Enhancement of the output voltage of galvanic cell above thermodynamic value

Development status

Phase 2

Feasibility study. There is a realistic design of the technology and the initial tests in the laboratory are leading to the specification of the technology requirements and its capabilities.

IP protection status

Czech patent application, in priority period

Partnering strategy

Collaboration, licensing

Institution

MUNI TTO Technology Transfer Office

Masaryk University

Challenge

Applications requiring higher voltages than thermodynamic necessitate multiple cells to be connected at the same time (set of galvanic cells with independent electrolytes). However, in some applications, it is not possible to couple cells with separate electrolytes because only one electrolyte volume (e.g. blood circulation) is available. Novel architecture of power supply does not require separated electrolytes and therefore enables its miniaturization eg. as implantable electronic devices. It can also be used as a source for single-time assays (eg glucose, coagulation or cholesterol test) or other disposable uses (eg flood detectors, emergency light).

Description

The enhancement of the output voltage is usually achieved by serial stacking of primary cells. The output voltage of our improved galvanic cell is enhanced by a simple change in an internal architecture. Whole design is realized in the one volume of an electrolyte, in a single container. The multiplied value of the voltage of the original primary cell is thus obtained for the improved single cell. Our approach simplifies the issues of energy supply potentially leading, for example, to the usage of lower number of accumulators and cells.

Commercial opportunity

This concept is generally applicable for all types of chemical energy sources (employing an electrolyte) – galvanic cells (batteries) and for fuel, enzyme and microbial based biofuel cells. It provides the possibility to be used as an energy source for the simple, one-purpose and specialized applications where it will be integrated into the body of the electronics. Moreover, it seems optimal also as a solution for implantable analytical devices powered by biofuel cells using substances available in the living system, e. g. glucose, electrolytes.