SWAGER NAMED FACULTY DIRECTOR OF DESHPANDE

Timothy M. Swager, the John D. MacArthur Professor of Chemistry, has been named faculty director of the Deshpande Center for Technological Innovation. His appointment, announced at the center’s annual research showcase, IdeaStream, is effective May 1.

“Professor Swager's background in world class research and technology commercialization, and his leadership within MIT’s Chemistry department will be great assets to the center,” says Deshpande Center founder Desh Deshpande. “Tim’s proven ability to impact the world with his ideas will allow him to play a key role in leading MIT's innovation agenda.”

Swager will replace Charles Cooney, the Deshpande Center’s faculty director since it was founded in 2002. Under Cooney’s direction, the center has awarded more than $13,000,000 in grants to more than 100 MIT research projects; these projects have lead to the formation of 28 spinout companies that have raised over $500 million in investment capital. “The Deshpande Center is grateful to Charlie for his unwavering commitment to innovation,” says the center’s executive director, Leon Sandler. “He has played an integral role in our success, and the center’s programs have thrived under his leadership.”

Swager has published more than 300 peer-reviewed papers, and has more than 50 issued or pending patents. He has served on a number of corporate and government boards, and he is the cofounder of four companies including C2Sense, a Deshpande Center-funded spinout company.

“As a two-time Deshpande grantee, I have benefitted from its transformative role in guiding the entrepreneurial activities of faculty and students,” Swager says. “The Center has had a tremendous impact on the transition of MIT inventions, and I am excited to steward this precious resource. I look forward to examining new models for directing, seeding, and fostering the commercialization of MIT’s research for the benefit of society.”

The Deshpande Center is part of the MIT School of Engineering and was established through an initial gift from Desh and Jaishree Deshpande. It is sustained by the generosity of alumni, friends, and corporations. The center serves as a catalyst for innovation and entrepreneurship by supporting leading-edge research and bridging the gap between the laboratory and marketplace. Additional information on the Deshpande Center’s grant program, research portfolio and other entrepreneurial resources can be found at http://deshpande.mit.edu.

A Peek Inside!

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More than half of all cancer patients who receive chemotherapy are treated with drugs containing platinum. These drugs are very powerful, but like many other chemotherapy agents, they can have side effects and may provoke resistance in tumor cells.

Although platinum-based drugs have been used since the late 1970s, it has taken scientists decades to fully understand how they work. “It’s a very simple question but it has a complicated answer,” Stephen Lippard, the Arthur Amos Noyes Professor of Chemistry at MIT, said during his April 7 James R. Killian Jr. Faculty Achievement Award Lecture.

For his contributions to unraveling the mechanism of how platinum drugs kill cancer cells, Lippard, one of the founders of the field of bioinorganic chemistry, was awarded this year’s Killian Award. “His groundbreaking work has pushed back the frontiers of inorganic chemistry, while simultaneously paving the way for improvements in human health and the conquering of disease,” reads the award citation.

“It’s a great honor for me to be here,” Lippard said after receiving the award from Steven Hall, chair of the MIT faculty and a professor of aeronautics and astronautics. “It’s very humbling to be selected by one’s peers for this honor.” Click here to watch a video of the lecture.

Powerful drugs

When Lippard began his scientific career in the 1960s, the biological activity of the first platinum drug, cisplatin, had just been identified. The discovery was serendipitous: Michigan State chemist Barnett Rosenberg was investigating the effects of electric fields on the growth of E. coli bacteria, which stopped dividing and grew into long filaments. He eventually realized that platinum leaching from the electrodes used in the experiment was reacting with ammonium chloride in the bacteria’s environment to produce cisplatin, which induced the filamentous growth without the electric field.

Subsequently Rosenberg showed that cisplatin could shrink tumors in mice, and the National Cancer Institute began running clinical trials; the Food and Drug Administration approved the drug for treatment of cancer in 1978. Since then, two related platinum drugs, carboplatin and oxaliplatin, have also been approved to treat cancer.

Cisplatin, the simplest of the three, consists of an atom of platinum bound to two molecules of ammonia and two chloride ions. In carboplatin, the two chloride ions are replaced by a more complicated structure, a cyclobutane dicarboxylate. Oxaliplatin has an even more complex architecture, with the central platinum atom bound to two separate ring structures.

After receiving his PhD from MIT in 1965, Lippard joined the faculty at Columbia University and began investigating how these drugs worked, with a focus on their impact on DNA. He continued this pursuit after...
NELSON ELECTED TO AMERICAN ACADEMY OF ARTS AND SCIENCES

P rofessor Keith A. Nelson has been elected to the American Academy of Arts and Sciences.

One of the nation’s most prestigious honorary societies, the Academy is also a leading center for independent policy research. Members contribute to Academy publications and studies of science and technology policy, energy and global security, social policy and American institutions, and the humanities, arts, and education.

“It is a privilege to honor these men and women for their extraordinary individual accomplishments,” said Don Randel, Chair of the Academy’s Board of Directors. “The knowledge and expertise of our members give the Academy a unique capacity – and responsibility – to provide practical policy solutions to the pressing challenges of the day. We look forward to engaging our new members in this work.”

Click here to read the list of new members.

The new class will be inducted at a ceremony on October 11, 2014, at the Academy’s headquarters in Cambridge, Massachusetts.

GABRIELA SCHLAU-COHEN TO JOIN THE DEPARTMENT

D r. Gabriela Schlau-Cohen, currently a postdoctoral fellow at Stanford University, will join the department as an assistant professor on January 16, 2015.

Dr. Cohen received a B.S. from Brown University in 2003 and a Doctor of Philosophy from the University of California Berkeley in 2011.

Research in the Schlau-Cohen group will use a combination of single-molecule and ultrafast spectroscopies to explore the energetic and structural dynamics of biological systems.

There are two major research thrusts. The first is developing new methodology to measure ultrafast dynamics on single proteins, which will be a means to study systems with both sub-nanosecond and second dynamics. The second merges optical spectroscopy with model membrane systems to provide a novel probe of how biological processes extend beyond the nanometer scale of individual proteins.

Inspired by the need to harness sunlight, one application of these approaches will be exploring the underlying mechanisms of photosynthetic light harvesting. Photosynthetic organisms convert absorbed sunlight to electricity with remarkable near unity quantum efficiency by transporting energy through a network of proteins. To understand the mechanisms behind this fundamental process, experiments will probe both the heterogeneity of the individual proteins and how they are wired together to produce efficient and adaptive systems.
returning to MIT in 1983, eventually building up evidence that platinum drugs bind to DNA at specific locations, forming cross-links. These linkages prevent the cell from transcribing the genes necessary to initiate cell division, so the cells become unable to divide and undergo programmed cell death, or apoptosis.

“From that understanding, our ultimate goal was to see if we could make improved drug candidates,” said Lippard, who is a member of MIT’s Koch Institute for Integrative Cancer Research.

New modes of attack

Although platinum drugs have been used successfully to treat many types of cancer — especially testicular cancer — they also have limitations: The drugs can have significant side effects, and cancer cells can become resistant to them, allowing tumors to recur. “That has led us, and others around the world, to look at nonclassical platinum compounds,” Lippard said.

In one approach Lippard described, he and others are modifying cisplatin by adding two more chemical groups that have their own anti-cancer activity. After entering a cancer cell, the two components are released, generating cisplatin in the process, and together they attack the cell on multiple fronts. In one early example, Lippard attached cisplatin to a drug known as DCA, which interferes with cancer cell metabolism, forcing them to undergo apoptosis.

Although the DCA-platinum compound proved powerful against cancer cells, Lippard said he doesn’t believe it will be developed as a cancer drug. However, this work demonstrated that such an approach is viable: “It shows that we can alter two different types of processes in cancer cells, which I think would make it much more difficult for them to become resistant and hopefully would lead to clinical success,” he said.

He also described efforts to package cisplatin into targeted nanoparticles, which could help minimize the drug’s side effects and also deliver it directly to cancer cells. He is one of the founders of a company called Blend Therapeutics that is developing this and other approaches to treat cancer.

Another way to improve platinum drugs, Lippard said, is to replace one chloride ion with a large chemical group to form a complex that impedes the transcription of DNA in tumors but without forming cross-links. Earlier research had suggested that neutral platinum compounds with two DNA-binding sites that form cross-links are required to kill cancer cells, but more recent studies have shown that some positively charged “monofunctional” platinum compounds with only one DNA-binding site also have anti-cancer activity.

In a study published in 2012, Lippard showed that a compound called phenanthriplatin, in which one chloride ion is replaced by a bulky three-ring structure, was four to 40 times more potent than cisplatin in a screen of many types of cancer cells. The next step is to test the compound’s effectiveness in animals, he said, which, with additional improvements, may lead to a clinical trial.

“We’re pretty excited about it and we think that phenanthriplatin and compounds like it could be developed and go forward,” Lippard said. “I would like to cure at least one person of cancer before I leave the planet.”
On Tuesday, March 18, 2014 at the 247th American Chemical Society National Meeting in Dallas, Texas, Professor Stephen J. Lippard, Arthur Amos Noyes Professor of Chemistry, was awarded the 2014 Priestley Medal. The Priestley Medal is the highest honor conferred by the American Chemical Society (ACS) and is awarded for distinguished service in the field of chemistry. Professor Lippard has spent his career studying the role of inorganic molecules, especially metal ions and their complexes, in critical processes of biological systems. He has made pioneering contributions in understanding the mechanism of the cancer drug cisplatin and in designing new variants to combat drug resistance and side effects. His research achievements include the preparation of synthetic models for metalloproteins; structural and mechanistic studies of iron-containing bacterial monooxygenases including soluble methane monooxygenase; and the invention of probes to elucidate the roles of mobile zinc and nitric oxide in biological signaling and disease.

Professor Lippard's acceptance address can be read in full in Chemical & Engineering News. An article titled "Trailblazer And Mentor" by Bethany Halford is also feature in the same issue. Click here to read the article in full.

5.301 IAP 2014 CHEMISTRY LABORATORY TECHNIQUES

5.301 IAP 2014 was a very good experience for all 14 students. Of the 14 students enrolled, 12 completed the course with a passing mark. The course proved to be intensive for all, requiring a major time commitment from each student starting at 10am in the morning and extending to late afternoons and sometimes, early evenings. The twelve students worked exceedingly well together and gained the confidence needed to take on a UROP appointment in their spring semester as freshmen. Dolhun, instructor for the course says: “this was a very celebratory group, the students inspired each other to work hard and be creative.”

The 5.301 students have reported back and these are the groups they joined for UROP’s: Anni Zhang (Stephen Buchwald), Nolan Concannon (Yogesh Surendranath), Chen Wang (Yogesh Surendranath), Nagisa Tadjfar (Mircea Dinca), Emma Chant (Mircea Dinca), Samantha Briasco-Stewart (Defer), Zi-Ning Choo (Bradley Pentelute), Lane Gunderman (Adam Willard), Justin Bader (Offered position at MGH pancreatic cancer research), Jareatha Abdul-Raheem (Stephen Lippard), Willie Chen (Unknown), Eli Sadovnik (Robert Griffin).
In 2012, Karen King, Hollis Professor of Divinity at Harvard University, approached the Swager Lab with an interesting request. She had obtained some years previously (from an anonymous donor) a papyrus fragment written in Egyptian Coptic making reference to a wife of Jesus. An important and controversial document for early Christian history, it was immediately determined that the veracity of the fragment would need to be independently verified. On November 5, 2013 Prof. King transported two papyrus fragments, hereafter referred to as the Gospel of Jesus’ Wife (GJW) and the Gospel of John (GosJohn), to the Center for Materials Science and Engineering (CMSE) at the Massachusetts Institute of Technology. The CMSE is home to a Fourier transform infrared microspectrometer (μ-FTIR), which is an instrument that combines a Fourier transform infrared spectrometer with a microscope. Through the identification of specific types of chemical bonds in a material, this instrument allows for a non-destructive, highly sensitive method for surface analysis of materials. A team was assembled to utilize this instrument for the analysis of GJW in order to determine if its chemical composition matches what would be expected of an ancient papyrus fragment. The other papyrus document, GosJohn, was used as a control.

The team for this analysis included Professor King (pictured second left) who conducted the transfer of the samples to the microscope, Professor Timothy Swager, the John D. MacArthur Professor of Chemistry at MIT, (far left) who provided technical guidance, and two graduate students from his lab, Joseph Azzarelli (far right) and John Goods (third left) who performed all spectroscopic measurements. The CMSE facility FTIR manager, Timothy McClure (not pictured) provided initial training for the use of the microscope.

The results have been published in the Harvard Theological Review / Volume 107 / Issue 02 / April 2014, pp 131-159

Click here to read the Harvard University Divinity School Press Release and Click here to read the New York Times article

JOHNSON RECEIVES MITEI SEED FUNDING

In March, the MIT Energy Initiative (MITEI) announced its latest round of seed grants to support early-stage innovative energy projects. A total of more than $1.6 million was awarded to 11 projects, each lasting up to two years. With this latest round, the MITEI Seed Fund Program has supported 129 early-stage research proposals, with total funding of about $15.8 million.

Assistant Professor Niels Holten-Andersen of materials science and engineering and Assistant Professor Jeremiah Johnson of chemistry will receive funding. Professor Niels Holten-Andersen and Johnson are working to combine metallosupramolecular assembly with polymer networks to create a new class of hybrid metal-organic materials. These novel materials will unite the well-controlled physical properties of polymers with the promising functional properties of metal-facilitated self-assembly. The materials will be versatile, robust, and capable of self-healing and “tunable” self-assembly. They can thus be optimized for applications such as carbon capture, wastewater filtration, and natural gas storage, and for use in devices including fuel cells, rechargeable batteries, and solar cells. For their work on combining metallosupramolecular assembly with polymer networks to create a new class of hybrid metal-organic materials.
"Why should I learn this?"

by Anique Olivier-Mason, Howard Hughes Medical Institute Technical Instructor, Drennan Lab, Dept. of Chemistry.

"This article first appeared in the March 2014 issue of the MIT STEM Pals newsletter, http://blossoms-newsletter.mit.edu/stem/2014-march.html, published by MIT BLOSSOMS. We thank the BLOSSOMS team for granting permission."

When I was 25 years old, I served as a forensics expert for the Innocence Project. The volunteer position was one of several personally transformative experiences I had while working my "day job" as a forensic biologist for the City of New York. On their website, the Innocence Project describes itself as a “national litigation and public policy organization dedicated to exonerating wrongfully convicted individuals through DNA testing and reforming the criminal justice system to prevent future injustice.” That may be what the organization means to the most people, but to me, it finally answered a question that had been nagging me throughout my education—how were the topics I studied in STEM courses related to the real world? For years, I had dutifully learned about various concepts that seemed totally disconnected from the world I lived in and cared about. At the Innocence Project, I saw how the bench work I had been doing was not in a vacuum, but rather it directly impacted someone else’s life and was important. That realization sparked a curiosity about the biological foundation of forensics that inspired me to pursue advanced study in graduate school.

Now that I am an instructor at MIT in Professor Drennan’s Education Laboratory, I am involved with several educational projects that emphasize the authentic nature of science and help high school and college students see why they should learn and care about different STEM concepts. Educational research supports our emphasis on motivation—there is a direct correlation between inspiration and persistence in science. I’ll describe two easy ways to implement suggestions from our work that can be done in any classroom.

Provide students with an example of an interesting application of a concept as a way to motivate them to learn about its intricacies. One way this can be done easily is by embedding short videos into your class. [The Drennan Group] has published online a series of videos, Behind the Scenes at MIT, that highlight the who and the why of chemistry (see the July-August 2013 announcement in STEM Pals). While all less than three minutes, the videos manage to relate specific textbook chemistry concepts to cutting-edge research in medicine, the environment, or alternative fuels and have been embedded within high school and college classes worldwide. Here at MIT, after a student saw the videos in his introductory chemistry class, he commented, “I saw that there was actually an impact in what they were doing. They were changing the world. That’s important I think, that’s important to me.”

Invite a scientist into your classroom either virtually or in-person. Instead of just talking about why learning a STEM concept is important, having a scientist describe how the concept is critically relevant to her research can be a life-changing moment for your students. For many K-12 students, this might be their first interaction with a working scientist and could be an opportunity to dispel the various myths about what type of person becomes a scientist and what scientists actually do while at work. Many graduate students and post-doctoral fellows are eager to meet K-12 students and don’t have the same time constraints as professors. To get in touch with a scientist, you can contact the outreach or education office at your local college or university. Teachers in the Greater Boston-area should consider attending There’s a Scientist in My Classroom, a bi-annual teacher-scientist workshop at MIT; at these workshops, we have helped dozens of teachers find a scientist to visit their classrooms. The next events will be in the fall of 2014.

Teaching a STEM subject in today’s world is exciting because science touches so many parts of people’s everyday lives. While those connections may seem obvious to those of us in the STEM fields, it is critical that as educators we remind our students of these connections and the relevance of each lesson—something that can be accomplished by spending less than three minutes of each class on a real-world example. Such efforts to bring the real world into the high school classroom may ignite in some students a passion for science they had not anticipated.
M y trip to Istanbul this past spring break was one of the most amazing experiences I’ve had at MIT. As part of the MIT-Sabanci University Freshman Scholars Program, I was one of eight MIT sophomores, chosen based on freshman year academic performance, who visited Sabanci University in Istanbul over spring break. Our counterparts from Sabanci are currently visiting MIT this week on their spring break. While in Istanbul, we sat in on classes at Sabanci, made new friends, and toured the city, visiting historic mosques and bazaars, and experiencing the rich culture (and cuisine!) of Turkey.

Sabanci University is beautiful, with a sprawling, tree-lined campus an hour outside of Istanbul. Classes there are not unlike MIT classes, with lectures, recitations, and labs. The language of instruction at Sabanci is English, so as to attract world-class faculty who might not speak Turkish. My fellow MIT students and I enjoyed attending classes on such varied topics as computer science, biology, art history, and visual art. It was a welcome break from our normal routines of taking mostly classes in our majors. My favorites were the classes on game theory and typographical design.

Most classes at Sabanci have two- or three-hour-long lectures, much longer than the typical one-hour lecture here at MIT. The instructors would give the class a 10- to 15-minute long break in the middle of class, to allow for students to ask questions, get coffee, or simply socialize. This was surprisingly effective at keeping everyone focused throughout the lecture. In visiting classes at Sabanci, I realized how well MIT has prepared all of us in the STEM fields: my friend Kathryn and I, neither of us physics majors, were able to listen in on a graduate-level laser optics class and understand nearly everything.

The city of Istanbul is truly a marvel to behold. Known variously as Byzantion, Augusta Antonia, Nova Roma, and Constantinopolis over the millennia, its current name comes from istimbolin, a Greek phrase meaning “in the city.” And it deserves every bit of that name. As a born-and-bred New Yorker, I was impressed by the sheer magnitude of Istanbul, which seemed to dwarf even New York City. Our host, Sabanci University’s President Nihat Berker (an MIT Course 5 alum and Professor Emeritus of Physics), took us to see the historic Hagia Sophia, which had served as a Byzantine basilica, an Ottoman mosque, and now a museum. We saw the Basilica Cistern, a huge underground reservoir for water from the Roman aqueducts, which are still visible around the city today. We visited the Topkapi and Dolmabahçe palaces, which had housed the Ottoman sultans and their harems in splendor and opulence for centuries.

We walked through local marketplaces and tried dondurma, a Turkish dessert resembling sticky, chewy ice cream, traditionally served by street vendors who serve the ice cream on a long stick and pull it away or toss it around several times before finally handing it to the customer. We sampled delicious Turkish dishes like stuffed apricots, eggplant with yogurt, baklava, and lamb kebabs. We took a boat cruise up and down the Bosphorus straight, which separates Europe from Asia, and enjoyed a meal of fish caught in the Black Sea. Several of us fell in love with sour cherry juice, a ubiquitous drink in Turkey, and took up drinking it with every meal for the rest of spring break.

When it came time to return home, I was truly sad to go. My trip to Istanbul and Sabanci University has been a remarkable once-in-a-lifetime experience. I got to know my companions from MIT well, and made friends with the Sabanci students who are now visiting Boston. I’m very excited to someday visit Turkey again and explore even more of its culture and history!
On March 9th, Professor Cathy Drennan delivered the keynote address for the Girl Scouts of Eastern Massachusetts “Changing the World Through STEM: Teen Career” Expo in Framingham, MA. The expo was an opportunity for girls in grades 6-12 to spend the day exploring STEM careers and hearing from inspirational scientists and educators. Professor Cathy Drennan shared her personal journey about becoming a chemist at MIT and encouraged the girls to see themselves as scientists and later pursue careers in the STEM fields.

5.062 SYMPOSIUM AT ENDICOTT HOUSE

Toward the end of the fall term, students enrolled in 5.062, Principles of Bioinorganic Chemistry taught by Professor Stephen Lippard, gather at MIT’s Endicott House in Dedham, MA, to confer on primary literature topics related to the principles of the course. Each student has first chosen a topic from a wide range of leading articles and then researched it by reading background and related literature including reviews. After discussions with Professor Lippard, the students write an abstract for their presentations and prepare a 10-page paper.

On March 22, 2014, an all-day course symposium was held giving each student an opportunity to present a 20 minute presentation on their topic followed by 10 minutes of questions and answers. In this manner, current research topics are covered that significantly extend the knowledge base imparted by 5.062, and the class gains experience in public speaking as well as interaction with peers in a forum designed to probe research at the forefront of bioinorganic chemistry. The cost of using the facilities has been underwritten by a generous grant from Strem Chemical Co.

ADVENTURES DOWN-UNDER

Chemistry alum, James D. White, PhD '65 (with George Buchi), traveling with an MIT alumni group is seen here (far left) on his recent visit to Australia and New Zealand in February. The banner in the photo has traveled with Dr. White on his MIT alumni travel tours to many parts of the world.

The group is in front of the remarkable "Uluru" (also known as "Ayer's Rock"), in the Northern Territory. "The sunset photo with the rock in the background does not do justice to this spectacular setting," said Dr. White, "but it does prove there is an MIT presence even in the remote Australian outback!"
On Saturday, April 19, 2014, the Dolhun team once again participated in the Science Carnival component of the Cambridge Science Festival, now in its eighth year.

The team's two spectacular shows, "Marvelous Molecules in Play," sponsored by the MIT Chemistry Department and MIT Boston Alumni Association, took place in the Cambridge Public Library Auditorium to packed houses.

The team was made up of (team leader) John Dolhun, Chemistry PhD '72, who is an Instructor in the MIT Department of Chemistry Undergraduate Labs; Nathan Sanders who is defending his PhD in Astrophysics at Harvard University at the end of April; Shannon Morey who has an advanced degree from MIT Chemistry and who has recently accepted a new position at an East Boston High School for the fall, 2014; William Watkins and Zaid Zayyad who are both seniors at MIT and both former 5.310 students, and Katy Chiang who has advanced degrees in Chemistry and is a Re-Seed Volunteer from Northeastern University.

Photography by Nathan Sanders

CO₂ bubbles in the palm of their hands
Knock your soxs off reaction

Reaction illustrating the expansion of liquid N₂ as a gas
Putting some Easter Peeps under vacuum
MIT Strong marathon runner developing 'bomb-sniffing' sensors

By Nicole Estvanik Taylor, MIT Spectrum

MIT [chemistry] graduate student Joseph Azzarelli's research focuses on developing low-cost, sensitive sensors that could potentially be used to detect bombs — and help prevent tragedies like last year's Boston Marathon bombings.

On April 21, Azzarelli, a PhD chemistry student, ran 26.2 miles in honor of slain MIT Police Officer Sean Collier as part of the MIT Strong marathon team. While that finish line is now behind him, his hours in the lab working on these "bomb-sniffing" sensors have become, in their own way, a sustained response to the bombings.

As part of the Swager Lab, Azzarelli is developing sensors that can detect gases in very low concentrations. In the hands of anti-terrorism teams, he explains, these could be valuable tools for detecting toxic gases and finding undetonated explosives — which emit trace amounts of telltale molecules, usually sniffed out by trained dogs.

Even when certain chemicals are essentially molecular "needles" in the environmental "haystack," their presence can be "very meaningful in terms of the information it conveys," Azzarelli notes. This type of data could also be useful in a variety of other applications — such as grocers monitoring food spoilage or factory owners concerned with air quality.

But Azzarelli ticks off three major hurdles in his research. The first, signal transduction, is in the chemistry: "What are the underlying properties of materials you can exploit to maximize the output from the smallest input?" he says. Challenge two, he says, is fundamentally an engineering problem: "How do you take a process that works in a lab setting and put it into devices that will function in the real world" — and, ideally, are wireless, and can withstand harsh weather and rough handling? His ultimate concern, however, is cost: For cities and businesses to adopt this technology, the devices and materials must be inexpensive and commercially available.

Azzarelli went into this research with the belief that making "chemical insight" accessible could have a host of societal benefits, including public safety. And that makes sense to him on a personal level. "I'd been keenly aware of the groundbreaking counter-explosives work that members of the Swager Group had accomplished before I came to MIT, and had helped to implement in places like Afghanistan and Iraq," he says. "But last year's bombings in Boston made me realize the global importance of this work."

FIVE CHEM MAJORS INDUCTED INTO PHI BETA KAPPA

The following Chemistry seniors are to be inducted into Phi Beta Kappa this year. They are honored in recognition of their "excellent academic records and commitment to the objectives to a liberal education."

- Arunima Balan
- Eun Young (Alice) Choi
- Daniel Mokhtari
- Katherine Silvestre
- Sasilada Sirirungruang

The annual Phi Beta Kappa lecture and initiation ceremony will be held on Thursday, 5 June, at 3:00 p.m. in 32-123. This year’s lecture will be by Professor Emma Teng, MacVicar Faculty Fellow and winner of the Levitan Prize in the Humanities. Her talk, "Crossing Boundaries: The Hidden Histories of Transnational and Mixed Families in the US, China and Hong Kong, 1842-1943," will be followed by the initiation ceremony for newly elected members and a celebratory reception.
As a student-organized seminar series, CSS relies exclusively on the support of our generous donors. If you are interested in contributing to the development of this program, please contact us, Team CSS.*

After another month of intellectually-stimulating Chemistry Student Seminars, we are pleased to bring you a brief recap of this month’s talks. We have continued to give out our 2014 CSS mugs to this month’s speakers and have been pleased to see attendees/former presenters drinking coffee from their new mugs!

This month began with a talk from Sebastién Rochat, a post-doc in the Swager lab. He summarized his post-doctoral work on the synthesis and chemosensing applications of several conjugated polymers, specifically in the detection of caffeine in everyday consumables or in the detection of toxic chemicals (e.g. amines) in ambient conditions. When asked about his experience he said he, “enjoyed the informal atmosphere, the audience’s participation...and the souvenir mug!”

Chi Zhang presented a talk on his collaborative work as a second year graduate student in the Pentelute lab on developing chemical and enzymatic cysteine arylation methods to modify one cysteine in the presence of other unprotected cysteines in the same protein chain. Chi also mentioned that he enjoys the pressure-free environment that CSS provides and that he received feedback that will be quite helpful for his future research.

The following week, we heard from Joseph Azzarelli, a third year graduate student in the Swager group, who presented work on a wireless, smartphone-based chemical sensing platform that has recently qualified him as a finalist in the running for the Lemelson-MIT prize. About CSS, he commented, “The CSS talks are an accessible way to meet other graduate students and post-docs in the department and to hear, first-hand, about the diverse work happening in other groups.”

We ended the month with a strong presentation from Dr. Melissa Zastrow, a new member of the Lippard lab. She spoke about her Ph.D. work in Vince Pecoraro’s lab at the University of Michigan. In her talk she described how de novo metalloprotein design can be used to generate dual-site metallopeptides where one metal-binding site offers structural stabilization and the other is a very efficient hydrolytic zinc site that models the active site of carbonic anhydrase.

This was another great month of informative and well-presented talks! Thanks to all the speakers and we look forward to our April seminars.

*CSS organizers
Markrete Krikorian – mk16@mit.edu
Katya Vinogradova – vinograd@mit.edu
Alexandra Velian – avelian@mit.edu

Chi Zhang

Aleksandr Zhukhovitksiy and Joseph Azzarelli

Melissa: “I enjoyed giving the talk and the questions and feedback I got were thought-provoking and interesting. I also enjoyed meeting a few new people!”
Carlos Bustamante, Howard Hughes Medical Institute Investigator and Professor of Molecular and Cell Biology, Physics, and Chemistry at the University of California, Berkeley, visited the department from April 22-23 inclusive to deliver the "T.Y. Shen Lectures in Biological Chemistry."

Professor Bustamante's first lecture was titled, "Division of Labor and Coordination Among the Subunits of a Viral Ring ATPase." The title of his second lecture was "Mechanisms of Cellular Proteostasis: Insights from single molecule approaches."

The T.Y. Shen Lectures in Biological Chemistry are made possible by Dr. T.Y. Shen who received his PhD from the University of Manchester in 1950 and did postdoctoral work at Ohio State University and the Massachusetts Institute of Technology where he worked with Arthur Cope. He then spent many years at Merck, Sharp and Dohme Research Laboratories as the Executive Director of Synthetic Chemistry. He was involved in the development of analgesics, immuno-suppressants and anti-inflammatory drugs. He is best known for his contributions to the development of Indomethacin, a non-steroidal anti-inflammatory drug. For his contributions at Merck, he received the Director’s Scientific Award in the field of medicinal chemistry in 1975. Shen retired from Merck in 1986 and held the Merck endowed chair in Chemistry at the University of Virginia where he is now Emeritus. The Shen family endowed the lectureship in 2001.

The Shen family also recently endowed an Amy Lin Shen Summer Graduate Fellowship named in honor of T.Y.’s wife, Amy, who carried out graduate studies in physical chemistry at MIT under Professor George Scatchard. The inaugural fellow was appointed last summer.

BRISTOL-MYERS SQUIBB LECTURES IN ORGANIC CHEMISTRY

Professor Jeff Johnson, University of North Carolina, at Chapel Hill, and Dr. David Kronenthal, Vice President of Early Phase Chemical Development at Bristol-Myers Squibb, delivered the "Bristol-Myers Squibb Lectures in Organic Chemistry" on Thursday, March 20, 2014.

Professor Johnson's talk title was titled: "Case Studies of the "Reserpine Phenomenon": Late Stage Stereochemical Correction in Complex Systems." Dr. Kronenthal spoke on "Discovery and Development of a Scalable Synthesis for a New Drug Candidate."
NOVARTIS LECTURES IN ORGANIC CHEMISTRY

Professor Viresh Rawal, University of Chicago, and Dr. Sejal Patel, Novartis Institute for Biomedical Research, visited the department on March 27, 2014 to deliver the "Novartis Lectures in Organic Chemistry"

Professor Rawal spoke about design and development of hydrogen bond donors as enantioselective catalysts. The title of Dr. Patel's talk was: "Molecular Problem Solving: There is More to Medicinal Chemistry than Affinity."

Dr. Patel, PhD 2000 is an alumna of the Department of Chemistry having carried out her graduate studies in Professor Tim Jamison's group.

DAVISON LECTURES IN INORGANIC CHEMISTRY

Professor Chi-Ming Che, University of Hong Kong visited the department on April 2-3, 2014, to deliver the Davison Lectures in Inorganic Chemistry.

"Anti-Cancer Gold Medicines" was the title of Professor Che's first lecture and "Phosphorescent Metal Complexes with Long-Lived Electronic Excited States. Photophysics, Photochemistry and Applications" was the title of his second lecture.

The lecture is named for Professor Emeritus Alan Davison who retired in 2005. Professor Davison, Fellow of the Royal Society, elevated the art of inorganic chemical synthesis in his laboratories at MIT for more than four decades. A student of the late Sir Geoffrey Wilkinson, he made research contributions spanning organometallic, boron, coordination, and bioinorganic chemistry. The annual Davison lectures in Inorganic Chemistry were launched in 2006.

BRADLEY VISITS FOR INAUGURAL DISTINGUISHED ALUMNI LECTURE

On April 15, Joel C. Bradley, PhD ’75 (with George Büchi), founder and CEO of Cambridge Isotope Labs, presented a guest lecture “Stable Isotopes—2014. Unique tools in Scientific Research, Trace Analysis and Medical Diagnosis.”

The event was hosted by Laboratory Chemistry and was the first 5.310 Distinguished Chemistry Alumni lecture organised by Dr. John Dolhun who is an Instructor in the Chemistry Undergraduate Labs.

Dr. Bradley built and runs one of the world’s top Isotope Labs, which he started in Cambridge, Massachusetts after receiving his PhD in chemistry.
MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF CHEMISTRY

PLEASE JOIN US

Chemistry Undergraduate Research Symposium

Saturday, April 26, 2014

$250.00 Strem Prize for Excellence in Undergraduate Research will be awarded to a participating student

Poster Session
10am – 12 noon
R & D Commons (32-G401)
Stata Center, 4th Floor

Oral Presentations
12:30 – 2 pm
Room 32-155

Refreshments will be available and lunch will be provided.

Contact Allison Kelsey (akelsey@mit.edu) for more information.
SENIOR - SEAN KARSON

Course 5 Senior, Sean Karson, is having an excellent senior season for the MIT baseball team. Sean has helped lead the Engineers to a 12-5 league record, while batting .345 (2nd on his team, 8th overall in the NEWMAC).

Sean was highlighted on the MIT website after the April 8th game: http://mitathletics.com/sports/m-basebl/2013-14/releases/201404087j82g2

KINGA FERENCZI JOINS THE DEPARTMENT

Kinga Ferenczi has joined the department as a Financial Assistant II. Kinga has begun working as a member of the Chemistry Finance Team, providing financial and administrative support to Professors Schrock and Dinca, and financial support to Professor Shoulders.

Kinga comes to MIT from Budapest, Hungary, where she worked since 2006 for several multi-national companies including Global Diageo Business Services, ADECCO, and SOLFITEL. Her most recent experience was as Key Department Requisitioner in the Accounts Payable Department at Global Diageo Business Services. Prior to joining Global Diageo Business Services, she worked as a Financial Assistant in Accounts Payable at ADECCO, where she prepared financial reports and forecasts.

She received a Bachelors degree in Economics (Tourism and Hotel Management) from the Heller Farkas College of Economics and Tourism, Budapest, Hungary.

Kinga's office is located in 6-333 and she can be contacted at 253-9385 or ferenczi@mit.edu.

THE NATIONAL ACADEMIES

The National Research Council of the National Academies sponsors a number of awards for graduate, postdoctoral and senior researchers at participating federal laboratories and affiliated institutions. These awards include generous stipends ranging from $45,000 - $80,000 per year for recent Ph.D. recipients, and higher for additional experience. Graduate entry level stipends begin at $30,000. These awards provide the opportunity for recipients to do independent research in some of the best-equipped and staffed laboratories in the U.S. Research opportunities are open to U.S. citizens, permanent residents, and for some of the laboratories, foreign nationals.

Detailed program information, including online applications, instructions on how to apply, and a list of participating laboratories, are available on the NRC Research Associateship Programs Web site (see link above).

Questions should be directed to the NRC at 202-334-2760 (phone) or rap@nas.edu.

There are four annual review cycles.
Review Cycle: May; Opens March 1; Closes May 1
Review Cycle: August; Opens June 1; Closes August 1
Review Cycle: November; Opens September 1; Closes November 1
Review Cycle: February; Opens December 1; Closes February 1

Applicants should contact prospective Adviser(s) at the lab(s) prior to the application deadline to discuss their research interests and funding opportunities.

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Freie Universität Berlin’s North American liaison office, is seeking applications for 20 Post Doctoral Fellowships in multiple disciplines.

The “Postdoc International” POINT research fellowship program – co-financed by the German Excellence Initiative and the Marie Curie Program of the European Commission – provides funding for outstanding postdoctoral researchers from all disciplines to conduct their own research project at Freie Universität Berlin. The aim is to support highly-qualified postdocs with international research experience and to integrate them into the university’s research networks in an early phase of their career.

The POINT program was designed by Dahlem Research School at Freie Universität Berlin to promote the further academic career development through research funding, a tailored qualification program and the opportunity to develop teaching and leadership skills. The program furthermore provides essential professional guidance on preparing grant proposals to support POINT fellows in obtaining funding for follow-up research projects at Freie Universität Berlin.

Starting in January 2015, each research fellowship will be awarded for 18 months.

The call is open to experienced researchers of all disciplines and all nationalities who:

- hold a doctoral degree (the dissertation must be submitted and proof of this must be available by the application deadline)
- completed their doctoral degree no longer than 6 years before the deadline (starting with the date on the doctoral certificate)
- have not lived in Germany for longer than 12 months during the last 36 months before the deadline, 4 July 2014.

Female postdoctoral researchers and returnees from phases of international, inter-sectoral and/or non-academic mobility (such as researching outside Germany, working for industry or a career break e.g. due to family reasons) are specifically encouraged to apply.

Applicants have to submit a project plan based around the research fields/ key topics of the participating Excellence Projects or Focus Areas. (Information available here: http://www.fu-berlin.de/en/sites/promovieren/drs/drs_fellowships/incoming_fellowships_call2014/participating_exc_proj.html)

Deadline for applications: 4 July 2014, 12:00 noon (Berlin local time)
For further information please visit: www.fu-berlin.de/en/sites/promovieren/drs/drs_fellowships/incoming_fellowships_call2014

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**Faculty, postdoc, and other positions available**

For information on positions, please contact Liz McGrath, (emg@mit.edu)

<table>
<thead>
<tr>
<th>Institution/Company</th>
<th>#</th>
<th>Level of Hire</th>
<th>Area</th>
<th>Tenure Track</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Chemistry at Cinvestav, campus Zacatenco, Mexico City</td>
<td>1</td>
<td>Assistant Professor</td>
<td>General Chemistry</td>
<td>Unknown</td>
</tr>
<tr>
<td>The Institute for Neurodegenerative Diseases (IND) at the University of California, San Francisco (UCSF)</td>
<td>&gt;1</td>
<td>Postdocs</td>
<td>One or more of the following areas: cellular and molecular biology, transfection of human cell lines, high content imaging, and protein expression, purification and characterization</td>
<td></td>
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<tr>
<td>The Shepherd Color Company Ohio</td>
<td>1</td>
<td>Research Chemist</td>
<td>Manufacture and supply of complex-metal-oxide pigments for use in coatings, plastics, and ceramics.</td>
<td>PhD</td>
</tr>
<tr>
<td>Genentech</td>
<td>2</td>
<td>Research Associates</td>
<td>Synthetic Organic Chemistry</td>
<td>SB/SM</td>
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<tr>
<td>Silver Creek Pharmaceuticals Mission Bay, SF</td>
<td>1</td>
<td>Scientist - Protein Engineer</td>
<td>Developing novel protein therapeutics for regenerative medicine</td>
<td>PhD</td>
</tr>
<tr>
<td>Merck &amp; Co. Inc. New Jersey</td>
<td>1</td>
<td>Sr. Scientist</td>
<td>Analytical Sciences</td>
<td>PhD</td>
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