MONDAY, AUGUST 10, 2009
LATEST UPDATE: 7:00AM



Jeff St. John | August 3, 2009 at 6:56 PM

# Electricity-Generating Geobacter Bacteria Made Stronger

Geobacter. It's a bacterium that turns waste into electricity in its naturally oxygen-free environment – and if you stress it out, it adapts to become even better at it.

That's one way to explain the results of research out of the **University of Massachusetts at Amherst** into Geobacter's potential to make microbial fuel cells – fuel cells made from living organisms – a practical reality.

Professor **Derek Lovley** has **been working with the bacterium** since he discovered it living in mud from the bottom of the Potomac River about 20 years ago. For most of that time, it was prized for "breathing in" iron and other substances, which made it useful for cleaning wastewater or earth of toxic metals.

But in more recent years, Lovley and other researchers have been studying Geobacter's habit of generating electrons as a byproduct of its respiration process in anaerobic, or oxygen-free, environments.

It and other microbes do this, which opens up the possibility of harnessing that power in a **microbial fuel cell**. So far, the currents generated have been too weak for practical purposes, however. Also, some of them require additional, often toxic substances to serve as an electron shuttling mediator.

But **the most recent research** by Lovley and colleagues – underwritten by the Office of Naval Research and the Department of Energy – shows that when you give Geobacter colonies a miniscule "pushback" current on the electrode they're being grown on, they rise to the challenge by boosting their own conducting capabilities.

Not only did the new strain boost its power output about eightfold, it grew more quickly, according to researchers whose work is described in the August issue of the journal Biosensors and Bioelectronics.

Geobacter are particularly good at this because of their pili, tiny hair-like growths about 5 nanometers wide and about 20,000 times as long. They appear to help in the formation of the bacteria's biofilm, which anchors it to the soil and sediment to which it transfers electrons in its natural environment, or on electrodes in the lab.

Some future uses of the technology could include powering devices in remote locations like ocean floors, or generating electricity from the same bioremediation bacteria that clean up wastewater or contaminated earth, the researchers noted.

Australia's **University of Queensland** and Fosters Brewing Co. have been testing such a system that converts wastewater from the brewing process into clean water, carbon dioxide and a small electrical charge.

And **Lebônê Solutions**, a Harvard spinout, is seeking to develop microbial fuel cells targeted at African villages that are off the electricity grid and need small amounts of power to charge lamps or cell phones (see **MIT Technology Review** article).

‹ **Older** | Peak Oil Coming in 2020, Says IEA's Top Economist

## Green Light

Greentech Media's Green Light blog covers the full-scope of the greentech world, while expanding the range of our daily news reporting with brief and insightful blog posts from our Greentech Media editors, GTM Research analysts and numerous guest bloggers.

**New Research**

Surviving the Shakeout: Winners and Losers in Crystalline Silicon PV

Emerging PV Market Brief: France

The Coming Disruption in the Inverter Market – Distributed Inverter Architectures