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TechTalk
SERVING THE MIT COMMUNITY

Biomedical research at MIT relies on engineering as well as science, math

Engineers grow tissue that mends broken hearts

Elizabeth Thomson
News Office

In a paper published this week in the online edition of the Proceedings of the National Academy of Sciences, engineers report creating a small swatch of heart tissue that displays many of the hallmarks of mature cardiac tissue, including regular contractions.

"We have been trying to engineer a patch of tissue that has the same properties as native heart tissue, or myocardium, that could be attached over injured myocardium," said Gordana Vunjak-Novakovic, a principal research scientist in the Harvard-MIT Division of Health Sciences and Technology (HST) who led the team of researchers.

"Think of it as a patch for a broken heart," she said.

The approach involves seeding cardiac cells, in this case from a rat, onto a 3-D polymer scaffold that slowly biodegrades as the cells develop into a full tissue. The cell/scaffolds, which are a little smaller than a dime and about the same thickness, are bathed in a medium that supplies nutrients and gases.

In a patent-pending technique, the researchers then apply electrical signals designed to mimic those in a native heart. They do so by essentially connecting the cell/scaffolds to a pacemaker. "Initially we had no idea if this would work. As it turns out, electrical stimulation was crucial for rapid assembly of functional tissue," said recent graduate Milica Radisic (Ph.D. 2004), who will be joining the faculty of the University of Toronto next year.

After only eight days of cultivation, single cells grew into a tissue "with a remarkable level of structural and functional organization," Vunjak-Novakovic said.

"The real advance here is we mimicked what the body does itself and got it to work," said Robert Langer, the Germeshausen Professor of Chemical and Biomedical Engineering and another member of the team.

PHOTO / **DONNA COVENEY**

Hyoungshin Park (left) and Milica Radisic, co-first authors on the heart work.

"The greatest challenge," said Vunjak-Novakovic, "is to reproduce this with human cells, and test how all this works in the body."

Other authors of the PNAS article are Hyoungshin Park, an HST research engineer and co-first author with Radisic; Helen Shing and Frederick Schoen of Harvard Medical School; Thomas Consi, now on the faculty at the University of Wisconsin, Milwaukee; and Lisa Freed, an HST principal research scientist.

This work was funded by NASA, the NIH, and a Poitras fellowship.

Malaria's cell deformation mimicked with optical tweezers

Elizabeth Thomson
News Office

Subra Suresh has spent the last two decades studying the mechanical properties of engineered materials from the atomic to the structural scale.

Until recently, the head of MIT's Department of Materials Science and Engineering never thought he'd be a player in the hunt for cures to malaria and pancreatic cancer.

It turns out, however, that Suresh's expertise in nanotechnology is quite applicable to biology and medicine. With colleagues in engineering, science and medicine at MIT, the National University of Singapore (NUS) and the universities of Heidelberg and Ulm in Germany, he has adapted state-of-the-art tools for the study of the mechanical properties of materials to the study of living cells.

In the January 2005 issue of Acta Biomaterialia, the researchers report the most complete and quantitative characterization yet of how a healthy human blood cell changes its shape upon being invaded by the malaria-inducing parasite Plasmodium falciparum.

Malaria kills some two to three million people every year. "I'm hopeful that this work will provide a deeper scientific understanding of how malaria affects cells by bringing cutting-edge engineering methodology to study medical problems," Suresh said.

In the same article, the researchers show how the deformation of human pancreatic cancer cells in response to certain naturally occurring biomolecules may

See **MALARIA**
Page 2

Building a better ankle bone connection to the leg bone

An MIT professor and colleagues from Brown University and the Providence Veterans Affairs Medical Center have begun a five-year, multidisciplinary research project to restore arm and leg function to amputees. The work will receive $7.2 million in funding from the Department of Veterans Affairs.

At the end of the project, the scientists hope to have created "biohybrid" limbs that will use regenerated tissue, lengthened bone, titanium prosthetics and implantable sensors that allow an amputee to use nerves and brain signals to move the arm or leg. The aim is to give amputees—particularly war veterans—better mobility and control of their limbs and reduce the discomfort and infections common with current prosthetics.

See **PROSTHETIC**
Page 2

PHOTO / **DONNA COVENEY**

A student DJ's attempt to personalize "Yeah," Usher's 2004 hit, is tougher than it looks. With one hand on the mixer and the other spinning the record back, the student tries to juggle the beat between two recordings of the same song.

Scratching your LPs isn't always a bad thing

Sasha Brown
News Office

There is more to being a successful DJ than just playing records and scratching, said Lars Blackmore of MIT's Dance Mix Coalition, the six-year-old student group now giving lessons to prospective DJs.

A good DJ needs to be able to feel the crowd and inject enough personality and creativity into the music without changing songs so much that people get frustrated. "You want to make a continuous flow of music," said Blackmore, a graduate student in aeronautics and astronautics. "It is actually surprisingly hard."

Because of the level of skill required, lessons seemed like the ideal way to bring new DJs into the club. Dan Lee, a senior in mathematics, and Dan Guarda, a junior in mechanical engineering, came up with the idea as a way of expanding the Dance Mix.

They held their first classes last spring with 20 students, Blackmore said. "This semester there were 30."

The five-week-long beginner course is offered for $20, in the Dance Mix studio in the Student Center. The welcoming studio offers oversized velvet couches and a picture window with a view of 77 Massachusetts Ave. The two turntables, mixer and sound equipment are expensive, Blackmore said. For students who do not wish to make such an investment, the Dance Mix course is perfect, because students can practice in the studio.

See **DJ**
Page 4

PHOTO / **DONNA COVENEY**

President Susan Hockfield (left) and husband Thomas Byrne served late-studying students a "breakfast" at Lobdell Sunday night. Mechanical engineering seniors Jason Martinez (far right) and Marissa Jacovich were happy beneficiaries.

MALARIA

Continued from Page 1

affect the metastasis of that disease. Ultimately, the work could lead to better treatments for these and other diseases.

Malaria and the cell

Healthy red blood cells regularly contort from circular disks to slender "bullets" to move through the tiniest blood vessels. Parasite-infected cells can lose their ability to do so because of reduced deformability and because they tend to stick more easily to one another and to blood vessel walls.

"It has been a great challenge to directly measure the cells' changing mechanical properties continuously as the parasite matures inside the cell," said Suresh, the Ford Professor of Engineering, who also holds appointments in MIT's Department of Mechanical Engineering and Biological Engineering Division.

In the Acta Biomaterialia paper, the researchers report doing just that. "We provide the first quantitative force versus displacement results on how the deformability of the red blood cell changes progressively" as the parasite develops inside, Suresh said.

"Such information at the molecular level is vital to gain insights into the pathogenesis of malaria, and potentially offers the opportunity to develop better drugs," Suresh added. Precise measurements of infected cells' response to mechanical forces could also help doctors understand how different strains of the parasite influence the functioning of organs such as the spleen.

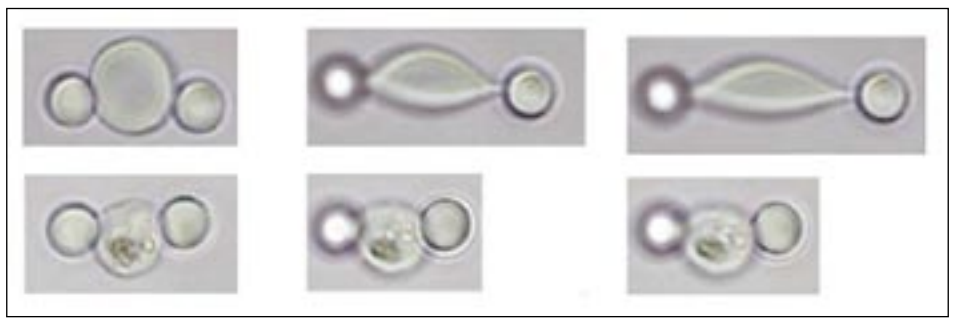

PHOTO COURTESY/ **SUBRA SURESH**

In the top row of images (left to right), optical tweezers stretch a healthy red blood cell. The bottom row shows a cell in a late stage of infection with the malaria parasite. The parasite, which is visible inside the cell, prevents the cell from being stretched by the tweezers.

Key to the work is a known tool: optical tweezers. With this tool, silica spheres or beads are attached to opposite sides of a red blood cell, and a laser beam is aimed at one bead. Under the right conditions, the laser "traps" the bead, so that the trapped bead can be pulled, stretching or deforming the cell.

While others have also used optical tweezers to study the deformation of cells, the forces they've been able to apply are far less than those needed to induce the deformation that cells would experience in the body. The forces obtained by the MIT-led researchers are several times larger, and their technique offers considerably greater flexibility to mechanically manipulate cells than other methods.

"This really gives a level of strain for the red blood cell that is similar to what that cell experiences as it moves through tiny blood vessels," said Suresh.

Suresh's MIT co-authors are graduate student John P. Mills and research scientist Ming Dao of of materials science and engineering.

PROSTHETIC

Continued from Page 1

The MIT research, led by Assistant Professor Hugh Herr, is aimed at making artificial legs perform like biologicial ones. He and his colleagues will focus on creating active knees and ankles controlled by an amputee's own nervous system and powered by muscle-like devices.

Currently, prosthetic knees and ankles can stop movement but cannot fuel it. Herr will build joints that can create the mechanical force needed to walk and climb without falls or fatigue.

To create proper knee rotation and propulsion, he will use special fluids that solidify into a paste when passed through a magnetic field, then reliquify when the energy is removed. Force will also be controlled by a tendon-like spring powered by an electric motor. The ankle system will either use a similar spring or an artificial muscle, made of electroactive polymers, which turn electrical energy into mechanical work.

Herr has appointments in the Program in Media Arts and Sciences and the Harvard-MIT Division of Health Sciences and Technology. He is director of the Media Lab's Biomechatronics Group.

NEWS YOU CAN USE

Hold the date!

Inauguration ceremonies for President Susan Hockfield, MIT's 16th president, will be held May 6 on Killian Court. Professor Stephen Lerner and the Inauguration Planning Committee promise additional information as the plans take shape.

Faculty meeting

A regular meeting of the faculty will be held today at 3:30 p.m. in the Kirsch Auditorium at the Stata Center. The agenda includes a vote on an S.M. in Computation for Design and Optimization, presented by professors Robert Freund and Jaime Peraire; a proposal for an S.B. in Biological Engineering, presented by Professor Linda Griffith; and an update on the management of MIT's endowment, by Treasurer Allan Bufferd.

Clothing drive begins

The Community Giving campaign is sponsoring a clothing drive from Dec. 17 to Jan. 7 to benefit local agencies that provide services to homeless men, women and children. Shelters need adult sweaters, pants, coats, hats and gloves; men's new underwear and white socks; and umbrellas and personal hygiene and first-aid items.

Clean items in bags marked "men's" or "women's" may be dropped off in bins located in the lobbies of buildings 13, 34, E18/E19, E23/E25, E52, NE49, N42, and the Stata Center basement, W91-103, NW16-205, NW21-104 and the Student Center. Lincoln Lab is holding a parallel clothing drive.

The MIT Community Giving Campaign runs through Jan. 21.

Getting fit as a team

Coming this January is a new way for people at MIT to beat the winter doldrums, win prizes, and keep those New Year's resolutions to get into shape. Getfit@mit, a 12-week, team-oriented fitness challenge begins Jan. 9. The deadline for team registration is Jan. 7. More information and registration are available online at getfit.mit.edu.

NameConnector expands

MIT has been using NameConnector, a sophisticated voice response system, to route after-hours calls made to its main number, 253-1000. NameConnector lets callers say the name of the faculty member, staff person, department, or residence they wish to reach, and get connected without operator intervention. (Callers trying to reach students still need to go through the operator.)

Beginning Dec. 22, MIT will also route calls made during business hours to NameConnector first. For callers who need, or prefer, to talk with a person, operators will continue to be available during business hours; connecting with the operator will be an option in NameConnector. The system will automatically transfer calls made during business hours to an operator if there is any problem connecting the call.

To see if you are correctly identified in NameConnector, dial 452-4111 and press 1. Corrections should be sent to nameconnector@mit.edu.

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Students offer Trapelo Road plan

Sasha Brown
News Office

Meeting the needs of homeowners, business owners, workers and commuters alike is part of the balancing act for any good city planner. For the 28 graduate students in "Community Growth and Land Use Planning," (11.360) the challenges were no different.

Since September, the students have worked closely with their client, the Belmont Citizens Forum out of Belmont, Mass. to study—and propose improvements to—the Trapelo Road corridor. The two-mile stretch of road is considered the main street in Belmont. Within it are two out of three of the town's busiest areas for commerce, including both Cushing and Waverly squares.

"The town has been struggling with the street for some time," said Eran Ben-Joseph, associate professor of urban studies and planning. This is his first year involved with the class also taught by adjunct Associate Professor Terry Szold.

Taught for more than 10 years, by Szold, the class has garnered a strong reputation in the Boston area and internationally. Towns facing significant planning challanges invite the class to help. "They view us as an unbiased entity," said Ben-Joseph. "We come to the projects with a clean slate." Last year, the town of Needham hired the class to make suggestions for improvement.

This clean slate was particularly important in Belmont where many residents initially seemed "resistant to change," said city planning graduate student Karla Solheim.

At the beginning of the semester, the task always seems daunting, said Szold. "The students have to get familiar with the whole road," she said. "But once they start identifying the underlying issues, they start thinking like planners.

The class divided into three groups, each studying a different part of the corridor, from the Cambridge line to the Waltham line. During September and early October, they walked the street, interviewed homeowners, shoppers and business owners, and focused mainly on beautification, better use of space, and safety.

On Oct. 14 they held a meeting in Belmont's town hall to hear from residents. On Dec. 2, they presented their findings at a meeting sponsored by the Forum at Beth El Temple Center in Belmont, with nearly 120 people in attendance.

Most of their proposals—such as a larger sign marking the Belmont town line and changes in zoning to allow for more housing—were met with praise. Another was to improve safety at the Grove Street intersection, referred to as the "run for your life" intersection, by creating a pedestrian island, improving traffic signal timing and marking bicycle and turn lanes.

Two more controversial recommendations will have to undergo further study and discussion. The first—making liquor licenses easier to obtain—would encourage more restaurant development in the area. As of now, Belmont gives out only three liquor licenses a year. "We believe restaurants are a very important component and right now, it is difficult for restaurants to thrives," said Solheim. The group also recommended changing parking zoning in some areas so that shop workers and business owners could park on residential streets. The final report is available at http://web.mit.edu/11.360/www.

Solheim said she is hopeful the suggestions will have an impact. "It was so exciting to be able to work on a real-world project with a real-world client."

Human, solar power prominent in 2.009

Mechanical engineering seniors designed and built prototypes of products united by the theme of energy—alternative, conservation or clean—in just three months this term in 2.009 (Product Engineering Processes).

This required senior design course culminates each December in a product fair featuring prototype demonstrations and business plan presentations before an audience of Boston-area professionals who critique and rate the students' work. This year's event was held Dec. 8 in Edgerton Hall.

Challenges faced by the six teams of 15-20 students weren't simply engineering related. They also had to learn to work in teams under fairly intense deadline pressure (just as they'll need to do once they're employed in industry), face expert (faculty) panels who had the power to approve their ideas or send them back to the drawing board, and think through the manufacturing and marketing aspects of the design—all on a tight budget.

Their collective thousand-plus hours of work resulted in a set of six innovative products, four of which were designed specifically with the developing world in mind.

- The Sol Pump, a solar-powered well pump;
- Sugar cane charcoal extruder that makes an alternative cooking fuel out of sugar cane waste;
- Kinkajuice, a human-powered battery charger that looks like a rowing machine;
- The VacPac, a vaccine cooling backpack that runs on solar, biomass, diesel or electric power;
- The MP 4ever, a self-powered MP3 player that uses a jogger's own efforts to recharge; and
- Sonic See-Saw, a musical children's see-saw designed for safety, comfort and durability.

For more information and photos of the products, see the course web site (web.mit.edu/2.009). The course is sponsored by the Lemelson Foundation, Ford, General Motors and United Technologies.

—Denise Brehm

PHOTO / **L. BARRY HETHERINGTON**

Smitha Raghunathan operates the Kinkajuice human-powered battery charger designed and built by her and her teammates, including (left to right) Etan Trangle, Jim Lin, Alfredo Bocanegra, Jennifer Hu and Lisa Chandler.

Suresh elected to Third World Academy of Sciences

Subra Suresh, the Ford Professor of Engineering and head of the Department of Materials Science and Engineering, has been elected an Associate Fellow of the Third World Academy of Sciences (TWAS) for "broad, innovative and pioneering contributions to the understanding of the mechanical behavior of materials."

Subra Suresh

Citizens of developing countries who have attained the highest international standards are elected as Fellows of the Academy. Associate Fellows are elected from among scientists of developed countries who either have their origin in developing countries or who have distinguished themselves in the context of science in the developing world and who have made outstanding contributions to their respective fields of science.

TWAS, headquartered in Trieste, Italy, presently has a total worldwide membership of 771 living scientists of whom approximately 130 are from the developed world. Suresh, who also holds appointments in MIT's Biological Engineering Division and Department of Mechanical Engineering, is one of three American scientists in the newly elected class of 68 members for 2004.

Americans elected in recent years as Associate Fellows of TWAS include chemistry Nobel laureate and former MIT Professor Mario Molina and U.S. National Academy of Sciences President Bruce Alberts.

Suresh has also been selected for Honorary Membership in the Indian Institute of Metals. Honorary Membership is the highest recognition given to a materials scientist by the Indian Institute of Metals. Suresh, who was chosen for the Honorary Membership of the Materials Research Society of India in 1997 and for Fellowship in the Indian National Academy of Engineering in 2003, presently serves as chair of the Materials Section of the U.S. National Academy of Engineering, to which he was elected in 2002.

—Elizabeth Thomson

AWARDS AND HONORS

The Bang on a Can All-Stars, with co-artistic director **Evan Ziporyn**, the Kenan Sahin Distinguished Professor of Music, was named Ensemble of the Year by the Musical America International Directory of the Performing Arts. Winners were honored in a Dec. 6 ceremony at Carnegie Hall. The Bang on a Can All-Stars describe themselves as part classical, part rock, part jazz group. The All-Stars are the performing body for Bang on a Can, which was originally a festival of new music in downtown New York, founded in 1987. Since then, it has become an audacious institution that comprises festivals, marathon concerts, publishing, recording, teaching, commissioning and touring.

The **MIT Biomedical Engineering Society (BMES) student chapter** was honored with a Meritorious Achievement 2004 Chapter of the Year Award by the National BMES. Each year, the society recognizes chapters and people who have made "contributions to the intellectual and professional development in the field of biomedical engineering."

The Institute's chapter was founded in 1995 by three MIT seniors who were looking for an outlet to provide students of biomedical engineering with research, employment and educational opportunities. Members of MIT's BMES span nearly all academic majors. Their main goal is to solve problems in biomedicine through the application of science and engineering. The award was presented at the BMES annual meeting in Philadelphia on Oct. 14 to the club's president, **Alexis DeSieno**, a senior in brain and cognitive sciences, and sophomores **Nupur Garg** and **Aparna Rao**, chemical engineering majors who serve as vice presidents of Campus Relations for MIT's BMES.

Named professorships

Chris Schuh, assistant professor in the Department of Materials Science and Engineering (DMSE), was appointed to the Danae and Vasilios Salapatas Assistant Professor of Metallurgy, for a period of three years that began in July. The chair is named after Vasilios Salapatas (C.H. 1961, M.L.) and his wife Danae. Salapatas is a member of the DMSE Visiting Committee.

Professor **Xiao-Gang Wen** of the Department of Physics has been selected as the Cecil and Ida Green Professor of Physics for a five-year term that began Sept. 1. The chair was established in 1976 by Mr. and Mrs. Green, who were longtime friends and benefactors of MIT. Cecil Green (Class of 1923) founded Texas Instruments, Inc.

Professor **Richard C. Larson** of civil and environmental engineering and engineering systems, was appointed a Mitsui Professor on Nov. 1 for a five-year renewable term. A fundamental objective of the chair is to encourage cultural and technological exchange between the United States and Japan. The first Mitsui Chair was established in 1974 through the generosity of the Mitsui Group, one of Japan's oldest and largest industrial groups in Japan. Larson is the first to hold the second Mitsui Chair.

Professor **John W. Belcher** of physics, a MacVicar Teaching Fellow, was selected to be the Class of 1922 Professor beginning Nov. 1, for a five-year renewable term. The class professorship was endowed through a 40th-reunion gift of the Class of 1922 to honor distinguished leadership in teaching and service.

Commemorative symposium held for Vernon Young

A symposium honoring the late Professor **Vernon R. Young**, who died in March 2004, was held at MIT last month. The daylong event on Nov. 12, "Looking Ahead in Honoring the Past," had been in the works for over a year as a Festschrift honoring Young's many contributions and achievements in nutritional science. After Young's death at age 66, the committee planning the event unanimously agreed to hold it as a celebration of his research in amino acids and of the work of others in similar fields.

Proceedings of the symposium will be published as a supplement in the American Journal of Clinical Nutrition. Additional copies will be distributed to developing countries by the International Nutrition Foundation.

In an effort to insure that groundbreaking research in human nutrition continues, The Vernon R. Young Commemorative Fund has been established under the auspices of The International Nutrition Foundation (inffoundations.org). The fund will accept contributions to support international fellowships in the field of nutrition as memorials to Young's life and work.

MIT EVENT HIGHLIGHTS DECEMBER 15 - 19

Science/ Technology | Performance | Architecture/ Planning | Humanities

Music | Exhibit | Reading | Special Interest

Business/ Money | Film | Sports | Featured Event

Clipperships

The MIT Museum presents 19th-century lithographs, rare plans, photos and exceptional models of clipperships with a focus on design, contruction and social experience, through July 10. Free with MIT I.D.

WEDNESDAY December 15

"Visualizing Physics: Trans-forming Science Learning at MIT"
Get an insider's view of how MIT is redesigning the way it teaches physics, through Feb. 13. 10am-5pm. MIT Museum. 253-4444.

Artist Behind the Desk
Reading by poet Karyn Crispo Jones, administrative assistant, Department of Materials Science and Engineering. Noon-1pm. Room 14E-304. 253-9821.

Object Lesson: Amazing Bubbles
Learn about MIT Professor Emeritus Irwin Pless' experience helping to design one of the first bubble chambers. Noon-1pm. MIT Museum. 253-4444.

Israeli Folk Dancing (participatory)
Israeli Folk Dancing. 8-11pm. Lobby 13. 484-3267.

THURSDAY December 16

Nantucket Sound Wind Farm
Public hearing. 7-11pm. Room 10-250.

"The Eight: Reindeer Monologues"
MIT Community Players' production of play by Jeff Goode. $10, $8 MIT community, other students, senior citizens, $6 MIT/Wellesley students. Dec. 16-18. 8pm except 2pm on Dec 18. Kresge Little Theater. 253-2530.

Karaoke Night at the Thirsty Ear
Must be over 21. Proper ID required. 8- 11pm. The Thirsty Ear Pub. 258-9754.

Bodhicitta
Meditation and discussion on the enlightened mind. 7-8pm. Chapel. 324-6030.

FRIDAY December 17

"Body Parts: A Self-Portrait by John Coplans"
Series of 26 large-scale, fragmented self-portraits. Noon-8pm. List Visual Arts Center. 253-4680.

Plasma Science and Fusion Center Seminar
Randy Wilson, Princeton Plasma Physics Laboratory, talks on power absorption during high harmonic fast wave heating on NSTX. 4-5pm. Room NW17-218. 253-8101.

List Visual Arts Center Gallery Talk
Led by curator Bill Arning. 6pm. List Center. 253-4680.

Weekly Anime Screening
MIT Anime Club presents the best of Japanese animation. 7pm. Room 6-120.

SATURDAY December 18

"Cerith Wyn Evans: Thoughts unsaid, now forgotten"
Cerith Wyn Evans' concurrent exhibitions at the MIT and the Museum of Fine Arts Boston. Noon-6pm. List Visual Arts Center. 253-4680.

"Yael Bartana: Three Works"
Exhibit by Israeli artist Yael Bartana. Noon-6pm. List Visual Arts Center. 253-4680.

For PhD's: Manager, Researcher or Professor?
Professor Lloyd Baird talks about the differences among the roles of manager, researcher and professor. 3-4:30pm. Room 6-120. 253-4733.

Christmas Dinner
Celebrate Christmas the Buddhist way. Sponsored by the Sri Lankan Students' Association. 7pm. McCormick Penthouse. 225-6464.

SUNDAY December 19

"Iquarium"
A virtual fluid flow display. Hart Nautical Gallery. 9am-8pm. 253-5942.

Dim Sum Cultural Event
Noon-2pm. Eastgate Penthouse.

MIT Museum
Free admission. See how far an idea can go. Noon-5pm. 253-5927.

International Folk Dancing (participatory)
8-11pm. Lobdell Dining Hall. 253-FOLK.

Go Online! For complete events listings, see the MIT Events Calendar at: http://events.mit.edu.
Go Online! Office of the Arts website at: http://web.mit.edu/arts/office.

Energy secretary nominee has strong ties to MIT

Sarah H. Wright
News Office

Samuel W. Bodman, a chemical engineer with strong ties to MIT and extensive experience in both the private sector and public service, has been named secretary of the U.S. Energy Department by President George W. Bush.

Bodman, 66, is currently deputy secretary of the treasury. He served as deputy secretary of commerce from 2001 to 2004.

Susan Hockfield, president of MIT, said of the announcement, "I am delighted that President Bush has nominated Sam Bodman—a distinguished MIT alumnus, a former member of our faculty, and a former Institute trustee—to be secretary of energy. In this new role, Dr. Bodman will exemplify MIT's longstanding commitment to public service, which he has upheld as deputy secretary of commerce and deputy secretary of the treasury."

The Chicago native received the Sc.D. degree in chemical engineering from MIT in 1965. He was an associate professor of chemical engineering for six years before entering the private sector. He is a former director of MIT's Chemical Engineering Practice School, a former member of the MIT Commission on Education and a former member of the executive and investment committees at MIT.

If confirmed by the Senate, Bodman would replace Secretary of Energy Spencer Abraham. Impending challenges for Bodman in his new office will include getting Congress to enact energy legislation and untangling legal and financial problems related to cleaning up the Yucca Mountain nuclear waste dump.

According to Bodman, these intricate and daunting challenges add up to a job that would "combine all aspects of my life's work." One theme connecting his research, teaching and government service is "dealing with the financial markets and the impact of energy and technology on those markets," he said.

DJ

Continued from Page 1

And a lot of that is required.

"Only about 50 percent of the beginners have it down at the end," of the course, said Blackmore. "The ones who learn it are the ones who practice." The large variety of mixing options—like playing one song's vocals over another melody—make for a steep learning curve.

One of the hardest skills to master is "beat juggling," said Guarda. "Beginner DJs would start by practicing 'looping'—which is just looping the same section over and over again by using two copies of the same record to keep a certain phrase or bar playing over and over again," he said. "The next step is to only use parts of the phrases or bars and specific sounds, like a snare, when 'juggling' back and forth between the two records to change up the beat and make it sound completely different."

By mastering these skills, a DJ can put her own personal touch into any party. But it can seem overwhelming to those new to the turntables.

"I was really surprised by how much went into it," said junior Christian Deonier, a junior in electrical engineering and computer science who took the beginner's course that wrapped up Dec. 8.

Originally, he took the class because it "sounded interesting" and wasn't expensive. He was surprised by the skill it took, but not daunted. He plans to continue practicing in the Dance Mix studio.

Though often a pricey hobby—DJs often supply their own records—some choose to parlay their pastime into a paying gig. Dance Mix Coalition can help with that as well. The club currently has a roster of 10 DJs who staff campus events and parties and offer music to suit the customer's taste.

To find out more, see the Dance Mix Coalition's web site (mitdmc).

IAP ARTS SMORGASBORD

Music

Music offerings include an audio history of Russian popular music of the 18th to 20th centuries ranging from folk to Soviet to rock; change ringing in Boston's Old North Church tower; Middle Eastern rhythms on the dara bukka/ dumbeg, an hourglass-shaped drum; a sea chantey sing-along; and an experimental musical instrument workshop in which participants build, play and record experimental musical instruments with guest artists.

Dance

If you're looking for movement more codified than stomping the slush off your boots, try Rueda, swing, ballroom, break and contra dance.

Film

Participants can make their own film in a filmmaking workshop or make a short film using miniature sets, stop-motion animation and a robotic camera rig in an animation workshop. IAP also offers a marathon of the documentaries of South African filmmaker Angus Gibson and a series of films from the Middle East.

Theater

Learn the basics of improv comedy with Roadkill Buffet or hear the iambic pentameter of Shakespeare Ensemble's Scene Night. A Friday night coffeehouse series titled "Think" will focus on searching for the meaning of life through poetry, skits, joke-telling, monologues, songs and scenes.

Visual Arts

Visual arts offerings include beginning life drawing, photography and darkroom techniques, sketching, watercolor, printmaking, pottery and clay carving. MIT Cable Television offers a gallery for these creations with the ArTtV art competition. Members of the MIT community can vote for their favorites.

CLASSIFIED ADS

Members of the MIT community may submit one classified ad each issue. Ads can be resubmitted, but not two weeks in a row. Ads should be 30 words maximum; they will be edited. Submit by e-mail to ttads@mit.edu or mail to Classifieds, Rm 11-400. Deadline is noon Wednesday the week before publication.

FOR SALE

37 gallon fishtank w/accessories, $50. 24" oak bathroom vanity, $100/bst. Table w/inside leaf, 5 chairs, $200/bst. HP P166 computer w/15" Sony monitor, $50/bst. Don at 978-692-4764 (8–4) or 978-957-2774 (after 4:30) or drs@haystack.mit.edu.

Black Capezio "character" shoes, 8.5 Medium, worn twice. Perfect condition and perfect for tango. Were $70, now $45. 452-3841 or jcraig@mit.edu.

HOUSING

Malden: 1 BR: Spacious 1st floor in 2-fam: LR, DR, eat-in kitchen, full bath, hdwd floors, half furnished, near public trans., off st. parkng., W/ D, dishwasher, refrig. No pets--available now. $950/mo. 617-650-9636 or haverty@mit.edu.

Cambridge: 1BR, $1,200/mo. Utils included. 1st floor in 2-fam, kitchen, bath, DR, LR. Spacious closets. Upright piano. Walkable to Harvard & MIT; near river/subway/bus. Cats ok. Mike at mike.amato@post.harvard.edu.

Arlington: furnished room, near public trans., off st. prkng. Own TV and fridge, kitchen privileges. $500/mo. Security deposit/references required. Avail. now. 781-648-7425.

WANTED

One or two persons to live in house near Boston College during January 2005. No chores. M.Tisza@comcast.net.

Temporary housing 3/1/05 - 4/15/05. Looking for a furnished apartment in Cambridge for visiting parents. MichalAkavia@yahoo.com.

STUDENT JOBS

Positions for students with work-study eligibility.

The Fair Housing Center of Greater Boston seeks intern to assist w/case investigations, public policy research regarding enforcement of fair housing laws. Min. 10hrs/wk w/$11-$12/hr compensation. Ginny Hamilton at (617) 399-0491x102 or ghamilton@bostonfairhousing.org.

Rec Place Afterschool is looking for coaches/ teachers. Camp experience a plus, especially sports or carpentry skills. In Newton near T. Good perks and pay. 617-332-7327.