Bacteria use hydrogen, carbon dioxide to produce electricity

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Researchers have engineered a strain of electricity-producing bacteria that can grow using hydrogen gas as its sole electron donor and carbon dioxide as its sole source of carbon. Researchers at the University of Massachusetts, Amherst report their findings at the 113th General Meeting of the American Society for Microbiology.

"This represents the first result of current production solely on hydrogen," says Amit Kumar, a researcher on the study who, along with his co-authors are part of the Lovley Lab Group at the university.

Under the leadership of Derek Lovley the lab group has been studying Geobacter bacteria since Lovley first isolated Geobacter metallireducens in sand sediment from the Potomac River in 1987. Geobacter species are of interest because of their bioremediation, bioenergy potential, novel electron transfer capabilities, the ability to transfer electrons outside the cell and transport these electrons over long distances via conductive filaments known as microbial nanowires.

Kumar and his colleagues studied a relative of G. metallireducens called Geobacter sulfurreducens, which has the ability to produce electricity by reducing organic carbon compounds with a graphite electrode like iron oxide or gold to serve as the sole electron acceptor. They genetically engineered a strain of the bacteria that did not need organic carbon to grow in a microbial fuel cell.

"The adapted strain readily produced electrical current in microbial fuel

cells with hydrogen gas as the sole electron donor and no organic carbon source," says Kumar, who notes that when the hydrogen supply to the microbial fuel cell was intermittently stopped electrical current dropped significantly and cells attached to the electrodes did not generate any significant current.

Provided by American Society for Microbiology