

News Release

March 31, 2025
Proterial, Ltd.
FEV Consulting GmbH

CALISMAT™, a technology for manufacturing CAM for LIBs developed by Proterial, is estimated by FEV to reduce CO₂ emissions by 36%

CALISMAT™, a technology for manufacturing cathode active materials (“CAM”) for lithium-ion batteries (“LIB[s]”) that was developed by Proterial, Ltd. (“Proterial”), contributes to solving environmental issues faced by the battery industry. An estimation by FEV Consulting GmbH (“FEV”) has found that **CALISMAT™** makes it possible to reduce CO₂ emissions by 36% compared to a conventional manufacturing method at a cost that is the same or lower. By providing **CALISMAT™** to the battery industry as a decarbonization solution, Proterial will contribute to the enhancement of the environmental value of LIBs over their product lifecycle.

1. Background

The demand for electric vehicles (EVs) is growing rapidly towards the realization of a decarbonized society, and LIBs are also attracting attention as an important component of EVs. However, the processes of manufacturing LIBs significantly impact the environment, with the CO₂ emissions from these processes accounting for more than 50% of the total emissions from EV manufacturing. In the LIB-manufacturing processes, the percentage of CO₂ emissions that are due to the CAM and their starting materials^{*1} are especially high (Figure 1). This was a major issue. In addition, sulfuric acid waste (Na₂SO₄) is emitted in the process of manufacturing CAM, and a large amount of water is needed to treat the waste, which was also an issue.

Proterial developed the **CALISMAT™** technology for manufacturing CAM which solves these environmental issues faced by the battery industry and announced it in May 2023 (Figure 2 and 3). Proterial is committed to helping enhance the environmental value of LIBs by providing this technology to the battery industry as a decarbonization solution. To further accelerate this initiative, Proterial quantitatively evaluated the environmental value of **CALISMAT™** with the cooperation of FEV, a global strategy consultancy and engineering service provider in the automotive industry.

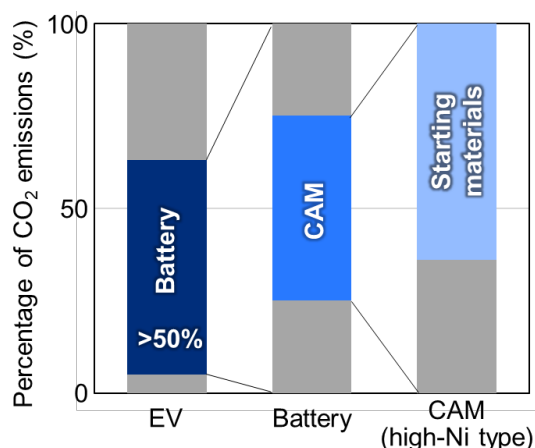


Figure 1: Percentage of CO₂ emissions from EV manufacturing^{*2}

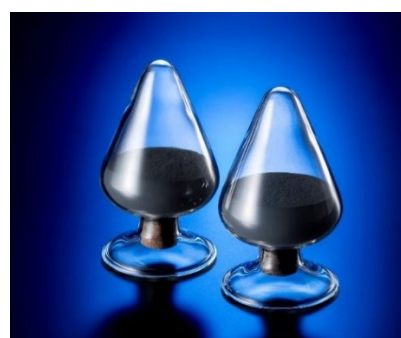


Figure 2: CAM obtained through CALISMAT™

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2. CALISMAT™, a technology for manufacturing cathode active materials

Proterial has developed CALISMAT™, a technology for manufacturing CAM for LIBs without producing a precursor by using a solid-phase reaction method*3 based on powder metallurgy technology (Figure 3). Using CALISMAT™ provides benefits, including the availability of starting material options other than nickel sulfate (NiSO_4), such as metallic nickel (Ni) and nickel oxide (NiO) and eliminates the need for waste treatment of sodium sulfate (Na_2SO_4).

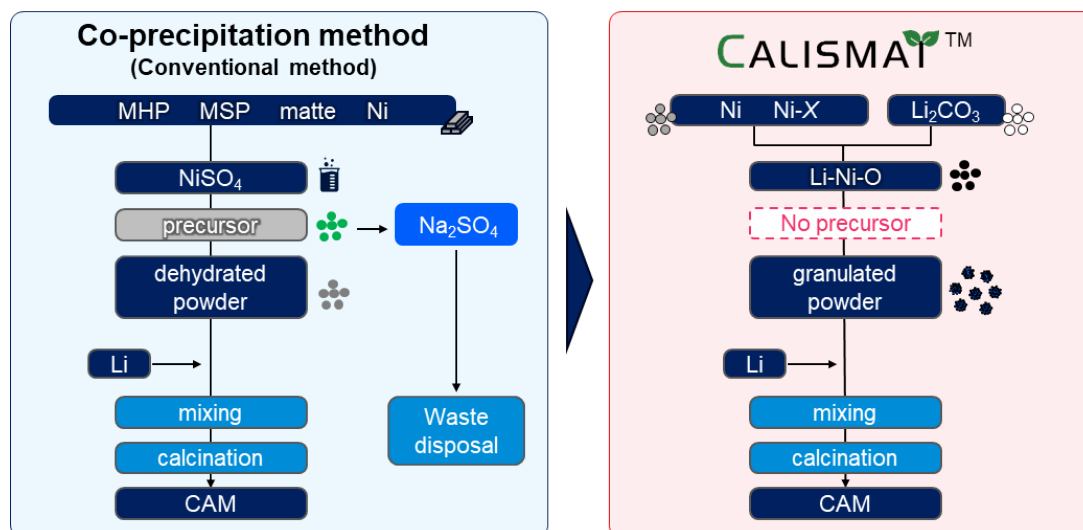


Figure 3: Comparison of CAM manufacturing flows: the co-precipitation method vs. CALISMAT™

3. Estimate of the value of using CALISMAT™

FEV has estimated the environmental value and cost-reduction effects of the conventional co-precipitation method and CALISMAT™ based on the knowledge it has accumulated through providing strategy consulting and engineering services to automotive and battery manufacturers in key regions, including Europe, United States, China, Japan, South Korea and India. The following estimates were obtained, verifying that CALISMAT™ has an environmental impact-reducing effect.

- The carbon footprint of NMC CAM manufacturing is reduced by 36%
- Water consumption is reduced by more than 85%, which simultaneously reduces the effort required for wastewater treatment
- CAM costs, which account for around 40% of total battery cell costs, are reduced by 6%*4

The results of this verification will be exhibited at Hannover Messe 2025 (venue: Messegelände Hannover), which will be held in Germany from March 31 to April 4, 2025.

Media Inquiries: Corporate Communications Dept.

https://www.cntct.proterial.com/contact/publish/inquiry_eng?g=01&c=001-01

Customer Inquiries: <https://www.proterial.com/e/contact/>

*1: Raw material used as the starting point necessary for the initial chemical reaction in the generation of chemicals for cathode materials.

*2: Prepared by Proterial based on IEA Global EV Outlook 2020, Sustainable Materials and Technologies 32 (2022) e00415.

*3: A manufacturing method based on powder metallurgy technology, in which a cathode material is synthesized by pulverizing, mixing, granulating, and sintering a starting material powder without dissolving it in water.

*4: Based on starting materials prices from early 2025

CALISMAT is a trademark of Proterial, Ltd.

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About FEV Consulting GmbH

Headquarters: Neuenhofstr. 181, 52078 Aachen, Germany

Business description: FEV Group is a globally leading engineering provider in the automotive industry and internationally recognized leader of innovation across different sectors and industries. FEV Consulting, founded in 2011, is the management consulting arm of FEV Group and acts as a bridge between strategy and technology. The company combines many years of experience in top management consulting with deep product understanding and technical know-how. As part of the mobility and energy ecosystem, it integrates different industry-specific capabilities. This enables FEV Consulting to create sustainable product and strategy solutions for some of the most pressing and complex issues facing today's enterprises. Core services range from development of business, growth and innovation strategies, to technology concept studies, production planning and cost optimization of products and processes. FEV Consulting currently has around 150 employees serving a global client base out of offices in eight different countries – Germany, the United States, Spain, France, UAE, Saudi Arabia, China and Japan.

Representative: Alexander Nase, Global Managing Director

Established: 2011

■ About PROTERIAL

PROTERIAL

"Proterial" reflects the essence of our corporate philosophy, which consists of three elements: Mission: "Make the best quality available to everyone;" Vision: "Leading sustainability by high performance;" and Values: "Unfaltering integrity" and "United by respect." It combines "**pro-**" with the word "**material.**"

"Pro-" represents our "three pros":

- **Professional — work that exceeds expectations**
- **Progressive — a spirit that keeps challenging**
- **Proactive — an enterprising attitude**

"Material" refers to the high-performance materials that our original technologies produce and underpinned by the three pros. With our focus on solving customer issues and bringing new levels of value, we promise to contribute to the realization of a sustainable society through the products and services that embody our philosophy.

■ Proterial, Ltd. — Company Overview

Established: April 1956

Head office: Toyosu Prime Square, 5-6-36 Toyosu, Koto-ku, Tokyo 135-0061, Japan

Capital : 310 million yen (as of March 31, 2024)

Representative : Sean M. Stack

Representative Director, Chairman, President and Chief Executive Officer (CEO)

Sales revenue: 1,033.2 billion yen (Term ended March 2024)

History: 1910: Founded as Tobata Foundry Co.

1937: Merged with Hitachi, Ltd.

1956: Established separately as Hitachi Metals Industries, Ltd.

2023: Company separated from the Hitachi Group, and renamed from Hitachi Metals, Ltd. to Proterial, Ltd.

Proterial is a participant of the United Nations Global Compact and adheres to its principles-based approach to responsible business. In January 2025, Proterial received a Silver rating in the EcoVadis Sustainability Assessment.

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