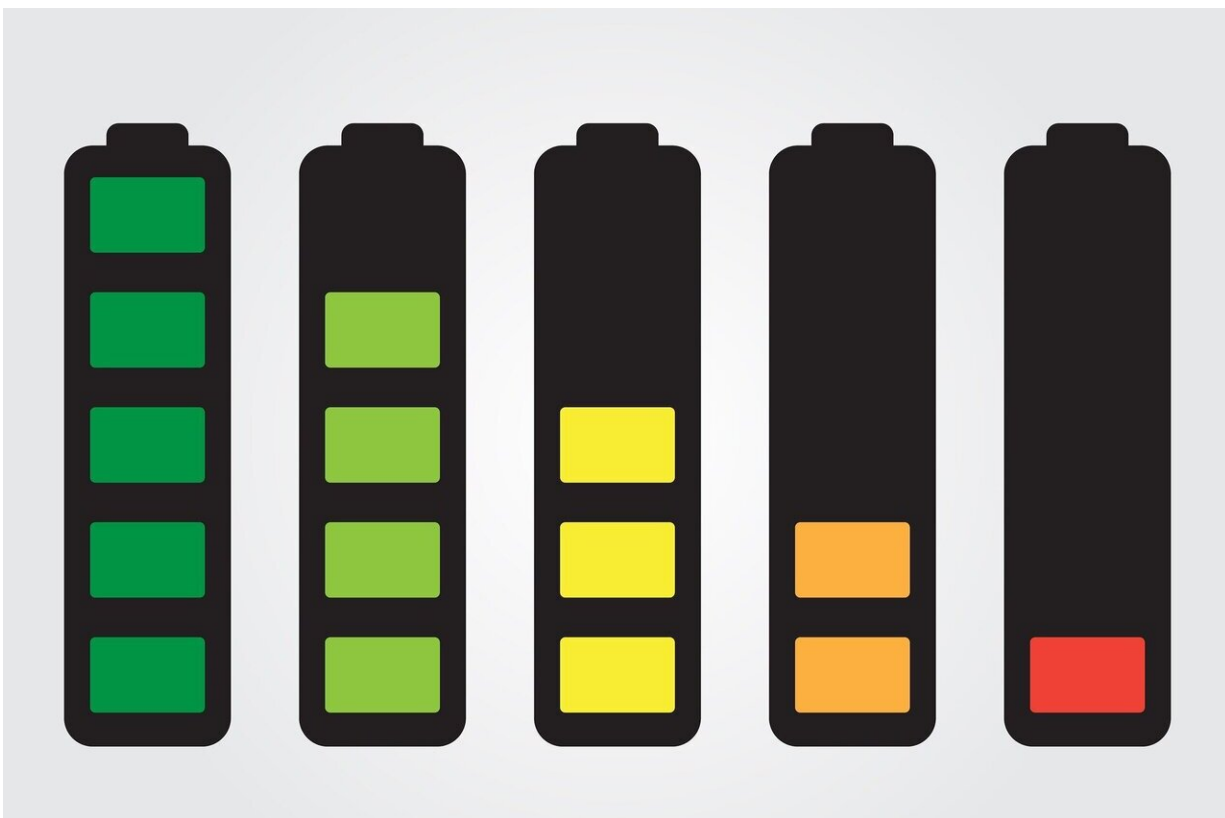


Researchers make strong battery separator using nanomaterials made from seaweed

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Sodium-metal batteries (SMBs) are one of the most promising high-energy and low-cost energy storage systems for the next-generation of large-scale applications. However, one of the major impediments to the

development of SMBs is uncontrolled dendrite growth, which penetrate the battery's separator and result in short-circuiting.

Building on previous work at the University of Bristol and in collaboration with Imperial College and University College London, the team has succeeded in making a [separator](#) from cellulose nanomaterials derived from brown seaweed.

The research, published in *Advanced Materials*, describes how fibers containing these seaweed-derived nanomaterials not only stop crystals from the sodium electrodes penetrating the separator, they also improve the performance of the batteries.

"The aim of a separator is to separate the functioning parts of a [battery](#) (the plus and the minus ends) and allow free transport of the charge. We have shown that seaweed-based materials can make the separator very strong and prevent it being punctured by metal structures made from sodium. It also allows for greater storage capacity and efficiency, increasing the lifetime of the batteries—something which is key to powering devices such as mobile phones for much longer," said Jing Wang, first author and Ph.D. student in the Bristol Composites Institute (BCI). Dr. Amaka Onyianta, also from the BCI, who created the cellulose nanomaterials, co-authored the research.

"I was delighted to see that these nanomaterials are able to strengthen the separator materials and enhance our capability to move towards sodium-based batteries. This means we wouldn't have to rely on scarce materials such as lithium, which is often mined unethically and uses a great deal of natural resources, such as water, to extract it.

"This work really demonstrates that greener forms of energy storage are possible, without being destructive to the environment in their production," said Professor Steve Eichhorn who led the research at the

Bristol Composites Institute.

The next challenge is to upscale production of these materials and to supplant current [lithium](#)-based technology.

More information: Jing Wang et al, Stable Sodium Metal Batteries in Carbonate Electrolytes Achieved by Bifunctional, Sustainable Separators with Tailored Alignment, *Advanced Materials* (2022). [DOI: 10.1002/adma.202206367](#)

Provided by University of Bristol

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