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Chemist Will Dichtel earns MacArthur 'Genius Award'

By Blaine Friedlander

Will Dichtel, Cornell associate professor of chemistry and biochemistry, whose innovations may allow for ample electricity and for detecting trace amounts of explosives, has received a 2015 MacArthur Foundation Fellowship. In its announcement today, the foundation called him “a leading figure in chemistry.”

Twenty-four awards, the so-called “Genius Awards,” were given this year to scientists, artists and community leaders, among them alumnus Christopher Ré '01, Ph.D. '09, a

computer scientist at Stanford University. The fellowships carry a \$625,000 no-strings-attached stipend over five years.

“Winning this award is just beginning to sink in. For me this is really amazing,” said Dichtel. “You look at the people who have been recognized in the past and there are many of my heroes in science, as well as artists and social reformers whom I admire. Scientific research, much like other creative pursuits, is not always recognized in its own time. This fellowship is wonderful recognition that my students – Cornell undergraduates, graduate students and postdoctoral researchers – are pushing the boundaries of science forward.”

Dichtel explained his surprise in a video on the MacArthur Foundation website. “I have been walking about a foot off the ground ever since I received that phone call [from the foundation],” he said. “I am incredibly grateful for this support and really excited about what we will do with it.”

The MacArthur Foundation recognized Dichtel for his innovative work on synthetic and supramolecular chemistry, which hold promise for bringing a new class of nanostructured materials out of the lab and into daily use.

Dichtel has pioneered the development of porous polymers known as covalent organic frameworks (COFs), which are formed from molecules with specific shapes that simultaneously polymerize (combine to form larger molecules that contain repeating structural units) and assemble into ordered two-dimensional grids or three-dimensional scaffolds, said the MacArthur Foundation. The tiny pores of COFs confer extremely high surface area – approaching that of a football field per gram of the polymer – making them of interest for molecular separations, sensing trace substances, storing chemical fuels or electrical charge, and purifying water, among other potential applications.

In fact, in 2013 Dichtel and his



Heather Ainsworth

Will Dichtel, associate professor of chemistry and biochemistry, works in his lab on Sept. 15.

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research group created a polymer that quickly and safely can detect trace amounts of a key chemical ingredient used in some improvised explosive devices (IEDs) – which could be used in low-cost, handheld explosive detectors and could supplement or replace bomb-sniffing dogs.

“One of the goals is to make detectors that can detect not just explosives on someone’s hands, but in the cloud around them,”

Dichtel said – much like the dust cloud surrounding Charlie Brown’s friend Pigpen, he said. “If someone had an IED in their bag, it would be nice not to have to open it.”

Beyond explosive detection, Dichtel’s group has developed materials capable of rapidly storing or releasing charge. [These molecular frameworks could pave the way for the development of more economical, flexible and versatile batteries.](#)

According to the MacArthur Foundation, Dichtel and his group have developed new methods to study the mechanism of COF formation and have already challenged long-standing but untested assumptions about expanding the concept of polymerization in two and three dimensions. “Dichtel’s breadth of expertise, ranging from small molecule organic chemistry to materials and device fabrication, and his pioneering demonstration of COFs with unprecedented functionality and improved stability have made him a leading figure in chemistry,” they said.

“This is the latest in a long series of awards that Will has won over the past couple of years. Not all of the awards are for his outstanding research; he is also a superb and committed teacher,” said Gretchen Ritter, the Harold Tanner Dean of the College of Arts and Sciences. “We are delighted that the MacArthur Foundation has recognized the excellence of his innovative research.”

Dichtel received a B.S. (2000) from the Massachusetts Institute of Technology and a Ph.D. (2005) from the University of California, Berkeley. He had a joint appointment as a research associate (2005-08) at the University of California at Los Angeles and the California Institute of Technology before joining the faculty of [Cornell University](#).

The foundation said Ré, assistant professor of computer science at Stanford, "is a computer scientist democratizing big data analytics through theoretical advances in statistics and logic and groundbreaking data-processing applications for solving practical problems. Ré has leveraged his training in databases and deep knowledge of machine learning to create an inference engine, DeepDive, that can analyze data of a kind and at a scale that is beyond the current capabilities of traditional databases."

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