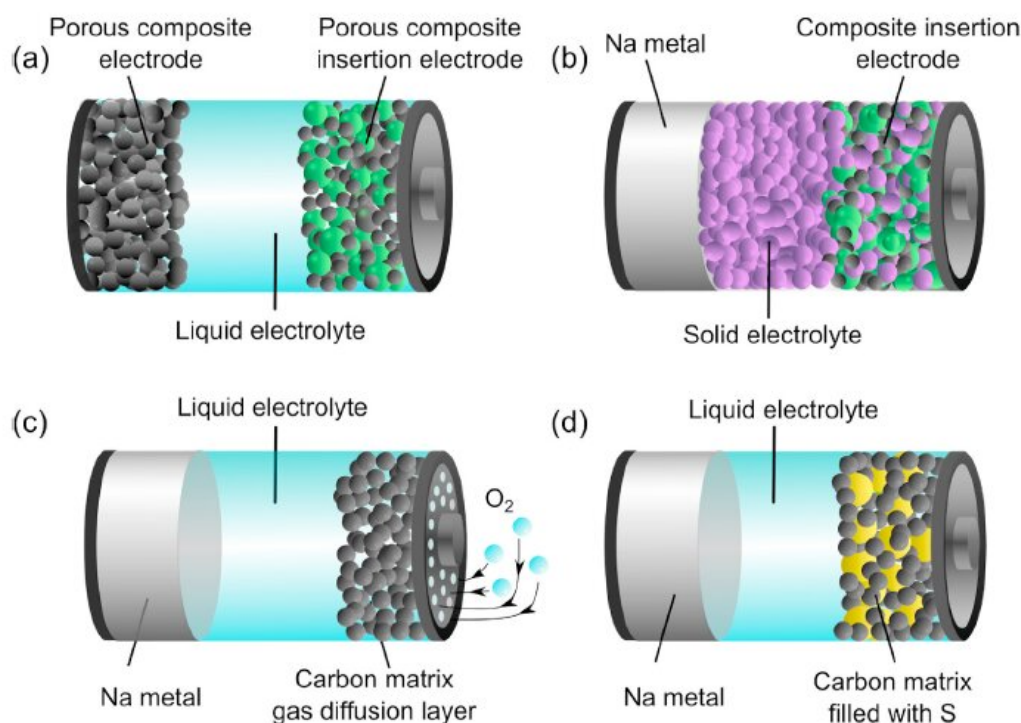


New research says sodium-ion batteries are a valid alternative to lithium-ion batteries

September 22 2020, by Luke Walton



Na battery graphic. Credit: University of Warwick

Lithium (Li)-ion batteries (LIBs) are the electrochemical energy storage systems of choice for a wide variety of applications, however other types of emerging battery technologies are currently on the path to share their dominant position.

Among them sodium (Na)-[ion batteries](#) (NIBs) have great potential to represent the next generation low cost and environmentally friendly energy storage solution. The diverse key performance indicators required by different applications and the market diversification is the driving force pushing the Na-ion technology closer to the market.

A team of scientists including WMG at the University of Warwick combined their knowledge and expertise to assess the current status of the Na-ion technology from materials to [cell development](#), offering a realistic comparison of the key performance indicators for NBs and LIBs.

LIBs play a primary role in the transition to a low carbon economy. However, as the market rapidly expands, the environmental and social challenges associated with the mass production of LIBs is triggering large attention toward the search for alternative energy storage solutions based on materials that can be sourced in a sustainable and responsible way. In this scenario, NIBs represent an alternative low cost, sustainable and more environmentally friendly energy storage technology.

In the paper "Challenges of today for Na-based batteries of the future: from materials to cell metrics," published on the 18th of September 2020 in the *Journal of Power Sources*, a large team of Na-ion technology expert scientists, led by WMG, at the University of Warwick (UK) analyze the prospect of NIBs taking a spot in the energy storage market. The paper also includes researchers from: Helmholtz Institute Ulm (Germany), College de France (France), Humboldt University Berlin (Germany), Institute for Energy technology (Norway), Université de Picardie Jules Verne (France), University of Bordeaux (France) and CIC energiGUNE (Spain).

Na- based batteries offer a combination of attractive properties. They are low cost, use sustainable precursors and have secure raw material

supplies. In addition, they are considered as a drop-in technology which could benefit from the already existing Li-ion batteries manufacturing facilities.

As Li-based systems, Na-based batteries come in different forms, such as Na-ion, Na-all-solid-state-batteries, NaO₂ and Na/S. While the last ones are seen as disruptive future technologies, the Na-ion technology represent an attractive technology almost ready to challenge the Li-ion batteries in specific applications.

Performance metrics are of utmost importance for the SIB technology to ensure a competitive cost per Wh and find a place in the market. In this work, the most promising electrode materials and electrolyte systems have been reviewed and performance metrics from the academic literature have been used to extrapolate full sodium ion cells performance indicators.

Authors indicate that with the ongoing development, the present best materials available for Na-ion cells should allow approaching the energy density of the present generation of Li-ion commercial cells. One of the most important application field for the developed sodium-ion battery prototypes is certainly stationary energy storage systems, where cost and cycle life represent two fundamental parameters. "In this field sodium-ion batteries have the potential to dominate the future market representing the most promising system to fill the gap between energy production and utilization by securing energy supply. However high-power applications in the electrified automotive field are a potential niche field application for NIBs" says Dr. Ivana Hasa, Assistant Professor at WMG.

Further technological improvements are needed to increase the performance especially in terms of [energy](#) density. Extremely encouraging results have been achieved for the Na-ion technology in a

very short time when compared to the Li-ion technology. Technological improvement will be achieved by cell component fabrication/assembly optimization, as occurred in the last thirty years for the LIB technology.

Dr. Ivana Hasa, from WMG, University of Warwick says, "From an applied research point of view, the future research efforts should be devoted on fundamental research, materials discovery and understanding of the thermodynamic and kinetic processes governing the chemistry of these systems. In addition, the investigation of upscaled Na-ion batteries is of primary importance to obtain realistic data to benchmark the progress of the technology as well as the adoption of a common reporting methodology in the scientific community enabling a fair comparison among performance results."

More information: Ivana Hasa et al. Challenges of today for Na-based batteries of the future: From materials to cell metrics, *Journal of Power Sources* (2020). [DOI: 10.1016/j.jpowsour.2020.228872](https://doi.org/10.1016/j.jpowsour.2020.228872)

Provided by University of Warwick

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