Solid-state batteries sucre

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A solid-state battery is an electrical battery that uses a solid electrolyte for ionic conductions between the electrodes, instead of the liquid or gel polymer electrolytes found in conventional batteries.[1] Solid-state batteries theoretically offer much higher energy density than the typical lithium-ion or lithium polymer batteries.[2]

While solid electrolytes were first discovered in the 19th century, several problems prevented widespread application. Developments in the late 20th and early 21st century generated renewed interest in the technology, especially in the context of electric vehicles.

Solid-state batteries can use metallic lithium for the anode and oxides or sulfides for the cathode, increasing energy density. The solid electrolyte acts as an ideal separator that allows only lithium ions to pass through. For that reason, solid-state batteries can potentially solve many problems of currently used liquid electrolyte Li-ion batteries, such as flammability, limited voltage, unstable solid-electrolyte interface formation, poor cycling performance, and strength.[5]

Materials proposed for use as electrolytes include ceramics (e.g., oxides, sulfides, phosphates), and solid polymers. Solid-state batteries are found in pacemakers, and in RFID and wearable devices[citation needed]. Solid-state batteries are potentially safer, with higher energy densities. Challenges to widespread adoption include energy and power density, durability, material costs, sensitivity, and stability.[6]

Between 1831 and 1834, Michael Faraday discovered the solid electrolytes silver sulfide and lead(II) fluoride, which laid the foundation for solid-state ionics.[7][8]

In 2011, Kamaya et al. demonstrated the first solid-electrolyte, Li10GeP2S12 (LGPS), capable of achieving a bulk ionic conductivity in excess of liquid electrolyte counterparts at room temperature.[17] With this, bulk solid-ion conductors could finally compete technologically with Li-ion counterparts.

Researchers and companies in the transportation industry revitalized interest in solid-state battery technologies. In 2011, Bollor? launched a fleet of their BlueCar model cars. The demonstration was meant to showcase the company"s cells, and featured a 30 kWh lithium metal polymer (LMP) battery with a polymeric electrolyte, created by dissolving lithium salt in polyoxyethylene co-polymer.

In 2012, Toyota began conducting research into automotive applications.[18] At the same time, Volkswagen began partnering with small technology companies specializing in the technology.

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In 2013, researchers at the University of Colorado Boulder announced the development of a solid-state lithium battery, with a solid iron-sulfur composite cathode that promised higher energy.[19]

In 2018, Solid Power, spun off from the University of Colorado Boulder,[27] received $20 million in funding from Samsung and Hyundai to establish a manufacturing line that could produce copies of its all-solid-state, rechargeable lithium-metal battery prototype,[28] with a predicted 10 megawatt hours of capacity per year.[29]

Qing Tao started the first Chinese production line of solid-state batteries in 2018 to supply SSBs for "special equipment and high-end digital products".[30]

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