.

In a commentary accompanying the *Nature Nanotechnology* paper, Joerg Lahann of the University of Michigan concluded: "Stellacci and co-workers have provided an example of a nanomaterial that has been rationally designed to address a major environmental challenge."

In addition to Stellacci and Kong (who is also affiliated with MIT's Research Laboratory of Electronics, or RLE), other authors are Jikang Yuan, a postdoctoral associate in EECS and RLE; Xiaogang Liu, now at the National University of Singapore; Ozge Akbulut of the Department of Materials Science and Engineering; Junqing Hu of the National Institute for Materials Science in Japan; and Steven L. Suib of the University of Connecticut, Storrs.

IMAGES COURTESY OF  
FRANCESCO STELLACCI  
AND NATURE NANOTECHNOLOGY

ABOVE, LEFT: The mesh of nanowires behind MIT's new material for absorbing oil and other organic pollutants, here shown at increasing magnifications (left to right).

ABOVE, RIGHT: Here the material is used to remove a layer of gasoline (dyed blue) from a vial of water.



## MIT Research Digest

### MIT confirms link between inflammation, cancer

Chronic inflammation of the intestine or stomach can damage DNA, increasing the risk of cancer, MIT scientists have confirmed.

The researchers published evidence of the long-suspected link in the June 2 online issue of the *Journal of Clinical Investigation*.

In two studies, the researchers found that chronic inflammation accelerated tumor formation in mice lacking the ability to repair DNA damage.

"It's something that was expected but it was never formally proven," said Lisiane Meira, research scientist in MIT's Center for Environmental Health Sciences and lead author of the paper.

The results of this work suggest that people with decreased ability to repair DNA damage might be more susceptible to developing cancer associated with chronic inflammation such as ulcerative colitis, Meira said.

### Embryonic pathway delivers stem-cell traits

Studies of how cancer cells spread have led to a surprising discovery about the creation of cells with adult stem-cell characteristics, offering potentially major implications for regenerative medicine and for cancer treatment.

Some cancer cells acquire the ability to migrate through the body by re-activating biological programs that have lain dormant since the embryo stage, as the lab of Whitehead Institute for Biomedical Research Member Robert Weinberg has helped to demonstrate in recent years. Now scientists in the Weinberg lab have shown that both normal and cancer cells that are induced to follow one of these pathways may gain properties of adult stem cells, including the ability to self-renew.

In a paper published online by *Cell* on May 15, former postdoctoral researcher Sendurai Mani and his colleagues demonstrated in mice and in human cells that cells that have undergone an "epithelial-to-mesenchymal" (EMT)

transition acquire several important characteristics of stem cells.

Epithelial cells, which make up most of the human body, bind together in sheet-like structures. In embryonic development, the EMT process breaks up cell-cell adhesion in the epithelial layer, and converts epithelial cells into more loosely associated mesenchymal cells. During cancer development, some cancer cells within a primary cancer may undergo an EMT, migrate through the body to their end destination, and there resume their epithelial form through a reverse process (the mesenchymal-to-epithelial transition).



PHOTO / DONNA COVENEY

Joshua Angrist

### Teacher tests undermining U.S. schooling? Study sees licensing as deterrent to talented individuals

Teacher certification tests may be undermining American public education by deterring higher-quality candidates from applying for teaching jobs, according to a study by MIT labor economist Joshua Angrist and Jonathan

Guryan of the University of Chicago Graduate School of Business.

The study, "Does Teacher Testing Raise Teacher Quality? Evidence from State Certification Requirements," will appear in *The Economics of Education Review* in October.

"States are using increasingly strict licensing provisions to identify and hire those most qualified to teach. But our results show that testing has acted more as a barrier to entry into teaching than as a quality screen," Angrist says.

One bright note among the researchers' findings is that teachers may be pleasantly surprised with their wages when—or if—they are hired, Angrist notes, since testing is associated with increases in teachers' wages.

"That's because barriers to entry reduce the labor supply, which in turn increases labor costs in the profession," Angrist says.

### Scientists reveal the lifestyle evolution of wild marine bacteria

Marine bacteria in the wild organize into professions or lifestyle groups that partition many resources, rather than competing for them, so that microbes with one lifestyle, such as free-floating cells, flourish in proximity with closely related microbes that may spend life attached to zooplankton or algae.

This new information about microbial groups and the methodology behind it could change the way scientists approach the classification of microbes by making it possible to determine on a large scale, relatively speaking, the genetic basis for ecological niches. Microbes drive almost all chemical reactions in the ocean; it's important to identify the specific professions held by different groups.

"This is the first method to accurately differentiate the ecological niche or profession among large groups of microbes in the ocean," said Professor Martin Polz, a microbiologist in MIT's Department of Civil and Environmental Engineering. He and colleague Professor Eric Alm, a computational biologist, published a paper describing their research in the May 23 issue of *Science*.

To read more about these and other MIT research advances, please visit <http://web.mit.edu/newsoffice/research.html>.



MIT In the World

# Harnessing the Tibetan sun

Student project aims to reduce deforestation and lung disease

David Chandler  
News Office

In many villages throughout Tibet, there are two ways to cook a meal. There's the traditional open fire, fueled by yak dung or the region's increasingly scarce wood. And then there are solar cookers, concentrating mirrors made of two-inch-thick concrete and covered with a mosaic of small glass mirrors.

The fires produce a lot of smoke, which, especially in the confined quarters of a kitchen, can lead to lung disease. The solar cookers are clean, but so heavy that it takes four people to move one, and they have a poorly engineered focus that sometimes lights fires, cooks food unevenly or even damages metal pots.

When MIT student Scot Frank and Catlin Powers of Wellesley College visited Tibet two years ago, one thing they kept hearing from the villagers was that it would make a big difference to their lives if there was a solar cooker that was lightweight enough to be carried with them when they went off to spend the day tending their fields or their flocks, yet strong enough to stand up to the strong winds that howl across the Tibetan plateau.

A team of students from MIT and from Qinghai Normal University in Tibet's Amdo region ended up producing exactly that. The lightweight dish they produced, inspired by Tibetan nomadic tents, is made of yak-wool canvas panels, supported by bamboo ribs, and faced with reflective mylar. Easily disassembled and transported by one person, the cooker can then be quickly reassembled in the field and staked down solidly on the ground to resist the wind. In the fall, the students will begin testing their prototype in several villages, and make the design available to local factories for manufacture.

The team, called SolSource Tibet, entered MIT's annual IDEAS competition for technologies that have the potential to make significant improvements in the lives of

people in developing countries, and won one of two Yunus Innovation Challenge awards, winning \$3,000 to help develop the project.

Frank, a senior with a double major in biology and electrical engineering and computer science, has spent about a year and a half in the Tibet region over the last four years, and plans for the new solar cooker emerged from discussions he and Powers had with villagers there about how to improve their situations.

They then teamed up with MIT students Orian Wellington, who had previously taught design fundamentals in Qinghai, was familiar with the area and has a background in photovoltaic solar design, and Brad Simpson, who has worked on research in clean-energy generation and had an interest in high-altitude problems, to work on the prototyping and actual construction of the test models. The goal was to find "improved designs and incorporate alternative materials for a more effective device, while still using local materials and production centers," Frank says.

The new cooker could find widespread application, he says, not only in Tibet but in surrounding areas in China, India, Nepal, Bhutan and Pakistan, and potentially in similar high-altitude regions in South America as well.

The solar cooker can be made for a cost of about \$17, Frank says — about the same price as the current heavy concrete model. In addition, the cookers can be fitted with an extra attachment and used to heat homes, for an additional \$26 — comparable to the cost of the non-renewable-fuel stoves they presently use for heating.

"After initial field testing this fall, we expect artisan training of the existing solar cooker factory workers to begin in January 2009 when Catlin, Brad and I will be onsite to assist in training and technology transfer," says Frank. "Our discussions with the solar cooker factory owners indicate that full-scale production could begin in summer 2009," although that may depend on the results of the field testing and any modifications that result.

And beyond that, he says, "we will be continuing with our other projects in the area: water and air-quality analysis, bilingual science book publications, and testing novel locally appropriate renewable electricity generation techniques, for which we are currently applying for patents."



PHOTO / SCOT FRANK

Tao Laoban works at cleaning one of the concrete solar cookers used in Tibet. A team of students, including some from MIT, have developed a more portable solar cooker.

## TB: Phone minutes reward patients for taking their pills

Continued from Page 1

majoring in biological engineering and member of the team, known as "X Out TB."

The students' plan, which has been field-tested in Nicaragua, combines a newly developed paper testing strip with a simple text message reporting system to ensure drug compliance.

The team's novel test strip takes advantage of new technology known as paper microfluidics. The strip is embedded with chemicals that react with metabolites present in the urine of patients who have taken TB medicine. When the chemical reaction occurs, the strip changes color, revealing a number.

Patients are given a device that dispenses one strip every 24 hours, and after they successfully take the test, they have about two hours to text the number on the strip to a central database that records that they have taken the drug.

Patients whose compliance rate is high enough receive free cell phone minutes. The team decided on cell phone minutes as an incentive because it's fairly easy to set up the reward system, and because most of the target patients have a cell phone already.

"It's really easy to tell cell phone companies to give someone extra cell minutes. You don't need a new infrastructure," says Leshen, who joined the team last fall.

Susan Murcott, who teaches D-Lab III: Dissemination, is advising the team. She says she's impressed with the innovation shown by the students.

"There are a lot of creative elements," said Murcott, a lecturer in civil and environmental engineering. "They've engineered a better urinalysis test, you don't have to send somebody out every day to check that patients are taking their medication, and there are these incentives built into the program."

The new system could be a breakthrough in monitoring patients in developing countries who don't live near medical centers, says Jose Gomez-Marquez, who joined the team while a grad student at Worcester Polytechnic Institute and is now directing MIT's Innovations in International Health initiative.

"Some of these people live six hours from the nearest health care center, so telling them that they have to come in every day to check if they're taking their medication is a non-starter," he said.

Gomez-Marquez, who is from Honduras, also believes the project will transform the relationship between patients and health care workers.

"Their lives are so hard already, and the last thing they need is to become an example of disappointment in another person's eyes," he says. "We're turning that around and rewarding them for doing good."

The project got started as part of the 2006-2007 Muhammad Yunus Innovation Challenge to Alleviate Poverty, which challenged students to find a way to get TB patients to take their medicine. The Yunus Challenge, part of MIT's IDEAS Competition, is sponsored by Mohammed Abdul Latif Jameel, benefactor of MIT's Poverty Action Lab.

The "X Out TB" team decided that simply reminding people to take their medicine is not enough—the best way to get people to comply is to offer them an incentive. Similar incentive programs have been launched in the United States.

"This is a universal concept that, given the right technology, we think can be applied just as effectively in developing countries as it can here," says Leshen.

The team plans to run larger field tests in Pakistan and Indonesia this summer, in conjunction with local hospitals.

Other members of the team are Minyoung Jang '07, Elizabeth Gillenwater '07, Aron Walker '07, Angela Kirby '07 and Jeffrey Blander, lecturer in the Harvard-MIT Division of Health Sciences and Technology.

## Everything new under the sun

MIT group will chart the course for solar energy

David Chandler  
News Office

In a major new project that could help set the agenda for policymakers, researchers and industry leaders, a team of MIT faculty members has begun a comprehensive study of the technology and the economics of a variety of approaches to harnessing the power of the sun.

Under the direction of Institute Professor John Deutch, the group will spend about a year and a half

analyzing the prospects for solar photovoltaics, solar thermal generating systems, solar water heating, and the use of solar energy to produce fuels.

The MIT Future of Solar Energy Study will be the third in a series of broad studies of energy options, joining earlier studies on the future of coal and the future of nuclear power. "Once again, we're going to do a study on a big energy area," says Deutch. "We're looking for it to be both widely read and influential."

Harnessing the particular strengths of this institution, he says, the report will be "MIT speaking in a way only MIT can—with an interdisciplinary focus, addressing in depth an area of energy." The report will have "a breadth of focus that encompasses technology, economics and policy, and looks at how these need to work together."

The nine faculty members on the team include specialists in chemistry, mechanical engineering, electrical engineering and computer science, materials science and engineering, physics, economics and management.

While the intent is to work on the study for about 18 months, Deutch says, there is no set time limit. "It's more important that we get the substance right" than to follow an arbitrary deadline, he says. "We won't conclude until the results justify it and we have something original to say." When published, the entire report will be made available free on the Internet.

The panel will have an executive director, yet to be selected, and will also include participation by students throughout the process. The study will look at prospects for solar energy both in the United States and globally, Deutch says. "We'll look at what's involved in deployment both in developed countries—the US, Europe and Japan—and in poorer countries, in Africa, South America and Asia, that get a lot of sunlight."

The committee will have an outside advisory panel, headed by Philip Sharp, President of Resources for the Future. The study will be financed by the Chesonis Family Foundation and other foundations.



### Darrell J. Irvine

*Eugene Bell Career Development Associate Professor of Tissue Engineering, associate professor of biological engineering and materials science and engineering; member of the Koch Institute for Integrative Cancer Research at MIT*

Irvine is an engineer. But instead of designing and building airplanes, cars, or computers, he engineers the immune system.

"My whole lab is devoted to figuring out how to deliver drugs and vaccines that better target the immune system," says Irvine. "We're trying to learn how to make the immune system mount more effective attacks against cancer, HIV, and other diseases." The goal is to create materials that, once in the body, can attract and be taken up by immune cells, and then spur them to seek out pathogens or tumor cells.



### Sangeeta N. Bhatia

*Professor of electrical engineering and health sciences and technology, member of the Koch Institute for Integrative Cancer Research at MIT*

A biomedical engineer, one of Bhatia's long-term goals is to generate a complete implantable liver. She and her colleagues have already created tiny colonies of human liver cells that model aspects of the full-size human organ.

Another major effort in Bhatia's lab is the development of nanoparticles designed to diagnose and treat cancer. One strategy makes use of nanoparticles that can sneak into blood vessels that feed tumors and then merge in clumps large enough to be detected by magnetic resonance imaging scans and reveal fast-growing cancer "hot spots."

## HHMI: 5 MIT scientists named investigators

Continued from Page 1

This year, HHMI chose 56 new investigators from among 1,070 applications. It currently employs approximately 300 investigators in the United States, along with more than 2,000 of their scientific staff.

The new HHMI investigators at MIT are Sangeeta N. Bhatia, Catherine L. Drennan, Darrell J. Irvine, Dianne K. Newman and David M. Sabatini.



### David M. Sabatini

*Associate professor of biology and member of the Whitehead Institute for Biomedical Research*

Sabatini's research revolves around how cells, organs and living creatures grow. "I think it's one of the most interesting questions out there," he says. "You look at the natural world around you and see such tremendous diversity in size. Yet we actually know relatively little about how size is regulated."

As a graduate student, Sabatini identified a protein complex in mammalian cells known as mTOR that anchors a master growth-regulating pathway in mammals. "I decided to study it further, and in essence I haven't stopped," says Sabatini. "It has led into a number of new and surprising areas."



### Catherine L. Drennan

*Associate professor of chemistry and biology*

Drennan revels in sorting out the architecture and function of metalloproteins—those proteins whose structure contains one or more metal ions.

Blending metal with amino acids, she notes, is nature's way of managing difficult but critical reactions, including things such as photosynthesis. "The most fundamental, simple reactions require the most complex metalloproteins," she explains. "Anything that is really hard often has a metal-containing protein. And the hard ones are really the fun ones, where there is the most to learn."

In 2006, Drennan was chosen as one of 20 HHMI professors, a \$1 million award that honors top research scientists who are also great teachers (see <http://web.mit.edu/newsoffice/2006/drennan-hhmi.html>). She is the first HHMI professor ever to be named an HHMI investigator.

PHOTOS / ROBERT E. KLEIN/AP, ©HHMI



### Dianne K. Newman

*John and Dorothy Wilson Professor of Biology and Geobiology*

Newman has learned to think big and small at the same time. And with good reason—her research focuses on the rocks on this huge planet and the tiny microbes that constantly exploit and change them.

"We're interested in the coevolution of life and Earth," she explains. "We're trying to discover when particular types of bacteria first appeared and when the major forms of metabolism evolved, because these events had a profound effect on the Earth." She hopes to use her knowledge of bacterial evolution to understand how modern bacteria have adapted to thrive in the human body.

## The Earth below, the sky above

Trend-setting EAPS turns 25

David Chandler  
News Office

Twenty-five years ago, MIT decided to bring together the Earth and the sky. In the years that followed, many others did the same.

Until 1983, MIT, like most universities, had separate departments for geology (Earth and planetary science) and for the sea and sky (meteorology and physical oceanography), but in that year they were brought together to form the present Department of Earth, Atmospheric and Planetary Sciences (EAPS). Soon after, many other institutions followed suit in bringing these interrelated disciplines together.

"In many universities, those are still separate today," says Maria Zuber, a planetary scientist who has been the chair of EAPS for the last five years. "But if you think about it, so many of the interesting questions about the Earth, about energy, about the environment, about climate, require that you have some aspects of these

different parts of the Earth system. We were able to do things others weren't, because we had these people co-located."

For example, Zuber, the E.A. Griswold Professor of Geophysics, cites an ongoing study on "the effects of climatic conditions on the growth and erosion of mountain belts. We've had a very successful study of this in Tibet, which has been going on for decades." And the connections between what were once disparate fields have only increased over the years, she adds. "Now, we're even studying the atmospheres of extrasolar planets. Who'd have thought?"

The creation of that united department was quickly influential. "By virtue of the fact that we're MIT, people watch what we do," Zuber says. "Now, everybody appreciates and realizes how multidisciplinary Earth science is." But even with that realization, "it's not easy to make these changes anywhere. But it's easier at MIT than at a lot of institutions."

One of the common aspects of many of the disciplines encompassed by the department, Zuber says, is analysis of fluid dynamics. While fluid processes obviously apply to both oceanography and atmospheric science, she says, it



turns out the same principles also apply to the semi-solid processes taking place in the Earth's crust and mantle.

The department, which has 39 faculty positions and currently about 160 graduate students, "covers a lot of intellectual ground," Zuber says. And like the planets themselves, the department is always evolving. "One of the things we're very excited about in the department is a new emphasis on geobiology," she says. "It's something we've wanted to get into for some time." For example, now "we have people looking at the biota of the early Earth, at how the proliferation of life affected

the atmosphere."

To celebrate the anniversary of the department's creation, EAPS is holding a daylong symposium on Wednesday, June 4, which will include talks on some of the most interesting and controversial ideas in the field, including whether a sudden flooding of the Black Sea was the basis for the biblical story of the flood, and whether the uncertainties in climate-change projections are growing or shrinking. Details on the symposium are at: <http://eapsweb.mit.edu/people/alumni.html>

IMAGE / NASA

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MIT biology research affiliate Joe Davis works in his apartment in Cambridge on the prototype for a Hurricane Katrina memorial—a 109-foot tower that will send laser beams into the sky. He recently won a Rockefeller fellowship for the project.

PHOTO / DONNA COVENER

## Research affiliate envisions towering Katrina memorial

Anne Trafton  
News Office

After Hurricane Katrina left its trail of destruction along the Gulf coast, MIT research affiliate Joe Davis decided to do something to memorialize the hurricane victims and inspire the survivors.

His idea? Build a tower that will capture electricity from lightning, using it to power a laser beam that throws energy back into the sky.

Davis, a 57-year-old biology researcher and artist, has worked at MIT for more than 25 years. He spent most of his childhood and adolescence in Mississippi and still has family there.

“Many members of my extended family lost their homes and livelihoods in Katrina,” Davis said. “Everything within a mile of the coast was utterly destroyed.”

He says the tower—which he hopes to build on an island or peninsula on Mississippi’s Gulf coast—will be not only a beacon of inspiration, but a scientific tool that could gather meteorological data for research projects.

“I want this to impact technology and research as well as tourism and the arts. I want it to help with the economic and technological and scientific recovery of the coast,” he said.

Davis, whose work has been exhibited at international events such as Ars Electronica, was recently awarded a \$35,000 Rockefeller New Media Fellowship to help with the project, which he has dubbed

“Call Me Ishmael.” He has gotten additional technical and financial support from private donors.

The Mississippi Gulf coast has one of the highest lightning incidence rates in the United States, and Davis hopes that studies involving his sculpture may help to resolve the mysterious electrodynamics of natural storms.

The 106-foot tower would be similar to a lightning rod but would differ in several important ways.

When lightning strikes the tower, its three vertical aluminum masts will form the electrodes of a resonant cavity that would electrically break down nitrogen in the air and trigger an ultraviolet laser discharge that sends beams back into the sky.

According to Davis, these beams may in turn trigger powerful secondary lightning discharges; as a consequence, enormously powerful secondary laser discharges will also be produced. Davis points out that solar sail researchers await such powerful lasers to propel solar sails beyond the inner solar system.

Davis has already had some contact with officers of the Mississippi Arts Commission about his ideas for the project and he has been invited to present his plans to community arts groups in South Mississippi.

Davis says he is saddened by the destruction caused by Katrina and the failure to rehabilitate the Gulf region. Sluggish recovery efforts there are “a source of national shame,” he says.

# Four from MIT win coveted Gates scholarships

Sarah H. Wright  
News Office

Four MIT students preparing for careers in affordable energy, public health, mathematics and biotechnology have been awarded full scholarships for graduate study at the University of Cambridge, England, by the Gates Cambridge Trust.

MIT students have won 14 of the prestigious scholarships since the program was established in 2000 by the Bill & Melinda Gates Foundation; the four scholarships this year represent the most MIT has received in a single year. The scholarships cover tuition, room, board, travel and stipend for study at Cambridge.

MIT’s four Gates Trust winners for 2008 are Talia Gershon, a senior majoring in materials science and engineering; Naveen Krishnan ’07; Marcelo Alvisio, a senior in mathematics, and Chawita “Jelly” Netirojjanakul, a senior in chemistry.

A fifth MIT student, Ingrid Lawhorn ’06, applied through her graduate school program at Pace University and was accepted.

Gershon, a leading MIT rugby player, is particularly interested in low-cost photovoltaics, fuel cells and low-energy lighting and hopes to participate in the Cambridge Environmental Initiative.

“Sustainability will be one of the biggest challenges of our generation and I believe these are the fields to which I can contribute most as a materials scientist,” says Gershon, of East Meadow, N.Y.

As an MIT student, Krishnan, of Del Mar, Calif., studied treatments for Huntington’s Disease, played on the varsity tennis team and founded a nonprofit organization to aid wounded soldiers from Iraq and Afghanistan. At Cambridge, he will work toward a master’s degree in public health. Krishnan’s goal is to become a surgeon.

MIT seniors Marcelo Alvisio of Argentina and Chawita “Jelly” Netirojjanakul of Thailand won Gates Cambridge Trust international scholarships for 2008-2009.

A theoretical mathematics major, Alvisio plans to read for the Certificate of Advanced Study in Mathematics at Cambridge then return to the U.S. to begin a doctoral program at the University of Chicago. Alvisio, who completed his senior year with a perfect GPA, is also an avid painter and linguist: He speaks his native Spanish and English, German, Latin, Italian and French.

Netirojjanakul, a chemistry major, will study technology policy at Cambridge before entering a doctoral program in chemistry in the United States. Netirojjanakul plans to use her advanced degrees to facilitate scientific advancement in Thailand. She also hopes to start her own biotech company there.

Prestigious Marshall and Rhodes Scholarships were also awarded to two MIT seniors for 2008-2009. Both are preparing for careers in medicine.

Marshall Scholarship winner Ali Alhasani of Boston will study at the University of London’s School of Hygiene and Tropical Medicine, and Rhodes Scholarship winner Melis Anahar of Bethesda, Md., will study at Oxford University.



Talia Gershon



Chawita “Jelly” Netirojjanakul



Marcelo Alvisio

PHOTOS /  
NUTTAWAN SUPAPONG AND  
JENJEERA BOONSOMBAT

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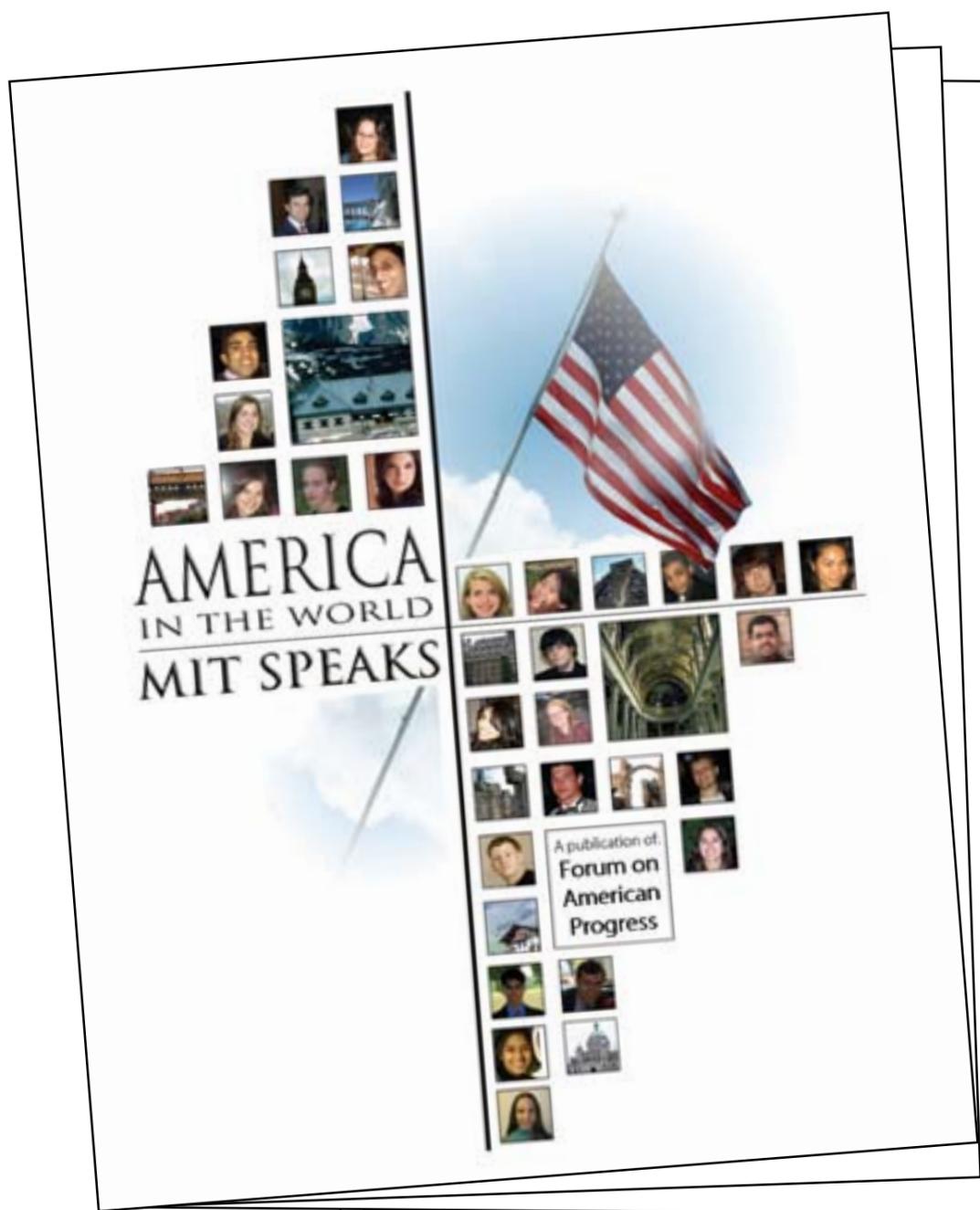
# MIT students weigh in on hope for AMERICA

Senior Ali Wyne hopes booklet of essays will inspire change



PHOTO / DONNA COVENEY

Sarah H. Wright  
News Office



## "Pay Attention to the Urbanization of Major Population Centers"

Angelica G. Weiner '09 (Course 11)

We are reaching a pivotal point in history when, for the first time, the majority of the population is expected to live in urban areas. Globally, more than 75% of future urban growth is expected to occur in already crowded slums. According to a 2003 United Nations HABITAT report, slums are sites of extreme inequality, places where people cannot secure key necessities such as water, durable housing, even a nearby toilet. This problem does not only afflict the developing world; American communities are experiencing the pressures of crowding, poverty, and diminishing green space.

If the future of our planet is indeed an urban one, we need to see greater leadership from scholars and politicians in the field. Those who are responsible for shaping our built environment and city infrastructure have not been as innovative as they can be, a reality that is costing communities extra tax dollars and causing them great environmental harm. With rising carbon dioxide emissions and shrinking freshwater reservoirs, the option of designing environmentally sustainable cities to manage a population of over 6.6 billion is no longer a luxury.

Domestically, we need to adopt progressive legislation and pay greater attention to urban issues. Internationally, the United States Agency for International Development should take a more aggressive approach in addressing urban issues via leadership and information sharing, as opposed to its current stance of providing "catalyst funding" to outside groups.

Americans should care about rapid urbanization because it involves human rights, because slums are breeding grounds for crime and terrorism, and because it is the source of environmental degradation via pollution, depleted water tables, and deforestation. The future of our cities, as with many phenomena, presents both a challenge and an opportunity.

Angelica G. Weiner is an Executive Member of Engineers without Borders and an active member of the Urban Studies Student Council.

Ali Wyne, a senior in management and political science, recalls how four years ago he couldn't get anyone to talk politics. Virtually none of his friends took an interest in the 2004 presidential election.

But this year, those same friends are attending rallies, working for campaigns, starting organizations, writing blogs and making their voices heard—a transformation catalyzed by Democratic Sen. Barack Obama's candidacy, Wyne says.

A prolific opinion writer for The Tech and vice president of MIT's Undergraduate Association, Wyne is showcasing his fellow students' new political energy in "America in the World: MIT Speaks," a booklet of 25 essays published by Forum on American Progress, which Wyne founded in his freshman year.

To produce the booklet, Wyne invited a diverse group of student leaders to describe what they thought the United States must do to make the world a better place in 2008.

The question that he posed, modeled closely on the one asked of global leaders at the 2008 World Economic

Forum, elicited bold, lively proposals—no surprise, Wyne says.

*MIT students approach problems in an objective, analytical manner; they're also willing to take risks to advance bold ideas.*

Ali Wyne  
MIT senior

"MIT students approach problems in an objective, analytical manner; they're also willing to take risks to advance bold ideas. Almost by definition, they're best suited to driving change," he says.

"America in the World" urges the United States to participate in addressing and solving global problems. Essay titles include "Consider the Nexus of Law and

Food Security in Africa" by Raja H.R. Bobbili, a senior in electrical engineering and computer science; "Build Schools to Inhibit the Taliban's Recruitment Efforts" by Adnan Esmail, a sophomore in mechanical engineering and management, and "Acknowledge the Deficiencies of the Microcredit System" by Reshmaan Hussam, a junior in economics.

The "America" authors comprise 13 women and 12 men who represent 15 majors and all four undergraduate classes. Their parents are from Zambia, Lebanon, Pakistan and other countries. They are involved in student government, public service, research, athletics, business and arts.

"Selecting a diverse group of authors was critically important. A publication with the subtitle 'MIT Speaks' must make every effort to represent the tremendous diversity of MIT students," Wyne says.

Wyne, who hopes to enter politics himself one day, intends to submit the booklet to whichever candidate prevails this November, he says.

Next fall, as the presidential race concludes, Wyne will be a 2008-09 Junior Fellow at the Carnegie Endowment for International Peace (CEIP), working under the director of CEIP's China Program.

As for "America in the World," Wyne hopes the booklet will serve as a model for other schools and for future projects that demonstrate the ability of youth to effect change on a global scale.

"America in the World," the first publication of its kind at the Institute, received support from 12 different MIT departments and centers including the Office of the Dean for Undergraduate Education, Technology and Culture Forum, The Center for International Studies, the School of Humanities, Arts, and Social Sciences, and the Public Service Center.

### CHECK IT OUT

The booklet is available online at <http://web.mit.edu/awyne/www/FAP/FAP%20Booklet.pdf>.

Printed copies are available through Wyne, at [awyne@mit.edu](mailto:awyne@mit.edu).