Latest News
Researchers Discover the Atomic Structure of a Powerful Molecular Motor

Electron Tunneling Could Enable Nanomotors to Rotate Faster than their Biological Counterparts

Molecular dynamics simulations show that electron tunneling through nanoscale rotary motors based on carbon nanotube

shafts may enable nanotech motors to rotate more than a million times faster than their biological counterparts—the proton-driven molecular motors that propel some bacteria. Researchers in the US have used computer simulations to show that nanometre-sized rotary motors could be driven by electron tunnelling. Although their design has not been confirmed experimentally, the team says that it is very similar to how naturally occurring biological motors work.

Sometime in the future, tiny autonomous "nanorobots" could be used to perform a wide range of tasks such as assembling electronic circuits or delivering drugs to specific parts of the body. But before this becomes a reality, nanotechnologists must come up with practical ways to propel such devices — something that has proven to be very difficult because conventional motors cannot simply be shrunk to nanometre dimensions.

Nature, however, contains a wide range of nanomotors — for example, some bacteria and other tiny organisms propel themselves using whip-like structures that are driven by biomolecular motors. Not surprisingly, researchers are looking at such "biomotors" for inspiration.

The quantum-mechanical tunnelling of protons is believed to be at the heart of some biomotors, and now Petr Král and colleagues that the University of Illinois at Chicago have shown that electron tunnelling could be used to drive manmade nanomotors.

The team used molecular-dynamics computer simulations to model nanomotors that comprise a carbon nanotube shaft with molecular "stalks" terminated by conducting "blades" …. The rotor resembles a water wheel, except that one electron at a time tunnels between stationary electrodes and moving blades.

…These artificial systems would surpass their biological counterparts in many ways, adds Král. For one, they could rotate a million or more times faster.

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Nanotechnology News - Interview with Nanoink's Tom Levesque, Carcinogenesis and More... NEW

Total running time 18.47 mins, File size: 12.8 Mb, File Type: mp3

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In this edition of AZoNano News, as well as bringing you the latest news from the international Nanotechnology industry, we'll hear how researchers have shown for the first time that nanoscale changes are present in cells extremely early on in carcinogenesis and we'll hear about a new technology that could replace X-Rays for diagnostic applications. In this week's AZoNano Interview, Cameron Chai speaks with Nanoink's Tom Levesque in an exclusive interview about their next generation Dip Pen Nanolithography (DPN) system.

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