

**SolarInnovate Energy Solutions**

# **Organic chemical energy storage battery**



## Overview

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Researchers from the University of New South Wales (UNSW) have developed a new type of rechargeable battery that uses protons ( $H^+$  ions) as charge carriers, offering a safer and more environmentally friendly alternative to conventional lithium-ion batteries. Are organic batteries a viable alternative to conventional energy storage?

Conventional energy storage technologies predominantly rely on inorganic materials such as lithium, cobalt, and nickel, which present significant challenges in terms of resource scarcity, environmental impact and supply chain ethics. Organic batteries, composed of carbon-based molecules, offer an alternative that addresses these concerns.

What are organic batteries?

Unlike traditional LIBs that rely on inorganic electrode materials (IEMs) based on transition metals, organic batteries use organic electrode materials (OEMs) composed of abundant light elements such as C, H, O, N and S (Fig. 1b).

What is battery-based electrochemical energy storage?

Battery-based electrochemical energy storage involves the basic concept of faradaic processes within an electrode. In the inorganic materials commonly used today, this is achieved by changing the oxidation state of a (transition) metal, which changes its electrochemical potential, thereby storing (or releasing) energy.

Are organic batteries more sustainable?

A lower energy to produce OEMs also indicates that organic batteries might be easier to degrade or recycle 65, 66, 67. The abundance of constituent elements of electrode materials is an important aspect affecting the cost and sustainability of batteries.

Which packaging processes suit organic batteries?

Moreover, exploring novel packaging processes that specifically suit organic batteries might include fibre batteries via weaving techniques 237, micro-batteries 238, thin-film batteries 239 and 3D-printed batteries 240.

How do organic batteries work?

Organic batteries using light elements such as C, H, O, N and S — which can be continuously cycled through natural resources via photosynthesis — can establish a closed-loop spanning production to recycling. First, these light elements are converted into organic electrode materials (OEMs) through a mild synthesis process.

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