

# What is massless energy storage

Could 'massless' energy storage be a new technology?

Their latest research breakthrough paves the way for essentially 'massless' energy storage in vehicles and other technology. Researchers from Chalmers University of Technology have produced a structural battery that performs ten times better than all previous versions.

Can a 'massless energy storage' battery be used commercially?

As part of their work on what they call 'massless energy storage,' the research team in Sweden has developed a battery made of a carbon fiber composite. It promises similar stiffness to aluminum, while also being capable of storing a fair bit of energy - enough to be used commercially.

Could a structural battery be a 'massless' energy storage technology?

Researchers have produced a structural battery that performs ten times better than all previous versions. It contains carbon fiber that serves simultaneously as an electrode, conductor, and load-bearing material. Their latest research breakthrough paves the way for essentially 'massless' energy storage in vehicles and other technology.

Is carbon fibre a 'massless' energy storage material?

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Could a massless battery reduce the weight of a car?

This study could result in a massless battery that produces 75 Wh/kg of energy and 75 GPa of stiffness, setting more records for massless batteries and greatly reducing their weight. The study team mentions electric cars, e-bikes, satellites, and laptops as technologies that could use massless batteries.

Are massless batteries safe?

Plus, with massless batteries storing lower energy than conventional devices, they also comprise less of a safety risk. In flexibility terms, the device was tested for an elastic modulus of 25 gigapascals and tensile strength exceeding 300 megapascals, and can thus compete with common construction materials, according to the researchers.

Massless energy storage. A schematic illustration of the structural battery and its application for massless energy storage. Illustration by Yen Strandqvist, Chalmers University of Technology. The SBE is a material consisting of a porous glassy polymer where the pores are occupied by a liquid electrolyte, as illustrated in Figure 2a. Reliable ...

A system like this is often termed "massless" energy storage. Effectively, this type of multifunctional battery

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can substantially reduce the weight of EVs. The Research. Chalmers and KTH research teams developed a battery with an energy density of 24 Wh/kg. This translates to a 20% capacity compared to lithium-ion batteries currently ...

Flywheel energy storage devices turn surplus electrical energy into kinetic energy in the form of heavy high-velocity spinning wheels. To avoid energy losses, the wheels are kept in a frictionless vacuum by a magnetic field, allowing the spinning to be managed in a way that creates electricity when required.

This latest advancement may lead to essentially "massless" energy storage in vehicles and other mobile technologies. 5 Since 2007, the scientists have been attempting to develop a truly structural battery, but it's been challenging to produce batteries that have both outstanding mechanical and electrical properties.

Now, researchers at the Chalmers University of Technology have achieved a breakthrough in massless energy storage with their new structural battery which could halve the weight of a laptop, make the mobile phone as thin as a credit card, and increase the driving range of an electric car by up to 70 percent on a single charge.

Their latest research breakthrough paves the way for essentially "massless" energy storage in vehicles and other technology. The batteries in today's electric cars constitute a large part of the vehicles' weight, without fulfilling any load-bearing function. A structural battery, on the other hand, is one that works as both a power source ...

A research group at Chalmers University of Technology in Sweden is presenting a world-leading advance in so-called massless energy storage - a structural battery that could halve the weight of a laptop, make the mobile phone as thin as a credit card or increase the driving range of an electric car by up to 70 percent on a single charge.

This is termed "massless" energy storage, because in essence the battery's weight vanishes when it becomes part of the load-bearing structure. Calculations show that this type of multifunctional battery could greatly reduce the weight of an electric vehicle.

Energy storage is the capture of energy produced at one time for use at a later time [1] to reduce imbalances between energy demand and energy production. A device that stores energy is generally called an accumulator or battery. Energy comes in multiple forms including radiation, ...

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For this reason, structural batteries are said to provide "massless" energy storage. The challenge is to provide batteries with both good electrical and mechanical properties. Early endeavours struggled to find the right

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balance, due to poor electrical insulation or low tensile stiffness. However, researchers are now starting to make major ...

But, back to the elusive massless battery. How can a battery actually be massless, you ask? While technically a misnomer, the structural battery that the team has developed is termed massless because its function is not only for energy storage, but it also plays a part in the structure of the object (in this case, a car).

The ability to store energy can reduce the environmental impacts of energy production and consumption (such as the release of greenhouse gas emissions) and facilitate the expansion of clean, renewable energy.. For example, electricity storage is critical for the operation of electric vehicles, while thermal energy storage can help organizations reduce their carbon ...

The rod is suspended from its midpoint as shown in the figure. Rotating the rod through an angle  $\theta$  results in elastic potential energy being stored in the string; the equation for this energy is  $U = \frac{1}{2} k \theta^2$ . The effective "spring constant",  $k$ , for this energy storage is 7.0 J.

"The battery has an energy density of 24 Wh/kg, meaning approximately 20 percent capacity compared to comparable lithium-ion batteries currently available. But since the weight of the vehicles can be greatly reduced, less energy will be required to drive an electric car, for example, and lower energy density also results in increased safety.

The Energy-Momentum Vector. Newtonian mechanics has two different measures of motion, kinetic energy and momentum, and the relationship between them is nonlinear, e.g., doubling your car's momentum quadruples its kinetic energy. However, nonrelativistic mechanics cannot handle massless particles, which are always ultrarelativistic.

Big breakthrough for "massless" energy storage March 22 2021, by Christian Borg 1/6. 2/6. Structural battery composite fabrication, showing the steps: battery component manufacture, pouch-cell manufacture, and curing of the SBE. Credit: Advanced Energy and Sustainability Research (2021). DOI: 10.1002/aesr.202000093

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