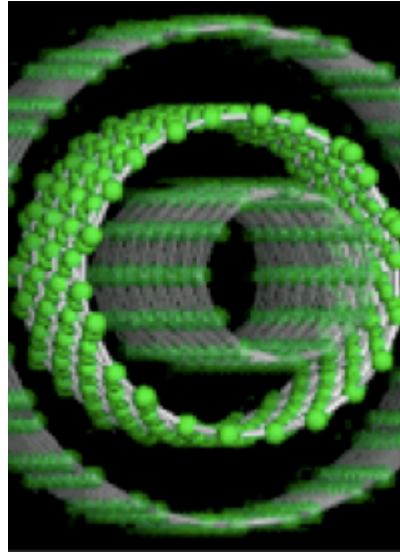




Written by [Selwyn Duke](#) on March 16, 2010

Nanotech Energy Source Discovered

Could you imagine a laptop battery that lasted for 500 hours? How about an electric car that boasts a range many times that of a gasoline vehicle? For that matter, think about environmental sensors that could be scattered into the air like dust and collect data. While the last thing might not exactly be what you want for Christmas, a breakthrough in energy production made by MIT researchers could make such technology a reality during the next few years.



The process, dubbed “thermopower waves” by its discoverer, MIT’s Dr. Michael Strano, does nothing less than open up “a new area of energy research, which is rare,” says the scientist. MSNBC’s Michelle Bryner describes the phenomenon and its applications in brief, [writing](#):

Researchers have found a way to produce large amounts of electricity from tiny cylinders made from carbon atoms.

The achievement could replace decades-old methods of generating electricity, such as combustion engines and turbines, the researchers say.

The cylinders are known as “carbon nanotubes,” which are, writes The Energy Collective, “submicroscopic hollow tubes made of a ‘chicken-wire-like’ lattice of carbon atoms.”

To describe the process in more detail, the MIT researchers took the nanotubes, applied a layer of fuel, and then ignited them at one end, creating a “fast-moving thermal [heat] wave traveling along the length of the carbon nanotube like a flame speeding along the length of a lit fuse,” [explains](#) the Environment News Service (ENS). This process is facilitated by the fact that nanotubes conduct heat far better than metals — up to 100 times faster. Then, getting more technical still, ENS writes, “As the heat feeds back to the fuel coating, a thermal wave is created that is guided along the nanotube. With a temperature of 3,000 kelvins [sic] (2,726 degrees Celsius or 4,940 degrees Fahrenheit) this ring of heat spreads [sic] along the tube 10,000 times faster than the normal spread of this chemical reaction.”

This is where Dr. Strano and his team experienced their Ivory Soap moment. While Strano claims to be the first scientist to predict that thermal waves coursing through a nanotube could create electric current, the great amount of it yielded was not predicted by thermoelectric calculations. “Lo and behold,” said the scientist, “we were really surprised by the size of the resulting voltage peak.” Strano and his team have called this unexpected phenomenon “electron entrainment,” “since part of the current appears to scale with wave velocity,” said Strano.

Because this energy source is so new, it’s hard to predict what the practical applications will be.



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However, the thermopower-wave process produces 100 times the energy per unit of weight of the average lithium-ion battery. Additionally, Strano says that such a power source would be composed of non-toxic substances, eliminating the disposal problems posed by current-generation energy cells.

The technology could also be used to help create sensors the size of a grain of rice that could be injected into the body and used to monitor health (e.g., heart function), administer medical treatment or, well, use your imagination. There are some ominous implications as well.

One obvious use of the technology, however, would be to create practical electric fuel cells for automobiles. One common drawback of electric cars is that they typically have a very limited range relative to combustion engine vehicles, owing to the fact that gasoline contains far more energy per unit of weight than today's electric fuel cells. But thermopower-wave generation could change that, providing light, long-range batteries and relatively inexpensive electricity. This could finally allow us to break our dependence on foreign oil.

Whatever the particulars, Dr. Strano's discovery is just the latest frontier in the staggering field of nanotechnology. The science of manipulating matter on the molecular and even atomic levels, it is quickly making science fiction, science fact.

Photo: carbon nanotube

For more on the subject, see Selwyn Duke's "The New Nanotech World" in the March 31, 2008 issue of The New American.



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