'Molecular Legos' Net Professor, Student Nanotech Prize

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A University of Pittsburgh researcher and his student have been awarded prestigious prizes from the Foresight Nanotech Institute for their work in developing a "molecular Lego® set" that will enable, for the first time, the quick manufacture of sturdy, predictable nanostructures.

Christian Schafmeister, assistant professor of chemistry at the University of Pittsburgh and a researcher in the University's Institute of NanoScience and Engineering (INSE), was awarded the 2005 Foresight Institute Feynman Prize for experimental work, named in honor of pioneer physicist Richard Feynman. Schafmeister's student Christopher Levins, a doctoral candidate in chemistry, received the Foresight Distinguished Student Award for work that he did within the umbrella of Schafmeister's research. They received the awards at the institute's awards banquet Oct. 26.

Schafmeister has designed 14 small molecules, each of which is about half a nanometer across and includes two removable molecular caps. Controlled chemical reactions strategically strip away the caps, causing the molecules to link together in predictable ways with pairs of stiff bonds—similar to Lego® blocks. He has snapped together 3.6-nanometer rods and 1.8-nanometer crescents, and has developed software that can aid in the construction of a wide variety of shapes.

With this method of nanofabrication, which he calls "a completely new field," Schafmeister is using his blocks to craft hinged, molecular traps that attract specific molecules, snap shut, and light up, serving as perfect

chemical sensors—just one of an almost infinite number of possible uses. Molecules with customized cavities could serve as catalysts or biomedical agents. Because the molecules are large enough to have interesting functions and rigid, designed shapes, they hold great promise as nanoscale parts for future atomically precise nanoscale machines.

“We’re developing a new programming language for matter,” said Schafmeister, “and we’re writing, ‘Hello, world.’”

Levins is working on one approach to constructing complex nanoscale devices by developing a systematic methodology for the design and synthesis of rigid macromolecular scaffolds. “Chris made some of the first breakthroughs—building blocks and larger structures—in our research,” said Schafmeister.

“We’re proud to see Dr. Schafmeister and his student honored for nanotechnology research,” said University Provost James V. Maher. “Pitt’s program in nanoscience is focused on platform technologies, like Dr. Schafmeister’s, that will have a real impact on future research and applications.”

Source: University of Pittsburgh