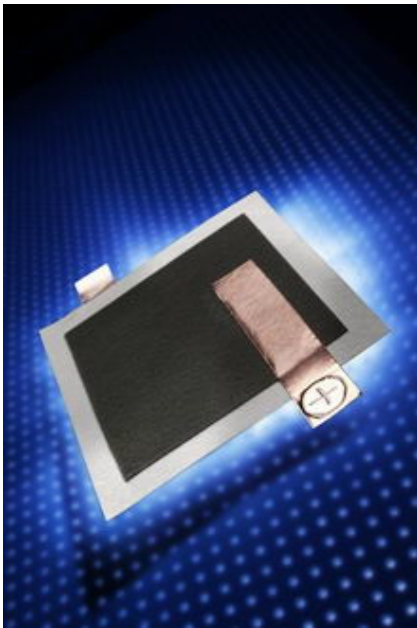


Printable biofuel cell developed in Finland



A printed enzyme-based power source.

An enzyme-based power source is a viable source of electricity for the rapidly proliferating RFID tags used in the medical sector and logistics. Applications include plasters containing a memory circuit and measuring electrode for temperature, and sensors monitoring food quality. VTT Technical Research Centre of Finland is developing printable biofuel cells in which enzymes convert the energy bound in the renewable fuels - sugar, alcohols, etc. - into electricity.

VTT is developing an enzyme-based power source that converts the chemical energy bound in the organic compounds (fuels) into electricity. The enzymes act as catalysts that facilitate the use of e.g. sugar and alcohols as fuels. VTT's invention is based on the use of the fungal laccase enzyme on the cathodic compartment. A patent on the solution, which has yielded a 0.7V voltage with a current density of 20 microampere per square metre, is pending. Laccase is also suitable for printable technology applications as it retains its ability to produce electricity even when printed on paper.

Printable enzyme-based power sources are compact, inexpensive and disposable. Potential applications include sensors used in the logistics chain, temperature sensors for food products, adhesive medical sensors and printed screens. Applications will probably become more widespread in the 2010s.

The enzymes replace the traditional precious metal catalysts, and the fuel cells operate with good overall efficiency in standard pressure at ambient temperature. The ability to mass-produce the fuel cells as printable products will enable a dramatic reduction in costs. They are also disposable, thanks to the biodegradable raw materials and fuels.

The development of biofuel cells is being carried out within the framework of the Printable Miniature Power Sources project, in which the Helsinki University of Technology (coordinator), VTT and Åbo Akademi are acting as research partners. The later stages of the project concern the development of a mass production method based on printable technology. VTT is also continuing its research in an EU project concerned with the use of biofuel cells as a power source for biosensors.

Source: Technical Research Centre of Finland (VTT)

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