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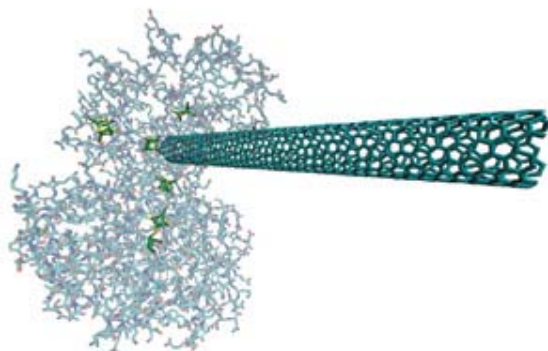
NANOTECHNOLOGY

Hot-Wiring Hydrogenase With A Carbon Nanotube

Single-walled nanotube serves as an electrical wire to help harness enzyme's catalytic powers

Bethany Halford

When it comes to tapping into the power of hydrogen, nothing beats hydrogenase. But harnessing hydrogenase's catalytic powers requires establishing an electrical connection that doesn't compromise the enzyme's activity.



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WIRED

Molecular model demonstrates how a carbon nanotube makes contact with hydrogenase's catalytic regions (green), permitting flow of electrons into or out of the enzyme while it works.

Scientists at the [National Renewable Energy Laboratory](#), in Golden, Colo., have now managed to do just that by using single-walled carbon nanotubes (SWNTs) as wires (*Nano Lett.*, DOI: [10.1021/nl072319o](#)).

[Michael J. Heben](#), [Paul W. King](#), and colleagues found that surfactant-isolated SWNTs spontaneously assemble with hydrogenase to form a catalytically active biohybrid system. Photoluminescence excitation and Raman spectroscopy indicate the SWNTs behave like molecular wires, making electrical contact to the enzyme's catalytic regions. The nanotubes can shuttle electrons away as the enzyme oxidizes H₂, or they can inject electrons into the system to reduce H⁺.

The research team says the accomplishment represents a first step toward constructing hydrogenase-SWNT hybrids for hydrogen-producing applications and fuel-cell technologies.

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