

Li-ion Battery Cathode Active Material Recycling

Patent Landscape Analysis - September 2025

Who are the key players and newcomers in the global IP race for Li-ion batteries cathode active materials recycling?

REPORT OUTLINE

- Li-ion Battery Cathode Active Material Recycling
- Patent Landscape Analysis
- September 2025
- PDF >120 slides
- Excel file >3,900 patent families
- Reference: KM25003
- 4,990 EUR for a multi-user license

KEY FEATURES

- **Global patenting trends**, including time evolution of patent publications, countries of patent filings, etc.
- **Main patent assignees and IP newcomers** grouped by geographical area.
- Focus on selected key IP players' portfolios
- Patents categorized by **type of cathode active material** (Li Ternary Oxides, Li Phosphates, Other CAM, Li & Li Precursors).
- **Excel database** containing all patents analyzed in the report, including **patent segmentations** and hyperlinks to an **updated online database**.

RELATED REPORTS & MONITORS

- [Silicon Anode for Li-ion Batteries Patent Landscape Analysis 2024](#)
- [Halide Solid Electrolytes for Li-ion Batteries Patent Landscape 2024](#)
- [Silicon Anode Li-ion Batteries Patent Monitoring Service](#)
- [Solid-State Batteries Patent Monitoring Service](#)



The growing interest in, and need for, a sustainable supply chain has driven innovators into an IP race in Li-ion battery CAM recycling

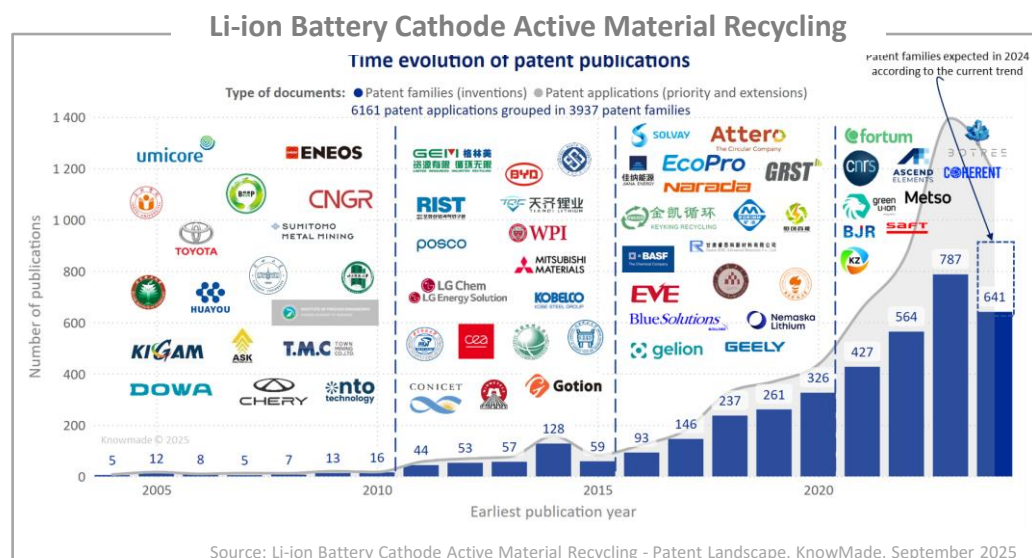
The rapid adoption of electric vehicles (EVs), renewable energy storage systems, and portable electronics has fueled an exponential increase in the demand for Lithium-ion batteries. The interest in critical raw materials such as lithium, cobalt, nickel, and manganese, increased, to instate a more sustainable supply chain and increase the independence of materials-scarce countries from critical minerals suppliers. This concentration of supply, coupled with environmental concerns and evolving regulatory frameworks, has intensified the need for sustainable end-of-life management strategies, particularly **the recycling of spent Li-ion batteries and their cathode materials**.

Cathode materials represent the most valuable and resource-intensive components of Li-ion batteries. These include layered oxides like NMC (LiNiMnCoO₂), NCA (LiNiCoAlO₂), and LCO (LiCoO₂); polyanion materials such as LFP (LiFePO₄) and LMFP (LiMnFePO₄); and spinels like LMO (LiMn₂O₄). Each chemistry presents unique challenges and opportunities for recovery and reuse. Efficient recycling not only reduces reliance on virgin mining but also lowers the environmental footprint of battery production, contributing to the circular economy goals set by governments and industries.

In this context, the present report aims to provide a **comprehensive analysis of the patent landscape** related to the **recycling of cathode active materials (CAM) from Li-ion batteries**. The general objectives of the present report are:

- to identify and map the key IP players in each chosen technological segment (Li & Li precursors, Li ternary oxides, Li phosphates, other cathode materials).
- to assess the geographical distribution of patent families, legal status of patent applications, helping stakeholders understand strategic positioning and navigate their competitive environment.

This insight will support R&D, investment, and policy decisions in the evolving field of Li-ion battery recycling.



A dynamic IP landscape

In this report, KnowMade's analysts have selected and analyzed over 6,100 patents and patent applications from more than 3,900 patent families (inventions) related to Li-ion battery cathode active materials recycling. This significant rise clearly demonstrates a strong interest in the technology from various entities, including large companies, start-ups, and R&D labs. Early entrants in this space such as **Umicore**, **Eneos**, and **Sumitomo Metal Mining** were followed over the years by other patent applicants (e.g., **LG Chem/LGES**, **GEM**, **Brup Recycling Technology**), and they are now competing with more recent new entrants in the patent landscape such as **Asaka Riken**, **EcoPro**, and **Blue Solutions**.

Revealing main trends and key players' IP position

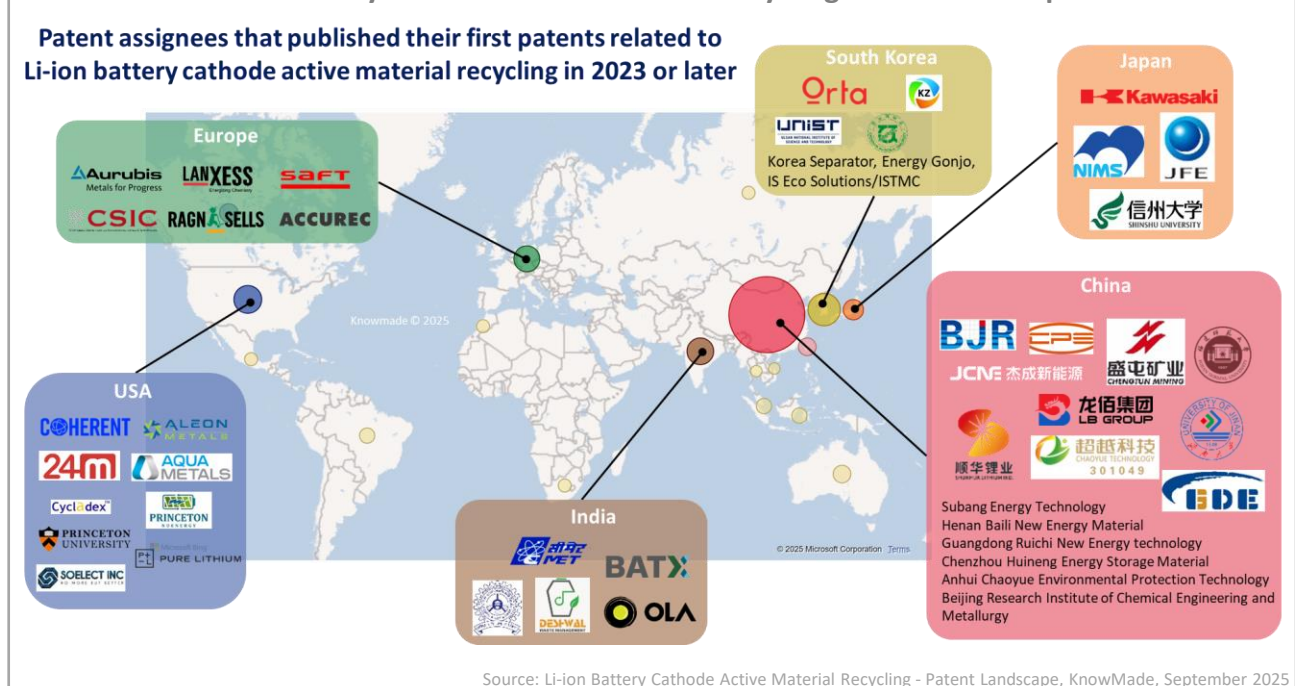
IP competition analysis should reflect the vision of players with a strategy to enter and develop their business in the **Li-ion battery CAM recycling** field. In this report, KnowMade's analysts provide a comprehensive overview of the competitive IP landscape and the main players involved. The report covers **IP dynamics** and **key trends** in terms of patents applications, patent assignees, filing countries, and technological segment of interest (Li & Li precursors, Li ternary oxides, Li phosphates, etc.).

It also identifies the **IP leaders**, most **active patent applicants**, and **new entrants** in the IP landscape. The report also sheds light on **under-the-radar companies** and **new players** in this field.

Entry of new patent applicants

Since 2023, Chinese entities have established themselves as dominant newcomers in the Li-ion battery CAM recycling patent landscape. **BJR**, **CP Lighting**, and **Chengtun Mining Group** are leading the field, while other East Asian IP players such as **Orta Materials** and **Korea Zinc** from South Korea, and **JFE** and **Kawasaki Heavy Industries** from Japan are following closely behind. Dedicated sections of the report focus on the **patent portfolios of key players** and **IP new entrants** from various countries.

Li-ion Battery Cathode Active Material Recycling Patent Landscape



Useful Excel patent database

This report also includes an extensive **Excel database** with all patents analyzed in this study, including **patent information** (numbers, dates, assignees, title, abstract, etc.) and **hyperlinks to an updated online database** (original documents, legal status, etc.), and **affiliation segments** (Li & Li precursors, Li ternary oxides, Li phosphates, other cathode materials).

Companies mentioned in the report (non-exhaustive)

From China: Brunp Recycling technology, Central South University, Institute of Process Engineering-CAS, GEM (Jingmen Gelinmei New Materials), Narada Power Source, Beijing Institute of Technology, Tianqi Lithium, Guoxuan High Tech Power Energy / Gotion, Keyking Recycling, BGRIMM Technology Group, RSK Advanced materials, Zhuzhou Smelter Group, EVE Energy, Lanzhou University of Technology, and more

From Europe: Umicore, BASF, CEA, Blue Solutions, Veolia, Aurubis, Fortum, Metso, Fraunhofer, and more

From Japan: Eneos Group, Sumitomo Metal Mining, Dowa Holdings, TMC (Town Mining Corporation), Asaka Riken, Toyota, Mitsubishi materials, Kobe Steel, Mitsui Mining and Smelting, Sumitomo Chemical/Tanaka Chemical, Hitachi, and more

From South Korea: SK Group, LG Chem/LG Energy Solution, KIGAM (Korea Institute of Geoscience and Mineral Resources), EcoPro, RIST (Research Institute of Industrial Science and Technology), Posco, Cosmochemical, KIST (Korea Institute of Science & Technology), Dongwoo Fince Chem, and more

From USA: Ascend Elements, Worcester Polytechnic Institute, OnTo Technology, Albemarle, Lockheed Martin/UT Battelle, Cirba Solutions, Coherent, University of California, Libus987, Urban Mining, 24M technologies, 6K inc. Aleon Metals, Aqua Metals, Li-Cycle, and more

From the rest of the World: CSIR (Council of Scientific and Industrial Research), Attero Recycling, Conicet, Gelion Technologies, Green Li-ion, Indiana Institute of Technology, Frontier Lithium, Hydro-Québec, and more

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- Scope of the report
- Excel database
- Basic knowledge of IP to better understand this report

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- Time evolution of patent publications
- Main patent assignees
- Timeline of IP players
- Main countries of patent filings
- Geographic coverage of granted patents and pending applications
- Geographical distribution of players' patent portfolios
- Current legal status of patents (granted, pending, dead)
- Main players owning granted patents
- Main players that hold pending patent applications
- IP leadership of patent assignees
- Strength index of players' patent portfolios

• **Focus on Recycling Companies** **36**• **Focus on IP Newcomers Since 2023** **40****TECHNOLOGICAL SEGMENTS** **46**

Technology breakdown by cathode active materials recycling

Time evolution of patent publications

Main patent assignees by cathode active materials recycling

Time evolution of patent publications by cathode active materials

IP leadership of patent assignees for Li & Li Precursors recycling

IP leadership of patent assignees for Li Ternary Oxides recycling

IP leadership of patent assignees for Li Phosphates recycling

IP leadership of patent assignees for other CAM recycling

FOCUS ON IP PLAYERS BY HEADQUARTERS COUNTRY **55**

For each headquarters country: main patent assignees, IP newcomers, geographical coverage of patent portfolios, technical coverage of patent portfolios, and IP profile of key players.

• **Chinese IP players** **57**

• **Japanese IP players** **70**

• **South Korean IP players** **84**

• **American IP players** **96**

• **European IP players** **107**

• **Rest of the World** **118**

ANNEX **125**

• Methodology for patent search, selection and analysis

• Terminology

KNOWMADE PRESENTATION **130****AUTHORS****Dr. Filippo Farina**

Filippo works at KnowMade in the field of energy storage and conversion devices. He's a Materials Chemistry PhD graduate from the University of Montpellier (France) and, after few years spent in industry as a chemical analyst, he has been working in the domain of materials for batteries and fuel cells since 2015 (University of Montpellier, CNRS and CEA-LITEN).

Contact: filippo.farina@knowmade.fr

**Dr. Nicolas Baron**

Nicolas is CEO and co-founder of KnowMade. He manages the development and strategic orientations of the company and personally leads Semiconductors and Energy departments. He holds a PhD in Physics from the University of Nice Sophia-Antipolis, and a Master of Intellectual Property Strategies and Innovation from the European Institute for Enterprise and Intellectual Property (IEEPI) in Strasbourg, France.

Contact: nicolas.baron@knowmade.fr

ABOUT KNOWMADE

KnowMade is a technology intelligence and IP strategy firm specializing in the analysis of patents and scientific publications. We assist innovative companies, investors, and research organizations in understanding the competitive landscape, anticipating technological trends, identifying opportunities and risks, improving their R&D, and shaping effective IP strategies.

KnowMade's analysts combine their strong technology expertise and in-depth knowledge of patents with powerful analytics tools and methodologies to transform patent and scientific data into actionable insights to support decision-making in R&D, innovation, investment, and intellectual property.

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Patent Landscape Analysis - September 2025

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