New harvesting approach boosts energy output from bacteria

April 25 2012

A team of scientists from University of Colorado Denver has developed a novel energy system that increases the amount of energy harvested from microbial fuel cells (MFCs) by more than 70 times. The new approach also greatly improves energy efficiency. MFCs are emerging as a way to use bacteria to directly harvest electricity from biodegradable materials, such as wastewater or marine sediments.

The energy from a single MFC reactor is usually too low to be used in the real world. But CU Denver engineers developed a harvesting system to allow active extractions of electrons from bacteria.

"This process changes the way we think about MFC energy," said Zhiyong (Jason) Ren, PhD, assistant professor of civil engineering in CU Denver's College of Engineering and Applied Science. "This may be a game changer for waste treatment or remote sensing because we've proven we can harvest energy as well as generate savings."

Data collected shows the system increased energy output by 76 times and improved energy efficiency by 21 times compared to a commonly used charge pump.

"The energy output from an MFC reactor is difficult to use directly," said Jae-Do Park, PhD, assistant professor of electrical engineering at CU Denver, who developed the harvesting scheme and prototype system. "That is why the role of the control system is so important. Our prototype has shown great progress toward harvesting energy."

The article, "Active Energy Harvesting from Microbial Fuel Cells at the Maximum Power Point without Using Resistors" was published in *Environmental Science & Technology* and was rated excellent by 3 of the 4 reviewers. The group, which included Ren, Park and PhD student Heming Wang also published a series of related articles in the *Journal of Power Sources* and *IEEE Transactions on Energy Conversion*.

More information: DOI: 10.1021/es300313d