

# Columbia Researchers Bring Nanotech's Promise a Step Closer to Reality

August 22 2005

---

Scientists at Columbia University's Nanoscience Center have solved a fundamental, and to date, highly elusive challenge in the fast-developing world of nanotech-molecular electronic devices.

In the July 22nd issue of Science, Colin Nuckolls, an associate professor of chemistry, and his colleagues George Tulevski, Matt Myers, Michael Steigerwald, along with Mark S. Hybertsen, from the department of applied physics and applied mathematics, describe how they created a so-called electricity-bridge to allow current to flow efficiently between molecules and nano-sized metals, a process necessary for molecular electronic device construction.

The discovery -- involving the ability to construct materials or machines on nano-scales (a nanometer is a billionth of a meter) -- brings scientists one step closer to achieving previously unimagined possibilities, including information processing with molecules, medicines from nanoparticles that vastly improve delivery and dosage, and molecule-sized robots that flow through a person's bloodstream to treat clogged arteries in heart attack or (potential heart attack) patients.

Nuckolls' research team at Columbia's Nanoscience Center built an effective bridge linking the molecular world with a metal (Ruthenium) that is conductive, stable and durable. The majority of experiments to date have used gold as a possible link, which does not offer good electrical conductivity, lacks endurance and doesn't have any useful subsequent chemistry.

Successful miniaturization (i.e., building nanoscale devices) requires these "electricity-bridges" since most electrical activity that is important in electronic devices occurs within just a few nanometers of an interface. "It can not be overstated how important these interfacial structures and properties are," Nuckolls says. "In a sense, interfaces are where the 'expanding nano' of chemistry and the 'shrinking nano' of electronics meet." In other words, he adds, "interfaces are where the rubber meets the road."

Nuckolls' research exemplifies Columbia's interdisciplinary approach and the University's effort to coordinate and harness expertise in various fields -- in this case, engineering, chemistry, mathematics, biology and numerous others to address emerging 21 st century scientific challenges.

Source: Columbia University

Citation: Columbia Researchers Bring Nanotech's Promise a Step Closer to Reality (2005, August 22) retrieved 19 April 2024 from <https://phys.org/news/2005-08-columbia-nanotech-closer-reality.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.