

BUSINESS

All-solid-state battery tech charges ahead

Small-scale installations anticipated by 2027, mass production by 2030

By CHENG YU
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Chinese battery players are joining forces, including leveraging artificial intelligence technologies, to accelerate the development of all-solid-state batteries, and targeting small-scale installations by 2027 and mass production by 2030, said industry insiders.

The latest goal comes as almost all leading industry players in the field of all-solid-state batteries — including battery manufacturers, automakers and scholars — participated in the second China All-Solid-State Battery Innovation and Development Summit Forum recently.

Ouyang Minggao, an academician at the Chinese Academy of Sciences, said the country's current route for all-solid-state batteries is to develop sulfide-based batteries, which, paired with high-nickel ternary positive and silicon-carbon negative materials, aim to achieve performance targets of 400 watt-hours per kilogram in energy density and life cycles of over 1,000.

"These advances are expected to facilitate the country's small-batch installation of all-solid-state batteries by 2027, with large-scale mass production projected by 2030," said Ouyang, who is also a professor at Tsinghua University.

To keep pace with the development of all-solid-state batteries, Ouyang said that in addition to building common supply chains for industry-wide base materials, it is essential to integrate large language models and AI for science-based endeavors.

He said his team has already collaborated with more than 30 related companies to conduct the development and optimization of large-scale models in the vertical field of all-solid-state batteries.

By leveraging AI large models for solid-state batteries, the system is now able to provide a variety of intelligent experts and intelligent design tools, which will enable intelligent matching of material systems, design parameters, smart optimization and process recommendations.

"The research and development efficiency of batteries can be greatly improved and the development costs can be reduced by 70-80 percent," he added.

All-solid-state batteries offer higher theoretical energy density and safety, and entail lower costs than lithium-ion batteries that currently dominate the electric vehicle sector. Hence, many countries consider them a potentially game-changing technology.

In a further sign of Chinese players' progress in the sector, Sun Huajun, chief technology officer of BYD Lithium Battery Co Ltd, the battery firm for China's largest EV maker BYD, said at the conference

“The research and development efficiency of batteries can be greatly improved (by AI) and the development costs can be reduced by 70-80 percent.”

Ouyang Minggao, an academician at the Chinese Academy of Sciences

that the company plans to begin small-scale production of sulfide-based all-solid-state batteries by 2027, and these batteries are expected to be incorporated into its mainstream EV models by 2030.

This timeline places BYD in direct competition with global automakers investing heavily in such batteries, such as Japan's Toyota, which has been ramping up efforts in this field to take a lead.

Wang Deping, chief scientist of FAW Group, one of China's largest State-owned automakers, said that the company aims to achieve small-scale application of solid-state batteries by 2027.

Wang said China FAW has been dedicated to the development of all-solid-state batteries since 2014, aligning its research with the needs of the automaking sector.

Industry experts said that China adopts a dual-track approach to the development of EV batteries. It will keep improving liquid lithium-ion batteries to "maintain advantages globally", while intensifying R&D of all-solid-state batteries, to "prevent disruptions" by other countries, they said.

Miao Wei, former minister of industry and information technology, said at the conference that economies like the United States, Europe, Japan and South Korea are prioritizing the research and commercialization of all-solid-state batteries, aiming to leapfrog China's current power battery industry, while Chinese companies are ramping up their investments to safeguard their competitive edge.

"While technical challenges remain, cost is another key factor in the widespread adoption of solid-state batteries," Miao said.

He said material costs for a typical solid-state battery exceed 2 yuan (\$0.28) per watt-hour, compared to 0.5 yuan per watt-hour for liquid lithium-ion batteries.

"This makes it far more expensive to produce solid-state battery packs. Thus, for the foreseeable future, liquid and solid-state batteries are likely to coexist in the market," Miao added.



Workers assemble *Ne Zha* movie-themed models in Dongguan, Guangdong province, on Monday. CHEN JIMIN / CHINA NEWS SERVICE

Ne Zha 2 sparks surge in orders for toy factories

GUANGZHOU — In the bustling production workshop of a cultural products company in South China's Guangdong province, miniature figurines of Ne Zha, Ao Bing and Tai Yi — all from the Chinese animated blockbuster film *Ne Zha 2* — are rolling off the assembly line at full speed.

As demand skyrockets, Sun Wenke, president of WoFactory, finds his phone ringing incessantly. In addition to updates on mold production, inquiries from distributors and collaboration requests from eager brands are flooding in.

The driving force behind this frenzy is the phenomenal success of the film, which has shattered multiple box office records around the globe. The film's popularity has triggered a buying spree for themed figurines, keychains and badges.

Many products have sold out both online and offline, with resale prices soaring several fold. Fans have jokingly remarked that after scrambling to secure cinema tickets, they now find themselves fighting for collectibles.

Many of these sold-out products are made in Dongguan, Guangdong known as China's "capital of designer toys". Established toy manufacturers

such as Sun's WoFactory are turning the film's characters into highly sought-after real-world collectibles through innovative designs and craftsmanship.

Founded in 2017, WoFactory is a cultural and creative company specializing in design, research and production, having supported over 2,000 designer brands.

"Our initial order before the film's release was 10,000 sets. Just days ago, an additional order was placed, multiplying demand by several hundred times, with total orders exceeding 100 million yuan (\$13.95 million)," Sun said.

The unprecedented surge in orders has left companies both excited and feeling the pressure.

"We have accelerated mold production to shorten the manufacturing cycle. Typically, it takes 35 to 60 days to produce a mold and another 45 to 90 days to complete a product, but now we can deliver the products to consumers in just over 20 days," Sun said.

To cope with the overwhelming demand, WoFactory has leveraged Dongguan's industrial ecosystem. After securing the massive order, the company partnered with dozens of local toy manufacturers to maximize production capacity and fulfill orders efficiently.

Meanwhile, at Guangdong Henglitai Craft Products Co Ltd, production lines are running 24/7 to meet demand.

"We are working round the clock to manufacture *Ne Zha* merchandise," said Cheng Shuiqiao, the company's engineering manager.

Henglitai's first batch of 300,000 *Ne Zha*-themed acrylic posters, transparent cards, badges, and filmstrips — nicknamed "life must-haves" by fans — sold out instantly before Chinese New Year. The company has since received orders 10 times that size.

Dongguan has in recent years become a global hub for designer toys, producing a quarter of the world's anime-related merchandise and 85 percent of China's designer toy products.

The city's well-established industrial chain and supply network have given companies a competitive edge. In Shipai Town, where WoFactory is based, a fully integrated ecosystem covers everything from design and mold manufacturing to assembly and logistics in a 5-kilometer radius — all accessible within a 15-minute drive.

"We are building an AI-powered prototyping center to integrate AI into toy manufacturing,"

said Liu Xueyi, deputy director of the economic development bureau of Shipai. "This will boost production efficiency by 20 percent and cut the average manufacturing time by 20 days."

Beyond manufacturing, brand partners have also been blown away by the meticulous attention to detail shown in various products.

"For *Ne Zha*-themed merchandise, we introduced subtle design touches such as adding a glitter effect to color cards to replicate the film's fiery visuals, and applying iridescent film to acrylic key-chains to create shifting colors depending on the angle," said Cheng.

The rise of China's designer toy industry is also a reflection of growing cultural confidence.

"Two years ago, only 40 percent of our products were based on Chinese intellectual properties (IPs), while the majority came from foreign franchises. Now, that trend has seen a complete reversal — Chinese IPs dominate our production line," Cheng said. "It's a sign of our cultural soft power strengthening on the global stage."

XINHUA

FROM THE GRASSROOTS

Expanding foie gras market in China and beyond

By LIU YUKUN and ZHU LIXIN
in Lu'an, Anhui

Within the bustling kitchen of a top-tier Japanese eatery in Shanghai, entrepreneur Zhu Renjun unraveled a frost-kissed foam box. Inside, the foie gras glistened with a luscious creamy sheen, prompting a sigh of relief from the head chef — it's the right ingredient.

Little did this "goose magnate" from Anhui province anticipate that the contents of this box would change the upscale dining landscape in East China for the next two decades.

Back in 2003, in Huoqiu county of East China's Anhui province, Zhu, fresh into the world of Landes goose farming, confronted a stark reality: despite his ability to craft top-notch foie gras, breaking into the market proved elusive.

"Out of a thousand restaurants, even sparking interest from just one was a triumph at that time. Not a lot of people ate foie gras. Back then, even the security guards in five-star hotel kitchens cast dubious glances at my foam-laden cargo," Zhu said.

For Zhu, the years spanning from 2003 to 2008 were a crucible of adversity. To boost productivity, he poured his entire savings into raising geese, peddling goose meat and promoting foie gras.

"It was a money pit. Acquiring goslings, tending to the farm, investing in equipment — yet struggling to promote the foie gras to be accepted by many restaurants. I resorted to selling goose



Foie gras products are displayed at a facility in Huoqiu county, Anhui province. XINHUA

meat to break even, crisscrossing the nation to pitch to eateries. We even bunked under bridges to cut costs," said Zhu.

It was this unyielding spirit that propelled Zhu through a "do-or-die breakthrough" in his fifth year of entrepreneurial toil. From Shanghai to Guangzhou, he traversed the expanse of East China with his homemade ice transport chest. Leveraging endorsements from culinary associations, he successfully cracked the door open to Japanese cuisine establishments.

Today, his enterprise, Anhui Renjun Poultry Farming Co Ltd, boasts annual sales of 110 tons of foie gras and a flock of 120,000 geese, consolidating its status as a premier player in Landes goose husbandry in China.

Hailing from France, Landes geese yield opulent and pricey foie gras. However, with their domestic

introduction, the foie gras market saw a price plunge of around 40 percent, courtesy of trailblazers like Zhu.

In Huoqiu, Anhui, a hub for foie gras production, over 140 Landes goose farming outfits flourish. The yearly output of Landes geese surpasses 5 million, yielding over 5,000 metric tons of foie gras and more than 22,500 tons of goose meat and ancillary products, boasting an annual value of up to 2 billion yuan (\$275.5 million).

A profound metamorphosis is brewing within the industry. With Huoqiu clinching the title of "China's foie gras town", the county has stitched together a seamless chain from goose breeding to the intricate processing of foie gras sauce to other related industries.

Today, Zhu's enterprise has ventured into uncharted territory. "The European Union mandates a

three-kilometer farm-residential distance, a make-or-break situation for us," he said. Acknowledging that Huoqiu's foie gras output constitutes a third of the national total, with 90 percent of enterprises yet to meet export criteria, he collaborates with the government to advance the overseas expansion of local foie gras companies.

"While we charge ahead in the global market, we remain steadfast in fortifying our domestic foothold. Alongside ensuring foie gras quality, we've innovated with pre-cooked offerings, now trying to enter major supermarkets. Meanwhile, an array of deep-processed foie gras products — from cherry-infused to creamy and red wine-infused variations — packaged for instant consumption at prices ranging from tens to hundreds of yuan, cater to diverse consumer demands," Zhu said.

"We aspire to further broaden our domestic sales channels. Beyond restaurants and major retailers, we're venturing into online livestreaming and e-commerce platforms and expecting more sales growth this year," he added. "Challenges are fleeting. Navigating solutions is akin to leveling up and battling foes in games. This process is not just about witnessing my business flourish but also about personal growth that generates a source of pride and purpose. With persistence, one can weather any winter."

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An employee addresses queries on all-solid-state batteries during a high-tech expo in Beijing in October. Embracing AI, Chinese battery makers are ramping up efforts to step up the mass production and installation of such batteries. ZHANG HAIYAN / FOR CHINA DAILY