**Bacterial Batteries**

Scientists from Wageningen University located in the Netherlands have recently discovered a new method of energy production. Using certain bacterial species known as electrogenic bacteria, (eg. Shewanella), the team of scientists have successfully constructed a self-contained energy producing and recharging system. The system is fueled by the bacteria’s ability to convert chemicals into electrical energy and vise versa. Successful expansion on the present experiment could potentially lead to a highly sustainable and environmentally safe energy source for the future.

The experiment was conducted a two component battery compartment which they named the biocathode and bioanode. The biocathode was responsible for production of acetate, and the bioanode was responsible for consumption of the acetate. The two systems in tandem would allow electricity to be produced as acetate is consumed, which could be used to power external electronics. Electrical input allows for the formation of acetate inside the battery system. This component allows the battery to be recharged. The anode and cathodes were also filled with a mixture of electrolyte substances and CO2, which would serve as the substance to be fixed in the form of acetate when electrical energy was input into the system. The systems were allowed a 16-hour charge period where acetate was produced and stored within the battery. The bacteria were then given an 8-hour discharge period and voltages were measured on both ends to detect how much electrical energy could be produced and released from the battery given a known input. Scientists discovered through multiple rounds of controlled testing that it was possible to generate a charge recovery higher than that of the charge put into the system. Some of this must be accredited to the previously present charge of the electrolyte, but removing this still lead to a promising amount of recoverable energy. The scientists believe that although the current energy density findings are not refined and powerful enough to compete with standard batteries currently available, there is promise in systems like the one they have designed.

Further testing and alteration to create higher energy yields could provide an excellent form of sustainable energy for the future. Bacterial battery systems that follow the same methodology of the Wageningen design use and produce no potentially harmful byproducts and have almost unlimited potential for long term energy production. For this idea to remain viable though there must be a way to increase the energy density produced by the battery systems to power a variety of electrical devices in self-contained systems. It would also be important to determine the different scales at which these batteries are effective. This could range from small batteries to power household appliances, to large industrial operations that could potentially power multiple square miles. It would also be important to understand the life span of different bacteria used in the batteries, to determine which species will provide the most longevity in electrical production.

Bacterial batteries could rival solar and wind energy when it comes to non-harmful energy sources. They simply require a one-time fuel input and then become self-sustaining. They can also address the ever-looming issue of maintaining a renewable source of energy that current fossil and some biofuels cannot address efficiently. Should a refined and efficient bacteria based batter hit the markets, modern energy could receive an entirely new, clean look.

**Reference**

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