Lithium sulfur battery explained

Lithium sulfur battery explained

Among the batteries of the future, many companies and research institutes are working on a very promising chemistry: lithium-sulphur. It has a number of features that make it highly attractive, particularly in terms of the mobility needs of the future.

Lithium-sulphur batteries offer high energy density, relatively low weight and low production costs thanks to the different raw materials used: mainly sulphur instead of cobalt. So why haven"t they taken over the market yet? Because there is no shortage of criticism.

Lithium-sulphur batteries, like the vast majority of rechargeable batteries, exploit the difference in electrical charge of two electrodes and the passage of ions from one to the other for charge and discharge cycles. More specifically, they have a predominantly lithium anode (negative pole) and a predominantly sulphur cathode (positive pole). They are separated by a layer of inert material and are immersed in an electrolyte whose function is to allow the passage of ions between the electrodes during the charge and discharge phases.

Lithium-sulphur batteries are characterised by their high energy density. Whilst the average lithium-ion battery achieves around 250 to 300 Wh/kg, lithium-sulphur batteries easily reach values of around 550 to 600 Wh/kg. But there are laboratory studies that allow values as high as 900 Wh/kg.

This means that by replacing the lithium-ion battery in a modern smartphone with a lithium-sulphur battery of equivalent size, the phone could easily operate for a week before needing to be plugged in. On an electric car, to continue the comparisons, you could easily travel more than 2,000 km (1,243 miles) on a full tank of electrons without increasing weight, bulk or cost. In short, the advantages seem obvious.

What"s more, lithium-sulphur batteries are lighter than lithium-ion batteries - which, in the automotive sector, is an added advantage - and they are also more reliable. They require little maintenance, suffer damage and malfunction less frequently and operate correctly over a wider range of temperatures.

So why aren"t they on the market yet? Because they have a short lifespan for use in electric cars and consumer electronics. On average, they lose a considerable percentage of their performance after just a hundred or so cycles.

They also suffer from self-discharge problems, a phenomenon whereby energy is lost even when the batteries are not in use. However, in recent times, significant progress has been made thanks to increased research.

After years of being relegated to the status of a marginal solution, lithium-sulphur batteries look set to enter the market. Silicon Valley-based start-up Lyten has discovered that by using porous graphene cages to cover the cathode, it is possible to increase battery life without compromising performance. Lyten has apparently

developed lithium-sulphur cells that can withstand more than 1,000 charging cycles.

The company, which is funded by both the US government and car manufacturers such as Stellantis, is confident that it will be able to develop a marketable product by 2025. And it is not alone. In the United States in particular, a number of players such as PolyPlus Battery, NexTech Battery and Zeta Energy LLC look set to take the lead in an industry that is currently worth $32 million and will exceed $200 million by 2028.

The rechargeable batteries can be categorized into various types based on their materials. Currently, lithium-ion batteries are the most widely used batteries. Since it was first commercialized in 1991, lithium-ion batteries have been servicing various fields even today in 2022. However, as the battery need for electric vehicles and ESS, the world is looking for next-generation batteries.

Lithium-sulfur batteries use sulfur as cathode and lithium metal as anode. Sulfur used as cathode for lithium-sulfur batteries is less expensive than cobalt used in lithium-ion batteries. Since the sulfur cathode and lithium anode have low density and high capacity per weight than lithium-ion batteries, the battery’s energy density can become two-fold (>500Wh/kg). In other words, the lithium-sulfur battery is rising as a next-generation battery since it could offer high capacity at a lower price.

Contact us for free full report

Web: https://www.sumthingtasty.co.za/contact-us/
Email: energystorage2000@gmail.com
WhatsApp: 8613816583346