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Electronics

Research results from University of Alicante update understanding of science and technology

2008 MAY 5 - (VerticalNews.com) -- According to recent research from Alicante, Spain, "The mechanism(s) by which electricity-producing microorganisms interact with an electrode is poorly understood. Outer membrane cytochromes and conductive pili are being considered as possible players, but the available information does not concur to a consensus mechanism yet."

"In this work we demonstrate that Geobacter sulfurreducens cells are able to change the way in which they exchange electrons with an electrode as a response to changes in the applied electrode potential. After several hours of polarization at 0.1 V Ag/AgCl-KCl (saturated), the voltammetric signature of the attached cells showed a single redox pair with a formal redox potential of about -0.08 V as calculated from chronopotentiometric analysis. A similar signal was obtained from cells adapted to 0.4 V. However, new redox couples were detected after conditioning at 0.6 V. A large oxidation process beyond 0.5 V transferring a higher current than that obtained at 0.1 V was found to be associated with two reduction waves at 0.23 and 0.50 V. The apparent equilibrium potential of these new processes was estimated to be at about 0.48 V from programmed current potentiometric results. Importantly, when polarization was lowered again to 0.1 V for 18 additional hours, the signals obtained at 0.6 V were found to greatly diminish in amplitude, whereas those previously found at the lower conditioning potential were recovered," wrote J.P. Busalmen and colleagues, University of Alicante.

The researchers concluded: "Results clearly show the reversibility of cell adaptation to the electrode potential and point to the polarization potential as a key variable to optimize energy production from an electricity producing population."

Busalmen and colleagues published their study in *Environmental Science & Technology* (Whole cell electrochemistry of electricity-producing microorganisms evidence an adaptation for optimal exocellular electron transport. *Environmental Science & Technology*, 2008;42(7):2445-2450).

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