

**МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
СУМСЬКИЙ ДЕРЖАВНИЙ УНІВЕРСИТЕТ
КАФЕДРА ІНОЗЕМНИХ МОВ
ЛІНГВІСТИЧНИЙ НАВЧАЛЬНО-МЕТОДИЧНИЙ ЦЕНТР**

**МАТЕРІАЛИ
VIII МІЖВУЗІВСЬКОЇ НАУКОВО-ПРАКТИЧНОЇ
КОНФЕРЕНЦІЇ
ЛІНГВІСТИЧНОГО НАВЧАЛЬНО-МЕТОДИЧНОГО ЦЕНТРУ
КАФЕДРИ ІНОЗЕМНИХ МОВ**

“TO LIVE IN A SAFER WORLD”

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HIGH-ENERGY-DENSITY SUGAR BIOBATTERY

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The rapidly growing demand for powering portable electronic devices is driving the development of better batteries with features such as enhanced energy-storage densities, high levels of safety, biodegradability and small environmental footprints.

The lithium-ion battery is often the system of choice because it offers a high energy density, has a flexible and light-weight design and has a longer lifespan than comparable battery technologies. The widespread use of metal-catalysed batteries also raises many concerns, primarily related to safety, toxic metal pollution and the availability of costly, limited, irreplaceable or rare metal resources.

Enzymatic fuel cells (EFCs) are emerging electrobiochemical devices that directly convert chemical energy from a variety of fuels into electricity using low-cost biocatalyst enzymes. Inspired by living cells that can utilize complex organic compounds, for example, starch and glycogen, sugar-powered EFCs represent the next generation of biobatteries. EFCs usually generate much higher power density. Most EFCs run on complex organic compounds (glucose, methanol, glycerol). Glucose can release up to $3,574 \text{ Ah kg}^{-1}$, which is 85-fold greater than the energy released by lithium-ion batteries (42 Ah kg^{-1}).

Sugars are appealing fuels for EFCs because they are abundant, renewable, inexpensive, non-toxic, and safe for storage and distribution, and carbon neutral over the entire life cycle. Sugar-powered biobatteries feature high energy-storage densities and high safety. Thus, these batteries represent next-generation micropower sources that could be especially useful for portable electronics. One of the greatest advantages of fuel cells is that they are open systems that use high-energy-density fuels (H_2 , methanol, glucose).

Thus high-energy-density sugar biobatteries could represent the next generation of environmentally friendly power sources, because of their features, such as high energy density, safety and biodegradability.