

A WINNING FORMULA

Weekends of brainstorming for competitions pay off for graduate student Chris Wilmer

“I have no discernible schedule,” says chemical and biological engineering PhD candidate Chris Wilmer. “When I was working on a project to estimate the distribution of electrons in crystals, I slept in the office for 10 days straight and showered at the gym. I didn’t want to lose time commuting.” Commuting would have meant a trip to an apartment a few blocks away.

Since marrying last summer Wilmer spends more time at home, but he continues to manage his time vigilantly—especially when it comes to entering science and engineering competitions. “We never spend more than a sleepless weekend or two on a competition entry,” says Wilmer, who typically collaborates for the competitions with researchers from other disciplines (see sidebar).

Wilmer’s small investment of time has yielded big rewards. Between fall 2009 and spring 2011 Wilmer and his teammates collected more than \$60,000 in prize money from competition

organizers such as InnoCentive, which describes itself as “the world’s largest problem-solving marketplace.” An even bigger payoff, says Wilmer, is “to learn about a real problem that needs solving and to know that your solution will be relevant.” Competition winners may see their ideas implemented quickly—a literal change of pace from the years of research and testing that shape the schedules of graduate students like Wilmer, who enrolled in McCormick in 2007.

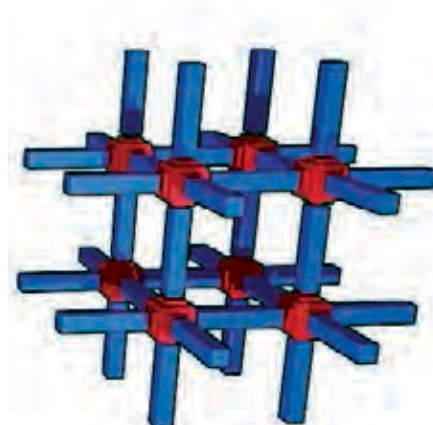
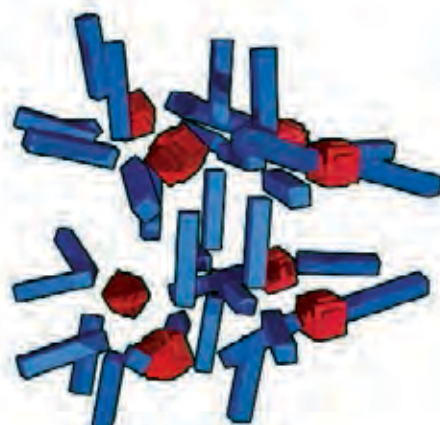
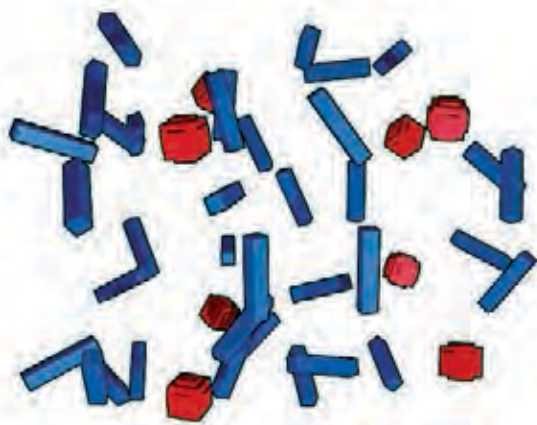
Working in the lab of Randy Snurr, professor of chemical and biological engineering, Wilmer designs materials capable of absorbing greenhouse gases or storing natural gas. “Gases are usually highly dispersed, but they like to stick on surfaces. Crystals are porous with lots of surface area and holes, like sponges that can soak up the gases,” says Wilmer. The team creates the ultra-absorbent crystals via self-assembly of molecular building blocks.

Knocking off a quick competition entry related to Wilmer’s ongoing research might sound like a no-brainer, but Wilmer says the projects for the competitions he enters are “tangents not directly related to my research.” Even so, he says he learns something from each entry, win or lose. *Competition rule #1: Winning isn’t everything; learning is.*

Even with his impressive number of victories, Wilmer wins only about 50 percent of the competitions he enters. He takes losses in stride and may recycle the entries for another competition. “Sometimes a project loses one competition but wins another,” Wilmer says. *Competition rule #2: If at first you don’t succeed, try again.*

The real key to Wilmer’s success, he says, is simply participation. “We’re entering an era of

Above: Chris Wilmer and drawings of a metal-organic framework self-assembling from his work in the lab of Randy Snurr. The blue shapes represent organic molecules, and the red cubes represent metal-containing molecules.



crowd-sourcing. You can't be afraid to go beyond what you know; you have to be open to learning from others," says Wilmer, who often collaborates online with colleagues throughout the world. *Competition rule #3: Multiple brains are better than one.*

The breadth of topics Wilmer tosses around with teammates demonstrates his fearlessness as well as his openness to new ideas. In the past two years he has weighed in on microfinance, toothpaste, and water treatment in developing countries (see sidebar).

"Science is in my bones," says Wilmer, who grew up in a suburb of Toronto, the son of a mathematician and a psychologist, both Polish émigrés who were visiting Canada when Poland went under martial law in 1981. In high school Wilmer lapped up books like Ray Kurzweil's *The Age of Spiritual Machines* and K. Eric Drexler's *Engines of Creation*. At the University of Toronto, Wilmer studied engineering and met his wife, a historian.

Wilmer's winning streak is not confined to science competitions. He took first place at McCormick's art fair last year for a sculpture of an alien that he created using Blender, a free software program he's been playing with since high school. On the Shapeways website, Wilmer turned the computer-generated image into a sculpture via 3-D printing. He used the same process to craft silver wedding rings that he and his wife designed together: a circle of stylized letters that spell out "Chris loves Emily loves Chris loves Emily."

Sounds like another winning collaboration for Wilmer. **M** Leanne Star

WILMER'S WINNERS

Overcoming the cultural barrier: leveraging microfinance networks for local community-based distribution of folic acid and other micronutrients

Collaborators: Toan Vu Phan, international macroeconomics; Simeon Bogdanov, electrical engineering and computer science; Eneda Hoxha, medical genetics and molecular biology—all Northwestern PhD students

Winnings: \$10,000 third prize from InnoCentive; Scientists Without Borders Global Malnutrition Challenge; \$5,000 Dow Sustainability Innovation Student Challenge Award

"Getting folic acid into foods is easy, but people weren't going for the fortified foods. We suggested highlighting the profitability of folic acid enrichment and encouraging local food sellers to promote the foods."

Clean drinking water in developing countries via solar disinfection: an inexpensive quality-control mechanism

Collaborator: Ron Appel, CalTech electrical engineering PhD student

Winnings: \$10,000 first-prize Perkins Coie Innovative Minds Award; \$50 first prize at the Northwestern Public Health Innovations Conference; \$250 InNUvation Applied Research Day ISEN Award

"It's been exciting to see this idea implemented. CORR TECH is manufacturing the device, which measures sunlight exposure to determine how much UV disinfection is needed. It's being field tested by the Albert Schweitzer Hospital medical research unit in Gabon, Africa."

Oral care for the poor: waste-free refillable toothpaste system

Collaborator: Toan Vu Phan

Winnings: \$1,000 second-prize Perkins Coie Innovative Minds Award

"Toan was in Vietnam; I was in Kansas. We spent New Year's Eve collaborating over the Internet."

Synthetic DNA management system

Collaborators: Wilmer went solo, but "my dad advised me on this one, and that was part of my motivation."

Winnings: \$31,500 first prize from InnoCentive private sponsor

"The challenge was to create a communication system to organize large quantities of information about synthetic DNA produced by private and government labs, like creating a mini-Amazon.com for scientists. The solution was a software database. Two weekends of work."

Absence of "profit drive" incentive to employ water treatment technology in rural populations of developing nations

Collaborators: Toan Vu Phan, Simeon Bogdanov

Winnings: \$4,000 first prize from InnoCentive: Nature.com

"The kernel of the idea came out of an interdisciplinary grad student discussion group I run called Let's Connect the Dots. We've talked about everything from gun control to health care."