Researchers infuse bacteria with silver to improve power efficiency in fuel cells
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A UCLA-led team of engineers and chemists has taken a major step forward in the development of microbial fuel cells—a technology that utilizes natural bacteria to extract electrons from organic matter in wastewater to generate electrical currents. A study detailing the breakthrough was recently published in Science.

"Living energy-recovery systems utilizing bacteria found in wastewater offer a one-two punch for environmental sustainability efforts," said co-

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like creating a dedicated express lane for electrons, which enabled us to extract more electrons and at faster speeds," said Xiangfeng Duan, the study's other corresponding author and a professor of chemistry and biochemistry at UCLA.

With greatly improved electron transport efficiency, the resulting silver-infused *Shewanella* film outputs more than 80% of the metabolic electrons to external circuit, generating a power of 0.66 milliwatts per square centimeter—more than double the previous best for microbial-based fuel cells.

With the increased current and improved efficiencies, the study, which was supported by the Office of Naval Research, showed that fuel cells powered by silver-*Shewanella* hybrid bacteria may pave the way for sufficient power output in practical settings.

Bocheng Cao, a UCLA doctoral student advised by both Huang and Duan, is the first author of the paper. Other UCLA senior authors are Gerard Wong, a professor of bioengineering; Paul Weiss, a UC Presidential Chair and distinguished professor of chemistry and biochemistry, bioengineering, and materials science and engineering; and Chong Liu, an assistant professor of chemistry and biochemistry. Kenneth Nealson, a professor emeritus of earth sciences at USC, is also a senior author.

Duan, Huang and Weiss are all members of the California NanoSystems Institute at UCLA.


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