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Kilpatrick, Sigma Xi lectures expose students to new, stimulating concepts

Utsav Gandhi
CAMPUS EDITOR

IIT students were exposed to a couple of fantastic great opportunities to hear from and discuss ideas with some great minds over the last couple of weeks, with two annual lectures being held to celebrate the rigor of IIT's academic and research components. The Department of Chemistry's annual Kilpatrick Lecture was Dr. Daniel Nocera, Harvard professor of Energy, inventor of the "Artificial Leaf", and the IIT Research Day/Sigma Xi Lecturer was noted science photographer Felice Frankel.

Held on a rainy afternoon on April 17, the annual Kilpatrick Lecture continued the legacy of IIT alumni Martin and Mary Kilpatrick who have left huge imprints on IIT's academic portfolio, and whose legacy includes this flagship annual lecture bringing to campus some of the country's best minds in research. Stating the importance of the Chemistry Department at IIT, CSL Dean Betts mentioned its renewed presence on campus integrated with the Lewis College of Human Sciences, which would be quite a throwback to its campus history of recently retired Professor Peter Lykos, having played a crucial role in starting the Computer Science Department with the revolutionary field of computational chemistry. He then introduced Dr. Daniel Nocera, Harvard Professor of Energy, who he called a "true scientist [in his efforts to] to improve the immediate world around him and the global community." The Artificial Leaf, his creation, has been named as one of the top "Inventions of the Year" by TIME magazine in 2011 and has been highlighted prominently in national media.

Dr. Nocera began his talk by stating that technology schools are becoming increasingly outcome oriented, meaning that they are coming up with revolutionary insights in research by working backwards from the desired outcome. He said that his work environment at Harvard allows him to collaborate with interdisciplinary teams, and he highly recommends those scenarios if we are to bring about significant changes in our approach to thinking. He said that he had started working on the artificial leaf at the age of 22, his primary motivation was wanting to invent something you could drop into the water that would split it. He said that intrinsically everything is a chemistry problem; and that today's Anthropocene is seeing us interfere with natural earth systems. He recommends that we need to move to the 'Sustainocene' - away from unsustainable, widening gaps between the haves and the have nots. Access to food, water and security aside, energy security predictions say that we will need 16TW more by 2050, counting 3 billion more people, all in the emerging economy.

So, how do we 'do' science for all these extra people? Suddenly, the fastest, biggest, tiniest, and the best is not the way to go forward. Cost is the first issue: we need something cheap, lightweight and easily manufactured. We need carbon neutral energy sources and a distributed system of energy to reach these people. In academics, we don't have to worry about politics and the stock market. Rather, the key for any renewable energy is storage. Compressing air energy storage and batteries are not going to help 6 billion people. His artificial leaf, a playing card-sized device is made up of cheap materials—silicon, cobalt and nickel mostly—and when placed in a con-

tainer of water and exposed to sunlight, it generates bubbles of oxygen and hydrogen. Those gases can be collected and stored—much more easily than the electricity produced by a photovoltaic solar cell—and then used to generate power through a fuel cell.

The Sigma Xi Lecture was delivered via Skype conference by Science photographer Felice Frankel, a research scientist in the Center for Materials Science and Engineering at MIT. Collaborating with scientists, designers and engineers across a host of disciplines, she creates images and graphics for journal submissions, presentations and publications to advance the public understanding of science. Her books include Envisioning Science: The Design and Craft of the Science Image, No Small Matter: Science

Eric Faurie, Ali Riaz, Abdulrhman Arnaout, and Emilie Woog, all from ECE; and the Sigma Xi Excellence in Research and Scholarship Award recipient was BME grad student Bin Jiang. The poster contest winners were Chris Barth (Biomed. Eng.) Microstructural Integrity of Brain White Matter in Non-Demented Older Adults Associated with Frequency of Cognitive Activity in Late Life (3rd place), Christopher Stovall (MMAE) Characterizing Turbulent Gusts in an Urban Environment for Use in Micro Air Vehicle Applications (2nd place) and the team of Abdulrhman Arnaout, Emilie Woog, Ali Riaz and Eric Faurie (Elec. and Comp. Eng.) RF Measurements to Support Dynamic Radio Spectrum Sharing. The Graduate winners were Bo Hu (Chemistry) C-H



on the Nanoscale, co-authored with George Whitesides, On the Surface of Things: Images of the Extraordinary in Science, also co-authored with G. M. Whitesides (who, coincidentally, was last year's Kilpatrick Lecturer). Her most recent book, coauthored with Angela DePace, is Visual Strategies, A Practical Guide to Graphics for Scientists and Engineers.

She started off by saying that visual representations are explanatory or exploratory, and that good representation needs good design. Fundamentally, representations are RE-presentations: they are interpretations, decisions, and clarifications. They need to make the bystander look. Good art also almost always needs good writing to accompany it, and by default, and good art also goes beyond just making the bystander look - it shows him/her the process that is being explained. She also made a case for using metaphors and simplistic arrows to give the viewer some room to breathe and the idea of using interactive graphics to layer data, giving the user the ability to decide what data they want to look at. Finally, she stressed the importance of collaborating on visual representations, to look and critique each other's work on representations together. Researchers need to communicate with designers, who need to have a curiosity.

The Sigma Xi event included a poster competition with 49 posters from CSL and ACE students. About 35 faculty members volunteered as judges. The Undergraduate Division winners were

activation by heterogeneous single site Fe(II) silica supported catalyst (3rd place), Elif Bayrak (Chem. and Bio. Eng.) Multi-Agent Systems for Modeling Vascularization and Tissue Growth within Porous Biodegradable Scaffolds (2nd place), and Sahar Hendabadi (MMAE) A Novel Technique to Identify Transport Templates in the Human Left Ventricle Using Doppler Echocardiography and Computational Modeling (1st place).

Photos courtesy of Office of Provost for Research & Abdulrhman Arnaout

IIT high school outreach efforts include building, math competitions

Luis Larco

TECHNEWS WRITER

During their undergraduate studies at the university, IIT Presidential Scholars commit to a significant community service project in the areas of Science, Technology, Engineering, and Mathematics. These outreach initiatives are intended to enrich and build capacity the academic options of students in both the IIT/Bronzeville/Chicago area and their sending and nominating communities. As part of his IIT Presidential Scholarship, Luis Larco, a Miami Dade College graduate, initiated a series of competitions for Chicago high schools.

IIT Build-it Competition (www.iit.edu/~tbp/build-it/) is an applied science competition where teams competed against each other to design and build the best solution to an engineering problem using the materials provided. The competition required no preparation prior to the competition day. It was hosted on Saturday, April 6th, at IIT's main campus, bringing 11 teams from 7 different high schools in Chicago (42 students). This year, the teams had to design and construct a cargo boat that is as efficient as possible, based upon the ratio of mass held / mass of the boat, before any water touches the loading cup.

The winning teams received a trophy and were recognized during the awards ceremony. Team IHSCA Power Builders from Instituto Health Sciences Career stood first, Team Soaring SHPE from Benito Juarez Community Academy were the runners-up, and Team Sullivan House from Sullivan House High School/Team Undefined from UNO Charter High School stood third with a technical tie.

This competition is a student-led project, sponsored by the Armour College of Engineering, the IIT Chapter of Tau Beta Pi, and the Office of Student Access, Success and Diversity Initiatives, and had 20 IIT engineering students volunteering.

The IIT High School Mathematics Competition (www.iit.edu/~mathclub/hscompetition/) was hosted on Saturday, April 20th, bringing 73 students from 9 different schools in Chicago. This competition is open to all secondary schools, public and private, in Chicago. All secondary school students are eligible to participate, although it is recommended only for those who have had courses up to pre-calculus algebra, and trigonometry or higher. The competition is divided into two evaluations: an individual exam and a team exam. A maximum of two teams are allowed per school, each consisting of a five or less students. However, the schools are allowed to bring as many students to participate in the individual exam.

The event was sponsored by Wolfram Research, who donated 18 Wolfram Mathematica 9 licenses (15 for the top three teams and 3 for the top 3 individual winners), as well as some other fun items, including Wolfram's dodecahedrons and posters.

The winning individuals were Christopher Shroba from Marist High School (first place, with 25/26 points), Yoonho Nam from Marist High School tied with James Costin from Marist High School (second, with 24/26 points), Kathy Ulaszek from Marist High School tied with Mark Triezenburg from Marist High School with 23/26 points for third place. The winning teams were Team Yoon Nam from Marist High School, Team Redhawks from Marist High School and Team Two from Lindblom Math & Science Academy High School for first, second and third place respectively.

This competition was not just a great event for the student participating, but it was also great for their teachers/coaches. While the students were taking the team exam, we had our Math Club advisor, Professor John Erickson from the Applied Mathematics department, leading a training seminar for the teachers on how to solve the competition problems. This event was co-sponsored by the Applied Mathematics Department, the IIT Math Club, and the Office of Student Success, Access, and Diversity Initiatives.

Both of these events were considered a success not just for IIT and the high schools participating, but also for our Chicago community. The organizer plans on hosting them again next year and also adding a new competition: The Illinois State Mathematics Olympics for Two-Year Colleges in the state of Illinois, bringing community college students on a Saturday to IIT to participate in an intense mathematics competition, and hoping to award the first place individual winner with a transfer scholarship to IIT.