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Xiaomi applies for a patent on high-density electrode, joins global solid-state battery development race

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Xiaomi's innovation focuses on a layered electrode structure, enhancing ionic conductivity and energy density for potential integration in future EVs

Source: Getty Images/vefimov

Mainland Chinese electric-car maker Xiaomi announced a new patent that marks its venture into solid-state battery technology. The patent is about a layered electrode structure that enhances ionic conductivity and energy density.

The design incorporates a current collector with several layers of electrode materials, such as active materials, conductive agents, binders and a solid electrolyte comprised of polymers and metal salts. By allowing the electrolyte to penetrate the electrode layer, the design aims to improve ion transport and performance.

Xiaomi noted that this technology is compatible with existing lithium battery manufacturing processes, which might facilitate mass production.

The company's prototype showcases a cell-to-body (CTB) design, achieving a 77.8% volume efficiency, with a battery pack just 120 mm tall, including the vehicle floor. It reportedly offers a China Light-Duty Vehicle Test Cycle (CLTC)-rated range of over 1,200 km and can charge up to 800 km in just 10 minutes.

The development coincides with an industrywide shift toward solid-state batteries, with companies such as CATL, BYD, Toyota, SAIC and BMW working on similar advancements.

BMW has begun testing a prototype i7, while CATL and SAIC plan small-scale production by 2027. Toyota targets releasing its solid-state battery models between 2027 and 2028.

Solid-state batteries, which replace liquid electrolytes with solid materials, have the potential to boost energy density, safety and thermal stability. However, they face challenges such as limited ionic conductivity and interfacial contact issues.

The three main types of solid electrolytes that are being developed are sulfide, oxide and polymer, each with its trade-offs.

Xiaomi's patent highlights advancements in overcoming ion transport challenges in thick electrodes, which is crucial for fast-charging applications. This innovation could lead to Xiaomi integrating its solid-state batteries into future electric vehicle models, potentially reducing dependence on third-party suppliers such as CATL and BYD.

Although widespread adoption of solid-state batteries may not occur until 2030, Xiaomi's involvement signifies growing industry momentum. Increased investments by automakers and battery companies are bringing these batteries closer to commercial viability.

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