Sodium ion batteries explained

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2024 will be the year of sodium-ion batteries. Actually, they have already made their debut in 2023, but in the coming months there will be many companies debuting this type of accumulator on the market. They are appealing because they function in a similar way to lithium-ion batteries, but unlike the latter, they use materials - such as sodium, in fact - that are less expensive and easier to find (sodium is the sixth most common element on earth and makes up 2.6% of the earth''s crust).

A bit like lithium-iron-phosphate (Lfp) batteries, if we want to acknowledge other chemistries that make it possible to produce products with reasonable performance at lower prices, but let''s go back to sodium ion batteries. They are considered among the most promising in the world and are expected to grow by about 600% between now and 2033.

Sodium ion batteries, as mentioned, have a similar architecture to lithium ion batteries. So, like these, they have the same main elements: the cathode, the anode, the separator and the electrolyte. Sodium, in particular, replaces lithium in the cathode, while carbon-based mixtures are still used for the cathode, which are usually obtained by high-temperature carbonisation of anthracite biomass, phenolic resin and other substances.

In sodium ion batteries, aluminium can also be used instead of copper. This is cheaper and further reduces production costs. Nothing changes at the level of the separator, which is still made of plastic.

The first advantage of sodium ion batteries is that they can be built on the same lines as lithium ion batteries. Few modifications are needed and, therefore, low investment. This opportunity makes the technology easily scalable and allows it to be deployed more quickly.

In addition, this type of battery has consistent performance over a wider temperature range. They function correctly from -40 degrees to 80 ?C. In addition, they resist flames better, making them safer. Sodium ion batteries also have a longer service life.

Sodium ion batteries, however, have a lower energy density. This means that larger and heavier batteries have to be built to achieve ranges comparable to those of lithium-ion batteries or, conversely, that when comparing batteries of the same size, sodium-ion batteries offer shorter ranges than lithium-ion batteries.

Added to this is the fact that sodium has a higher specific weight than lithium. As a result, although sodium and lithium in their respective batteries are used in fairly low percentages, sodium-ion batteries are likely to be heavier - a characteristic that makes them less attractive in many fields of application such as electric cars.

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Sodium ion batteries are already a reality when it comes to zero-emission cars. The first car to use them is the Hua Xianzi, a city car produced by JAC and Volkswagen that debuted on the market last year and promises a range of 155 miles (250 kilometres). JAC has beaten everyone to the punch, but there are many manufacturers and car makers who will start offering them.

Above all, CATL and BYD. The former is working on increasingly advanced cells, which are increasing in energy density from generation to generation (we are now at around 160 Wh/kg compared to an average lithium-ion density of 250-300 Wh/kg). Stellantis, which recently signed an agreement with the French company Tiamat to develop batteries of this type for its forthcoming economical electric cars, has also entered the race towards this type of battery.

CATL"s Qilin battery is compatible with several chemistries

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