

Battery research – where is it heading?

Starting with the familiar lithium ion batteries, researchers are moving in all directions. All the components of the battery are being studied: the cathode (positive pole), the anode (negative pole) and even the electrolyte, through which the ions move. Current and future battery types at a glance.

Known battery types

Lithium ion battery

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- + high energy density
- + established technique
- flammable if treated wrongly
- limited lifespan
- ingredients from China (supply security)

Research on:

- cathode material without cobalt (from China)
- non-flammable electrolyte liquids
- better performance and reliability
- lower production costs

Molten salt battery

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- + long lifespan
- + many charging/discharging cycles
- + ingredients easily obtainable
- operating temperature 300 °C
- needs to be charged/heated daily

Research on:

- solid electrolytes
- better performance and reliability
- lower production costs

Research on new battery types

Graphite cathode, metal anode

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- + sodium, aluminum, magnesium possible
- + cathode made of low-cost waste graphite
- + easy to assemble, large quantities
- every metal needs special chemistry

Lithium metal anode with thin-film electrolyte

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- + higher energy density than lithium ion batteries
- + non-flammable
- + does not release any toxins in the event of accidents / breakdowns
- production at around 500 °C
- ingredients have to be resistant to high temperatures

Lithium ion battery with solid electrolyte

see pages 14 and 20

- + non-flammable
- + sodium or magnesium possible instead of lithium
- + simple production (pressed powder)
- mechanical stress ages battery
- optimum electrode material still unknown