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Interactive Bibliography: Lithium-Ion Battery Recycling

Five Reasons You Need Onsite Metals Analysis Capabilities for Battery Recycling

1. **Monitoring airborne particulates**
   Go to Category
2. **Analyzing black mass**
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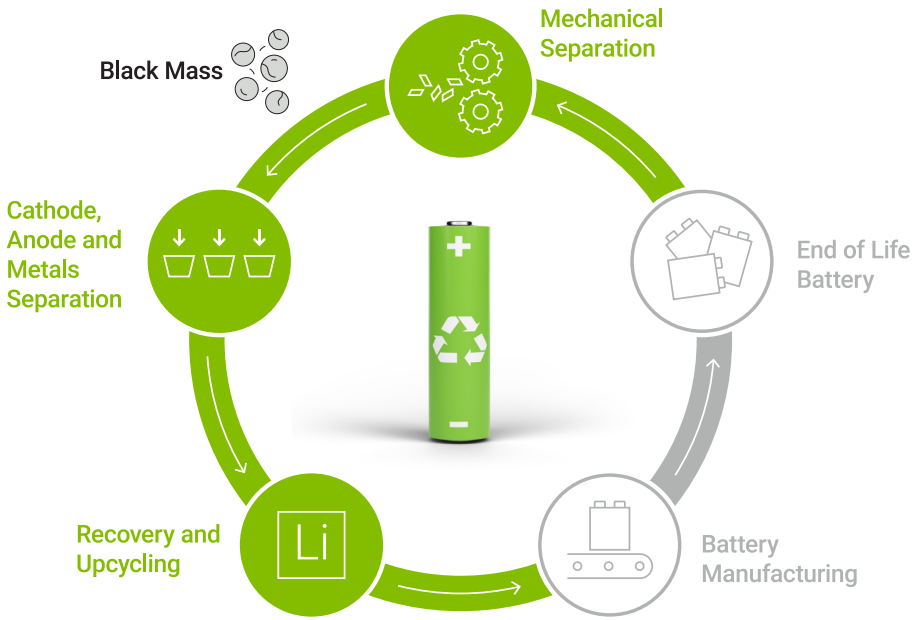
3. **Monitoring and optimizing recycling processes**
   Go to Category
4. **Ensuring QC of input chemicals**
   Go to Category
5. **Monitoring environmental discharges**
   Go to Category



Introduction

As the global demand for lithium-ion batteries continues to surge across automotive, electronics, and energy storage sectors, the critical importance of sustainable battery recycling has become increasingly apparent. The rapid expansion of electric vehicles, portable electronics, and grid-scale energy storage systems has created an urgent need for comprehensive recycling solutions.

With thousands of research papers, technical reports, and studies published annually on battery recycling, staying current with the latest developments presents significant challenges. Identifying relevant, high-quality research from vast databases requires considerable time and specialized expertise—resources that are often limited in today's fast-paced environments.

This interactive bibliography addresses these challenges by consolidating over 100 carefully curated peer-reviewed journal articles, technical reports, and cutting-edge research publications from leading academic and industry sources worldwide. By systematically filtering and organizing the most relevant research into an accessible, searchable format, this resource enables efficient access to essential knowledge for advancing sustainable battery recycling initiatives.

Purpose and scope

This bibliography encompasses multiple dimensions of lithium-ion battery recycling research, including:

- **Materials recovery:** Extracting lithium, cobalt, nickel, manganese, and other critical materials
- **Process innovation:** Hydrometallurgy, pyrometallurgy, direct, and other recycling approaches
- **Environmental impact:** Life cycle assessments and sustainability metrics
- **Economic analysis:** Cost-benefit analyses and market dynamics
- **Policy and regulation:** Regulatory frameworks and policy recommendations
- **Technology development:** Emerging technologies and process optimization

How to use this interactive bibliography

This document features advanced filtering capabilities designed to help you quickly locate relevant research based on your specific interests and requirements.

Filter categories

- **Research focus area:** Air monitoring, black mass analysis, process monitoring, input chemicals, and environmental discharge
- **Recycling method:** Hydrometallurgy, pyrometallurgy, direct recycling, and other approaches
- **Publication year:** Access to both historical developments and cutting-edge research
- **Geographic focus:** Regional studies, global perspectives, and country-specific research

Navigation features

- Click on any filter category to refine your search results
- Click the Home page button on the top right of each page to return to the publication categories
- Direct links to original publications are available from each title

Research landscape

Lithium-ion battery recycling research has evolved rapidly over the past decade, driven by increasing battery waste volumes, supply chain security concerns, and environmental regulations. Current research focuses on developing more efficient recycling processes, improving material recovery rates, and creating circular economy models for battery materials.

This bibliography provides essential access to the latest developments and helps identify research gaps for future investigation, making it an invaluable tool for anyone working in this rapidly advancing field.

Publication Categories

Click on any filter category to refine your search result

Publication Year

- 2025
- 2024
- 2023
- 2022
- 2021
- 2020
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- 2016
- 2015
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Research Focus Area

- Air Monitoring
- Black Mass Analysis
- Process Monitoring
- Input Chemicals
- Environmental Discharge

Recycling Method

- Hydrometallurgy
- Pyrometallurgy
- Direct Recycling
- Other Approaches

Geographic Focus

- China
- Europe
- Middle East
- North America
- South America
- Southeast Asia

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2025**, *354*, 128929	A comprehensive overview of decommissioned lithium-ion battery recycling: Towards green and economical	Chenkai Dong et al	Shandong Key Laboratory of Environmental Processes and Health, School of Environmental Science and Engineering, Shandong University, Qingdao, China	2025	China
Energies **2025**, *18*(2), 398	Optimizing Acidic Reductive Leaching for Lithium Recovery: Enhancing Sustainable Lithium Supply for Energy Markets	Agnieszka Sobianowska-Turek et al	Department of Water and Wastewater Management and Waste Technology, Faculty of Environmental Engineering, Wrocław University of Technology, Poland	2025	Poland

Reference	Title	Authors	Institution	Year	Country
Journal of Alloys and Compounds **2024**, *993*, 174691	A facile approach for regeneration of graphite anodes from spent lithium-ion battery	Rongchang Li et al	Institute of New Carbon Materials, College of Materials Science and Engineering, Taiyuan University of Technology, Taiyuan, China	2024	China
Separation and Purification Technology **2025**, *354*, 129035	A process for preferential recovery of lithium and manganese from spent NCM by vacuum carbothermal reduction method	Jun Li et al	Key Laboratory for Nonferrous Vacuum Metallurgy of Yunnan Province, Kunming University of Science and Technology, Kunming, China	2024	China
Hydrometallurgy **2024**, *230*, 106362	A zero-liquid discharge process to recover all critical metals from spent NCM111 cathode material of end-of-life lithium-ion batteries: statistically optimized leaching with formic acid and in-situ crystallization	Alexandru Sonoc et al	Mechanical and Materials Engineering Department, Queen's University, Ontario, Canada	2024	Canada
Minerals **2024**, *14*(9), 878	Characterization of Lithium-Ion Batteries from Recycling Perspective towards Circular Economy	Lucas Fonseca Guimaraes et al	Department of Chemical Engineering, Polytechnic School, University of Sao Paulo, Sao Paulo, Brazil	2024	Brazil
Chemical Engineering Journal **2024**, *494*, 153199	Closed-loop resynthesis of $LiNiCoAlO_2$ cathode active materials from the industrial leachate of spent li-ion batteries	Seoa Kim et al	Department of Energy & Mineral Resources Engineering, Sejong University, Seoul, Republic of Korea	2024	Korea
Metals **2024**, *14*(1), 80	Co-Precipitation of Metal Oxalates from Organic Leach Solution Derived from Spent Lithium-Ion Batteries (LIBs)	Dominik Schmitz et al	IME Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2024	Germany
Separation and Purification Technology **2024**, *348*, 127771	Eco-friendly closed-loop recycling of nickel, cobalt, manganese, and lithium from spent ternary lithium-ion battery cathodes	Gong Siyu et al	Faculty of Metallurgy and Energy Engineering, Kunming University of Science and Technology, Kunming, Yunnan, China	2024	China
Journal of Cleaner Production **2024**, *480*, 144128	Efficient leaching of valuable metals from spent lithium-ion batteries using green deep eutectic solvents: Process optimization, mechanistic analysis, and environmental impact assessment	Songming Zheng et al	College of Material Science and Engineering, Chongqing University, Chongqing, China	2024	China
Mineral Processing and Extractive Metallurgy Review, **2024**, *46*(3), 386–399	Glutamate Leaching of Spent Lithium-Ion Battery Cathode in Weak Acidic-Neutral Condition: New Insight on Kinetics and Dissolution Mechanism	Erik Prasetyo et al	Research Center for Mining Technology, National Research and Innovation Agency, Lampung Selatan, Indonesia	2024	Indonesia
Separation and Purification Technology **2025**, *354*, 128808	Green recycling of spent $LiCoO_2$ cathodes using a water-based deep eutectic solvent	Xi Wu et al	Key Laboratory of Materials Physics, Centre for Environmental and Energy Nanomaterials, Anhui Key Laboratory of Nanomaterials and Nanotechnology, Institute of Solid State Physics, Hefei Institutes of Physical Science, Chinese Academy of Sciences, Hefei, China	2024	China

Continued on next page

Reference	Title	Authors	Institution	Year	Country
Journal of CO_2 Utilization **2024**, *81*, 102703	Implementation of a sub-and supercritical carbon dioxide process for the selective recycling of the electrolyte from spent Li-ion battery	Nils Zachmann et al	Department of Chemistry and Chemical Engineering, Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Gothenburg, Sweden	2024	Sweden
Minerals Engineering **2024**, *215*, 108828	Investigating battery black mass leaching performance as a function of process parameters by combining leaching experiments and regression modeling	Jere Partinen et al	Aalto University, School of Chemical Engineering, Department of Chemical and Metallurgical Engineering, Aalto, Finland	2024	Finland
Waste Management Bulletin **2024**, *2*, 275–288	Investigation of hydrohalic acids as lixiviants for the leaching of cathode metals from spent lithium-ion batteries	Prichard M. Tembo et al	Department of Chemical and Materials Engineering, University of Nevada-Reno, Nevada, USA	2024	USA
Scientific Reports **2024**, *14*, 10818	Leaching of NMC industrial black mass in the presence of LFP	Yuanmin Zou et al	Department of Chemical and Metallurgical Engineering, School of Chemical Engineering, Aalto University, Aalto, Finland	2024	Finland
Environ Sci Pollut Res **2024**	Mechanical Methods for Materials Concentration of Lithium Iron Phosphate (LFP) Cells and Product Potential Evaluation for Recycling	Priscila Silva Silveira Camargo et al	Corrosion, Protection and Recycling of Materials Laboratory (LACOR), Department of Materials Engineering, School of Engineering, Federal University of Rio Grande do Sul, Brazil	2024	Brazil
Environ. Sci. Technol. **2024**, *58*(48), 21362–21373	Mechanisms of Thermal Decomposition in Spent NCM Lithium-Ion Battery Cathode Materials with Carbon Defects and Oxygen Vacancies	Kang Liu et al	Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology, Hong Kong, China	2024	China
ACS Sustainable Chem. Eng. **2024**, *12*(45), 16564–16576	Metal Extraction from Commercial Black Mass of Spent Lithium-Ion Batteries Using Food-Waste-Derived Lixiviants through a Biological Process	Joseph Jegan Roy et al	Energy Research Institute at Nanyang Technological University (ERI@N) and SCARCE Lab, Singapore	2024	Singapore
Separation and Purification Technology **2024**, *335*, 126181	Multicomponent solvent extraction modelling of lithium, cobalt, nickel, and manganese from simulated black mass leachate	Junnan Lu et al	Department of Chemical Engineering, The University of Melbourne, VIC, Australia	2024	Australia
Separation and Purification Technology **2024**, *345*, 127415	Novel targeted extraction of lithium: An environment-friendly controlled sulfidation roasting technology and mechanism for recovering spent lithium-ion batteries	Wencan Quan et al	School of Metallurgy Engineering, Jiangxi University of Science and Technology, Ganzhou, China	2024	China
Environmental Advances **2024**, *17*, 100570	On the effect of cavitation on particles in leaching processes: implications to battery recycling	Chiara Canciani et al	CCRC, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia	2024	Saudi Arabia
Results in Engineering **2024**, *23*, 102802	Optimization of high-temperature thermal pretreatment conditions for maximum enrichment of lithium and cobalt from spent lithium-ion polymer batteries	Lizhen Gao et al	College of Environmental Science and Engineering, Taiyuan University of Technology, Shanxi-Province, China	2024	China

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Reference	Title	Authors	Institution	Year	Country
Joule **2024**, *8*(10), 2735-2754	Phase-selective recovery and regeneration of end-of-life electric vehicle blended cathodes via selective leaching and direct recycling	Laura L. Driscoll et al	School of Chemistry, University of Birmingham, Birmingham, UK	2024	UK
Chemical Engineering Journal **2024**, *500*, 157219	Precise regulation of layered-to-rock structure of spent Li-ion cathodes achieving ultrahigh lithium recovery rate	Xue Bai et al	State Key Laboratory of Chemical Resource Engineering, College of Chemistry, Beijing University of Chemical Technology, Beijing, China	2024	China
Journal of Industrial and Engineering Chemistry **2024**, *139*, 111–124	Recent recycling methods for spent cathode materials from lithium-ion batteries: A review	Karmegam Dhanabalan et al	School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea	2024	Korea
Separation and Purification Technology **2024**, *348*, 127777	Review on the sustainable recycling of spent ternary lithium-ion batteries: From an eco-friendly and efficient perspective	Xiang-nan Zhu et al	College of Energy and Mining Engineering, Shandong University of Science and Technology, Shandong, China	2024	China
Journal of Environmental Chemical Engineering **2024**, *12*, 114346	Selective lithium recovery from waste lithium-ion batteries by H_2SO_4 roasting focused on process intensification and conversion mechanism	Haoyuan Deng et al	State Key Laboratory of Pollution Control and Resources Reuse, Shanghai, China	2024	China
Minerals **2024**, *14*(11), 1155	Spent NCM Lithium-Ion Batteries: Potential Evaluation of Mechanical Pretreatment for Recycling	Priscila Silva Silveira Camargo et al	Laboratory of Corrosion, Protection and Materials Recycling (LACOR), Materials Engineering Department, School of Engineering, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Brazil	2024	Brazil
Journal of Analytical and Applied Pyrolysis **2024**, *179*, 106466	Sustainable method for disposing of ceramic-coated battery separator via carbon dioxide-assisted thermochemical process	Sangyoon Lee et al	Department of Earth Resource and Environmental Engineering, Hanyang University, Seoul, Republic of Korea	2024	Korea
Separation and Purification Technology **2024**, *348*, 127707	Sustainable recovery of cobalt and lithium from lithium-ion battery cathode material by combining sulfate leachates and aqueous biphasic systems based on tetrabutylphosphonium-ionic liquids	Jasmina Musovic et al	Laboratory of Physical Chemistry, Vinca Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia	2024	Serbia
Chemical Engineering Journal **2024**, *481*, 148516	Sustainable recycling of spent ternary lithium-ion batteries via an environmentally friendly process: Selective recovery of lithium and non-hazardous upcycling of residue	Jianxing Liang et al	School of Environmental Science and Engineering, Shanghai Jiao Tong University, Shanghai, China	2024	China

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Reference	Title	Authors	Institution	Year	Country
Journal of Cleaner Production **2024**, *438*, 140798	Sustainable regeneration of high-performance cathode materials from spent lithium-ion batteries through magnetic separation and coprecipitation	Wei Ding et al	School of Resources and Environmental Engineering, Wuhan University of Technology, Wuhan, China	2024	China
Waste Management **2024**, *183*, 209–219	Sustainable reprocessing of lithium iron phosphate batteries: A recovery approach using liquid-phase method at reduced temperature	Tingyan Ren et al	South China Institute of Environmental Sciences, Ministry of Ecology and Environment of China, Guangzhou, China	2024	China
Chemical Engineering Journal **2024**, *499*, 156114	Synergistic ternary deep eutectic solvents: An archetype for sustainable and eco-conscious Li and Co recovery from spent batteries	Hussein K. Amusa et al	Department of Chemical and Petroleum Engineering, Khalifa University, Abu Dhabi, United Arab Emirates	2024	UAE
Environ. Sci. Technol. **2024**, *58*(43), 19486−19500	Toward a Circular Lithium Economy with Electrodialysis: Upcycling Spent Battery Leachates with Selective and Bipolar Ion-Exchange Membranes | Environmental Science & Technology	Zi Hao Foo et al	Department of Mechanical Engineering, Massachusetts Institute of Technology, Massachusetts, USA	2024	USA
Minerals Engineering **2024**, *217*, 108918	Valorization of lithium containing slags from pyrometallurgical recycling route of spent lithium-ion batteries: The enrichment of γ-$LiAlO_2$ phase from thermodynamic controlled and modified slags	Hao Qiu et al	Institute of Mineral and Waste Processing, Recycling and Circular Economy Systems (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2024	Germany

Reference	Title	Authors	Institution	Year	Country
Journal of Energy Storage **2023**, *72*, 108486	A comprehensive review of full recycling and utilization of cathode and anode as well as electrolyte from spent lithium-ion batteries	Gongchu Shi et al	School of Material Science and Engineering, Beijing Institute of Technology, Beijing, China	2023	China
Nature Energy **2023**, *8*, 1137–1144	A contact-electro-catalytic cathode recycling method for spent lithium-ion batteries	Huifan Li et al	CAS Center for Excellence in Nanoscience, Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, Beijing, China	2023	China
Metals **2023**, *13*(7), 1276	Acid-Assisted Separation of Cathodic Material from Spent Electric Vehicle Batteries for Recycling	Anton Zorin et al	School of Metallurgy and Materials, University of Birmingham, Birmingham, UK	2023	UK
Waste Management **2023**, *165*, 189–198	Acid-free extraction of valuable metal elements from spent lithium-ion batteries using waste copperas	Xi Jin et al	College of Materials Science and Engineering, Chongqing University, Chongqing, China	2023	China
Metals **2023**, *13*(5), 834	Acid Leaching of Al- and Ta-Substituted $Li_7La_3Zr_2O_{12}$ (LLZO) Solid Electrolyte	Kristin Schneider et al	Institute of Mineral and Waster Processing, Recycling and Circular Economy Systems, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2023	Germany
Science Advances **2023**, *9*, 39	Battery metal recycling by flash Joule heating	Weiyin Chen et al	Department of Chemistry, Rice University, Houston, TX, USA	2023	USA
Science of the Total Environment **2024**, *924*, 171453	Can e-waste recycling provide a solution to the scarcity of rare earth metals? An overview of e-waste recycling methods	Sai Sree Varsha Vuppaladadiyam et al	Department of Chemical and Biological Engineering, Monash University, Australia	2023	Australia
Waste Management **2023**, *166*, 122–132	Chemical speciation changes of an all-solid-state lithium-ion battery caused by roasting determined by sequential acid leaching	Yutaro Takaya et al	Faculty of Engineering, The University of Tokyo, Tokyo, Japan	2023	Japan
Journal of Environmental Chemical Engineering **2023**, *11*, 110979	Comparative of malonic acid aqueous solution and malonic acid-based deep eutectic solvent for $LiCoO_2$ cathode materials recovery: Leaching efficiency and mechanism	Yunpeng Wen et al	School of Metallurgical Engineering, Xi'an University of Architecture and Technology, Xi'an, China	2023	China
Waste Management **2024**, *187*, 1–10	Conversion and fate of waste Li-ion battery electrolyte in a two-stage thermal treatment process	Li-Jun Wu et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2023	China
ChemElectroChem **2023**, *10*(17), e202300265	Co-precipitation of NCM 811 Using Recycled and Purified Manganese: Effect of Impurities on the Battery Cell Performance	Toni Kauppinen et al	University of Oulu, Research unit of Sustainable chemistry, Oulu, Finland	2023	Finland

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Reference	Title	Authors	Institution	Year	Country
Journal of Industrial and Engineering Chemistry **2024**, *134*, 112–122	Design of a novel magnetic composite catalyst with highly efficient cobalt circulation for activating peroxymonosulfate to degrade tetracycline	Lei Wang et al	School of Materials Science and Engineering, Anhui University of Science and Technology, Huainan, China	2023	China
Minerals **2023**, *13*(6), 798	Development of a More Sustainable Hybrid Process for Lithium and Cobalt Recovery from Lithium-Ion Batteries	José Cristiano Mengue Model et al	Metallurgy and Materials Engineering, Laboratory of Corrosion, Protection and Materials Recycling, Federal University of Rio Grande do Sul, Porto Alegre, Brazil	2023	Brazil
Materials Today Energy **2023**, *37*, 101374	Direct recycling of degraded lithium-ion batteries of an electric vehicle using hydrothermal relithiation	Ka Ho Chan et al	Laboratory for Strategic Materials, Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, Canada	2023	Canada
Nature Communications **2023**, *14,* 584	Direct regeneration of degraded lithium-ion battery cathodes with a multifunctional organic lithium salt	Guanjun Ji et al	Tsinghua-Berkeley Shenzhen Institute & Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2023	China
Ceramics International **2023**, *49*, 9147–9154	Effective stripping and reutilization of $LiFePO_4$ cathode waste from retired lithium ion batteries	Yucai Zhang et al	School of Chemistry & Chemical Engineering, Xinjiang Key Laboratory of Energy Storage and Photoelectrocatalytic Materials, Xinjiang Normal University, Urumqi, China	2023	China
Energy Storage Materials **2023**, *63*, 103025	Efficient separation and coprecipitation for simplified cathode recycling	Lu Yu et al	Electrification and Energy Infrastructures Division, Oak Ridge National Laboratory, Oak Ridge, USA	2023	USA
Journal of Industrial and Engineering Chemistry **2023**, *118*, 351-361	Electrolyte recovery from spent Lithium-Ion batteries using a low temperature thermal treatment process	Nils Zachmann et al	Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Nuclear Chemistry and Industrial Material Recycling, Gothenburg, Sweden	2023	Sweden
Chemical Engineering Journal **2023**, *467*, 143441	Green recovery of Li, Ni, and Mn from spent $xLi_2MnO_3 \cdot (1-x)LiMO_2$ cathode materials: Experimental study and mechanism analysis	Yifan Wang et al	Institute of Circular Economy, Beijing University of Technology, Beijing, China	2023	China
ACS Omega **2023**, *8*(7), 6959–6967	Highly Efficient Recovery and Recycling of Cobalt from Spent Lithium-Ion Batteries Using an N-Methylurea–Acetamide Nonionic Deep Eutectic Solvent	Subramanian Suriyanarayanan et al	Bioorganic and Biophysical Chemistry Laboratory, Linnaeus Centre for Biomaterials Chemistry, Department of Chemistry and Biomedical Sciences, Linnaeus University, Kalmar, Sweden	2023	Sweden
Journal of Materials Chemistry A **2024**, *12*, 7321-7328	High-power recycling: upcycling to the next generation of high-power anodes for Li-ion battery applications	A. J. Green et al	School of Chemistry, University of Birmingham, Birmingham, UK	2023	UK

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Reference	Title	Authors	Institution	Year	Country
Journal of Hazardous Materials **2023**, *457*, 131782	In-situ pyrolysis based on alkaline medium removes fluorine-containing contaminants from spent lithium-ion batteries	Hanlin Huang et al	Chemistry and Chemical Engineering Data Center, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2023	China
Industrial Chemistry & Materials **2023**, *1*(2), 254-261	Large-scale direct regeneration of $LiFePO_4$@C based on spray drying	Yongxing Zou et al	Sauvage Laboratory for Smart Materials, Harbin Institute of Technology, Shenzhen, China	2023	China
Journal of Environmental Chemical Engineering **2023**, *11*, 109759	Microwave low-temperature treatment – Step leaching process for recovering black mass from spent lithium-ion batteries	Chao Liu et al	School of Water Resources and Environmental Engineering, East China University of Technology, Nanchang, Jiangxi, China	2023	China
Journal of Cleaner Production **2023**, *431*, 139645	Novel approach to recycling of valuable metals from spent lithium-ion batteries using hydrometallurgy, focused on preferential extraction of lithium	Jialin Qing et al	School of Metallurgy and Environment, Central South University, Changsha, China	2023	China
Resources, Conservation & Recycling **2023**, *190*, 106782	Oriented conversion of spent $LiCoO_2$-lithium battery cathode materials to high-value products via thermochemical reduction with common ammonium oxalate	Chunli Liu et al	National-Local Joint Engineering Research Center of Heavy Metals Pollutants Control and Resource Utilization, School of Environmental and Chemical Engineering, Nanchang Hangkong University, Jiangxi, China	2023	China
Resources, Conservation and Recycling **2023**, *192*, 106937	Priority Lithium recovery from spent Li-ion batteries via carbothermal reduction with water leaching	Zhiming Yan et al	WMG, University of Warwick, Coventry, UK	2023	UK
Journal of Environmental Chemical Engineering **2023**, *11*, 109160	Rare metals recycling from spent NCM cathode materials and simultaneous dehydrofluorination of polyvinylidene fluoride (PVDF) in subcritical water	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2023	Korea
New Carbon Materials **2023**, *38*(5), 787-803	Recent developments and the future of the recycling of spent graphite for energy storage applications	Ji-Rui Wang et al	School of Materials Science and Engineering, Hefei University of Technology, Hefei, China	2023	China
Chemical Engineering Journal **2023**, *476*, 146733	Recent progress on sustainable recycling of spent lithium-ion battery: Efficient and closed-loop regeneration strategies for high-capacity layered NCM cathode materials	Liuyang Yu et al	State Key Laboratory of Chemical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin, China	2023	China
Chemical Engineering Journal **2024**, *481*, 148564	Recovery and reuse of spent lithium-ion batteries as catalysts for low-temperature NH_3-SCR	Na Wu et al	Key Laboratory of Special Functional Materials for Ecological Environment and Information, Hebei University of Technology, Tianjin, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
Recycling **2023**, *8*(5), 79	Recovery of Graphite from Spent Lithium-Ion Batteries	Charlotte Badenhorst et al	Institute of Earth Sciences—Porto, Department of Geosciences, Environment and Land Use Planning, Faculty of Sciences, University of Porto, Porto, Portugal	2023	Portugal
Separation and Purification Technology **2024**, *330*, 125498	Recyclable deep eutectic solvents for recycling $LiCoO_2$ from spent lithium-ion batteries with high selectivity	Yaozhi Zhang et al	State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing, China	2023	China
Journal of Energy Storage **2023**, *73*, 109073	Recycling valuable materials from the cathodes of spent lithium-ion batteries: A comprehensive review	Sezgin Yasa et al	Yildiz Technical University, Faculty of Chemical and Metallurgical Engineering, Department of Metallurgy and Materials Engineering, Istanbul, Turkey	2023	Turkey
Journal of Industrial and Engineering Chemistry **2024**, *134*, 281–288	Research on the separation process of positive electrode active material and aluminum foil	Yuhui Zhao et al	School of Resources and Environmental Engineering, Jiangsu University of Technology, Changzhou, China	2023	China
Separation and Purification Technology **2023**, *315*, 123684	Review on comprehensive recycling of spent lithium-ion batteries: A full component utilization process for green and sustainable production	Si-qi Jiang et al	College of Chemical and Biological Engineering, Shandong University of Science and Technology, Shandong, China	2023	China
Separation and Purification Technology **2023**, *306*, 122559	Separation and recovery of nickel cobalt manganese lithium from waste ternary lithium-ion batteries	Chunyan Li et al	Key Laboratory of Coal Processing and Efficient Utilization of Ministry of Education, School of Chemical Engineering and Technology, China University of Mining and Technology, Xuzhou, China	2023	China
Batteries **2023**, *9*(11), 549	Sequential Recovery of Critical Metals from Leached Liquor of Processed Spent Lithium-Ion Batteries	Ayorinde Emmanuel Ajiboye et al	Applied Materials Division, Argonne National Laboratory, Chicago, IL, USA	2023	USA
Journal of Hazardous Materials **2023**, *458*, 131959	Shearing-enhanced mechanical exfoliation with mild-temperature pretreatment for cathode active material recovery from spent LIBs	Chenyu Zhang et al	School of Chemical and Environmental Engineering, China University of Mining and Technology, Beijing, China	2023	China
Communications Chemistry **2023**, *6*, 49	Universal and efficient extraction of lithium for lithium-ion battery recycling using mechanochemistry	Oleksandr Dolotko et al	Karlsruhe Institute of Technology (KIT), Institute for Applied Materials-Energy Storage Systems (IAM-ESS), Karlsruhe, Germany	2023	Germany
Molecules **2023**, *28*(6), 2558	Upcycling of Acid-Leaching Solutions from Li-Ion Battery Waste Treatment through the Facile Synthesis of Magnetorheological Fluid	Magdalena Abramowicz et al	Faculty of Chemistry, University of Warsaw, Warsaw, Poland	2023	Poland

Reference	Title	Authors	Institution	Year	Country
Science Advances **2022**, *8*, 40	A green and sustainable strategy toward lithium resources recycling from spent batteries	Jing Xu et al	Research Center of Grid Energy Storage and Battery Application, School of Electrical Engineering, Zhengzhou University, Zhengzhou, China	2022	China
Journal of Environmental Chemical Engineering **2022**, *10*, 108627	A novel ternary deep eutectic solvent for efficient recovery of critical metals from spent lithium-ion batteries under mild conditions	Yanshun Liao et al	School of Materials Science and Engineering, Beijing Institute of Technology, Beijing, China	2022	China
Waste Management **2023**, *156*, 247–254	A sustainable approach for selective recovery of lithium from cathode materials of spent lithium-ion batteries by induced phase transition	Fu Rao et al	School of Resources and Environmental Engineering, Shanghai Polytechnic University,Shanghai Collaborative Innovation Center for WEEE Recycling, Shanghai, China	2022	China
J. Am. Chem. Soc. **2022**, *144*, 20306−20314	Adaptable Eutectic Salt for the Direct Recycling of Highly Degraded Layer Cathodes	Jun Ma et al	Tsinghua-Berkeley Shenzhen Institute and Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2022	China
Chemistry A European Journal **2022**, *28*, 22	Comprehensive Characterization of Shredded Lithium-Ion Battery Recycling Material	Christoph Peschel et al	University of Munster, MEET Battery Research Center, Munster, Germany	2022	Germany
Green Chemistry **2023**, *25*, 3503-3514	Direct reuse of aluminium and copper current collectors from spent lithium-ion batteries	Pengcheng Zhu et al	School of Chemistry, The University of Birmingham, Birmingham, UK	2022	UK
Chem **2022**, *8*(7), 1944-1955	Direct upcycling of mixed Ni-lean polycrystals to single-crystal Ni-rich cathode materials	Xiaotu Ma et al	Department of Mechanical Engineering, Worcester Polytechnic Institute, Worcester, USA	2022	USA
Chemical Engineering Journal **2022**, *447*, 137507	Downstream recovery of Li and value-added metals (Ni, Co, and Mn) from leach liquor of spent lithium-ion batteries using a membrane-integrated hybrid system	Ramesh Kumar et al	Department of Earth Resources & Environmental Engineering, Hanyang University, Seoul, Republic of Korea	2022	Korea
Waste Management **2022**, *148*, 12–21	Efficient recovery of valuable metals from cathode materials of spent $LiCoO_2$ batteries via co-pyrolysis with cheap carbonaceous materials	Yiming Lai et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2022	China
ACS Sustainable Chem. Eng. **2022**, *10*(46), 15297−15304	Occupational Threat of Recycling Spent Lithium-Ion Batteries by Vacuum Reduction	Keyi Lin et al	Guangdong Provincial Key Laboratory of Environmental Pollution Control and Remediation Technology, School of Environmental Science and Engineering, Sun Yat-Sen University, Guangzhou, China	2022	China

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Reference	Title	Authors	Institution	Year	Country
Metals **2022**, *12*(4), 677	Recovery of Graphite and Cathode Active Materials from Spent Lithium-Ion Batteries by Applying Two Pretreatment Methods and Flotation Combined with a Rapid Analysis Technique	Hao Qiu et al	Institute of Mineral and Waste Processing, Waste Disposal and Geomechanics (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2022	Germany
Resources, Conservation and Recycling **2022**, *186*, 106579	Recycling cathode material $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ by leaching with a deep eutectic solvent and metal recovery with antisolvent crystallization	Chunyan Ma et al	Department of Chemical Engineering, KTH Royal Institute of Technology, Stockholm, Sweden	2022	Sweden
Chemical Engineering Journal **2022**, *434*, 134542	Selective recycling of valuable metals from waste $LiCoO_2$ cathode material of spent lithium-ion batteries through low-temperature thermochemistry	Xiangping Chen et al	School of Environmental Science and Engineering, Shaanxi University of Science & Technology, Xi'an, China	2022	China

Reference	Title	Authors	Institution	Year	Country
Carbon **2022**, *189*, 293e304	A new approach to regenerate high-performance graphite from spent lithium-ion batteries	Qinghao Chen et al	College of Materials Science and Engineering, Sichuan University, Chengdu, China	2021	China
Waste Management **2021**, *131*, 20–30	A novel pulsated pneumatic separation with variable-diameter structure and its application in the recycling spent lithium-ion batteries	Xueshuai Zhu et al	School of Chemical and Environmental Engineering, China University of Mining and Technology, Beijing, China	2021	China
Resources, Conservation & Recycling **2021**, *175*, 105863	A technology for recycling lithium-ion batteries promoting the circular economy: The RecycLib	M.P. dos Santos et al	Center for Advanced and Sustainable Technologies (CAST), Sao Paulo State University (UNESP), Brazil	2021	Brazil
Separation and Purification Technology **2021**, *276*, 119307	Development of heterogeneous equilibrium model for lithium solvent extraction using organophosphinic acid	Junnan Lu et al	Department of Chemical Engineering, The University of Melbourne, VIC, Australia	2021	Australia
Metals **2021**, *11*(2), 177	Early-Stage Recovery of Lithium from Tailored Thermal Conditioned Black Mass Part I: Mobilizing Lithium via Supercritical CO_2-Carbonation	Lilian Schwich et al	IME, Institute for Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2021	Germany
Renewable Energy **2022**, 181, 714–724	High temperature microwave dielectric and thermochemical properties of waste $Li_xMn_2O_4$ battery cathode materials reduced by moso bamboo	Shunda Lin et al	Key Laboratory of Unconventional Metallurgy, Ministry of Education, Faculty of Metallurgical and Energy Engineering, Kunming University of Science and Technology, Kunming, China	2021	China
Hydrometallurgy **2021**, *203*, 105694	Lithium and cobalt recovery for lithium-ion battery recycle using an improved oxalate process with hydrogen peroxide	Ankit Verma et al	Institute for Sustainable Engineering, University of Kansas, Lawrence, USA	2021	USA
Resources, Conservation & Recycling **2021**, *170*, 105551	Recovery of cathode materials from spent lithium-ion batteries using eutectic system of lithium compounds	Yi Ji et al	Environmental and Ecological Engineering, Purdue University, West Lafayette, USA	2021	USA
Resources, Conservation & Recycling **2022**, *176*, 105921	Recovery of spent $LiCoO_2$ lithium-ion battery via environmentally friendly pyrolysis and hydrometallurgical leaching	Ren Tao et al	CAS Key Laboratory of Green Process and Engineering, National Engineering Laboratory for Hydrometallurgical Cleaner Production Technology, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2021	China
Journal of Hazardous Materials **2021**, *405*, 124211	Recycling lithium cobalt oxide from its spent batteries: An electrochemical approach combining extraction and synthesis	Jianbo Wang et al	Key Laboratory of Solid Waste Treatment and Resource Recycle, Ministry of Education, School of Environment and Resource, Southwest University of Science and Technology, Sichuan, China	2021	China
Journal of Environmental Chemical Engineering **2021**, *9*, 104689	Recycling of graphite and metals from spent Li-ion batteries aiming the production of graphene/CoO-based electrochemical sensors	Jessielem S. Ribeiro et al	Laboratory of Carbon and Ceramic Materials, Department of Physics, Federal University of Espirito Santo (UFES), Vitoria, Brazil	2021	Brazil

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Reference	Title	Authors	Institution	Year	Country
Nature Communications **2021**, *12*, 6554	Selective cobalt and nickel electrodeposition for lithium-ion battery recycling through integrated electrolyte and interface control	Kwiyong Kim et al	Department of Chemical and Biomolecular Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA	2021	USA
Metals **2021**, *11*(2), 188	Speciation of Manganese in a Synthetic Recycling Slag Relevant for Lithium Recycling from Lithium-Ion Batteries	Alena Wittkowski et al	Institute of Inorganic and Analytical Chemistry, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2021	Germany
Science of the Total Environment **2021**, *759*, 143478	Sustainable recycling of $LiCoO_2$ cathode scrap on the basis of successive peroxymonosulfate activation and recovery of valuable metals	Hao Guo et al	Shanghai Key Laboratory of Materials Protection and Advanced Materials in Electric Power, Shanghai University of Electric Power, Shanghai, China	2021	China

Reference	Title	Authors	Institution	Year	Country
Metals **2020**, *10*(8), 1069	A Combined Pyro- and Hydrometallurgical Approach to Recycle Pyrolyzed Lithium-Ion Battery Black Mass Part 1: Production of Lithium Concentrates in an Electric Arc Furnace	Marcus Sommerfeld et al	IME Process Metallurgy and Metal Recycling, Institute of RWTH University, Aachen, Germany	2020	Germany
Sustainable Materials and Technologies **2020**, *25*, e00152	A direct recycling case study from a lithium-ion battery recall	Steve Sloop et al	OnTo Technology LLC, Bend, OR, USA	2020	USA
Journal of Hazardous Materials **2021**, *410*, 124610	A green, efficient, closed-loop direct regeneration technology for reconstructing of the $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ cathode material from spent lithium-ion batteries	Xiaoping Fan et al	Guangxi Key Laboratory of Low Carbon Energy Materials, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
ACS Applied Energy Materials **2020**, *3*(5), 4767-4776	Innovative Electrochemical Strategy to Recovery of Cathode and Efficient Lithium Leaching from Spent Lithium-Ion Batteries	Kui Liu et al	Guangxi Key Laboratory of Low Carbon Energy, Materials, Guangxi New Energy Ship Battery Engineering, Technology Research Center, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
Energies **2020**, *13*(24), 6732	Investigation of the Physico-Chemical Properties of the Products Obtained after Mixed Organic-Inorganic Leaching of Spent Li-Ion Batteries	Weronika Urbanska et al	Department of Environmental Engineering, Wrocław University of Science and Technology, Wrocław, Poland	2020	Poland
Metals **2020**, *10*(12), 1633	Li-Distribution in Compounds of the Li_2O-MgO-Al_2O_3-SiO_2-CaO System—A First Survey	Thomas Schirmer et al	Department of Mineralogy, Geochemistry, Salt Deposits, Institute of Disposal Research, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2020	Germany
Journal of Hazardous Materials **2020**, *398*, 122955	Pyrolysis kinetics and reaction mechanism of the electrode materials during the spent $LiCoO_2$ batteries recovery process	Jun Lia et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2020	China
Journal of Hazardous Materials **2020**, *396*, 122667	Rapid leaching and recovery of valuable metals from spent Lithium Ion batteries (LIBs) via environmentally benign subcritical nickel-containing water over chlorinated polyvinyl chloride	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2020	Korea
Minerals **2020**, *10*(6), 555	Recovery of Co, Li, and Ni from Spent Li-Ion Batteries by the Inorganic and/or Organic Reducer Assisted Leaching Method	Weronika Urbanska et al	Department of Environmental Engineering, Wrocław University of Science and Technology, Wrocław, Poland	2020	Poland
Chemosphere **2020**, *254*, 126670	Ultrasound-assisted leaching of spent lithium ion batteries by natural organic acids and H_2O_2	M. Esmaeili et al	Department of Chemical Engineering, University of Kurdistan, Sanandaj, Iran	2020	Iran

Reference	Title	Authors	Institution	Year	Country
Journal of Hazardous Materials **2019**, *375*, 43–51	A green process for exfoliating electrode materials and simultaneously extracting electrolyte from spent lithium-ion batteries	Kai He et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China	2019	China
Separation and Purification Technology **2019**, *215*, 398–402	A more simple and efficient process for recovery of cobalt and lithium from spent lithium-ion batteries with citric acid	Min Yu et al	School of Chemistry and Chemical Engineering, Wuhan University of Science and Technology, Wuhan, China	2019	China
Nature Energy **2019**, *4*, 339-345	Deep eutectic solvents for cathode recycling of Li-ion batteries	Mai K. Tran et al	Rice University, Houston, TX, USA	2019	USA
Journal of Power Sources **2019**, *440*, 227140	The strategy of entire recovery: From spent cathode material with high nickel content to new $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ and Li_2CO_3 powders	Shiting Yan et al	College of Chemistry and Molecular Sciences, Wuhan University, Wuhan, China	2019	China

Reference	Title	Authors	Institution	Year	Country
Waste Management **2018**, *79*, 545–553	A sustainable process for metal recycling from spent lithium-ion batteries using ammonium chloride	Weiguang Lv et al	Beijing Engineering Research Center of Process Pollution Control, Division of Environment Technology and Engineering, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2018	China
Ceramics International **2018**, *44*, 351–357	Performance of $LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$ prepared from spent lithium-ion batteries by a carbonate co-precipitation method	Li-Po He et al	National Engineering Research Center for Integrated Utilization of Salt Lake Resource, East China University of Science and Technology, Shanghai, PR China	2018	China
Metals **2018**, *8*(5), 321	Recovery of Valuable Metals from Lithium-Ion Batteries NMC Cathode Waste Materials by Hydrometallurgical Methods	Wei-Sheng Chen et al	Department of Resources Engineering, National Cheng Kung University, Tainan, Taiwan	2018	Taiwan
Minerals Engineering **2018**, *126*, 28–35	Separation of Li and Co from the active mass of spent Li-ion batteries by selective sulfating roasting with sodium bisulfate and water leaching	Dahui Wang et al	State Key Laboratory of Advance Processing and Recycling of Nonferrous Metals, Lanzhou University of Technology, Lanzhou, China	2018	China

Reference	Title	Authors	Institution	Year	Country
Journal of Industrial and Engineering Chemistry **2016**, *43*, 117–126	Acid baking of spent lithium ion batteries for selective recovery of major metals: A two-step process	Pratima Meshram et al	CSIR-National Metallurgical Laboratory (NML), Jamshedpur, India	2016	India
Waste Management **2016**, *51*, 239–244	An environmental benign process for cobalt and lithium recovery from spent lithium-ion batteries by mechanochemical approach	Meng-Meng Wang et al	Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2016	China

Reference	Title	Authors	Institution	Year	Country
Chemical Engineering Journal **2015**, *281*, 418–427	Hydrometallurgical processing of spent lithium ion batteries (LIBs) in the presence of a reducing agent with emphasis on kinetics of leaching	Pratima Meshram et al	CSIR-National Metallurgical Laboratory, Jamshedpur, India	2015	India
Journal of Power Sources **2015**, *282*, 544e551	Succinic acid-based leaching system: A sustainable process for recovery of valuable metals from spent Li-ion batteries	Li Li et al	School of Chemical Engineering and the Environment, Beijing Key Laboratory of Environmental Science and Engineering, Beijing Institute of Technology, Beijing, China	2015	China

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2015**, *144*, 197–205	Separation and recovery of metal values from leaching liquor of mixed-type of spent lithium-ion batteries	Xiangping Chen et al	Key Laboratory of Resources Chemistry of Nonferrous Metals, College of Chemistry and Chemical Engineering, Central South University, Changsha, China	2014	China

Reference	Title	Authors	Institution	Year	Country
ACS Sustainable Chem. Eng. **2022**, *10*(46), 15297−15304	Occupational Threat of Recycling Spent Lithium-Ion Batteries by Vacuum Reduction	Keyi Lin et al	Guangdong Provincial Key Laboratory of Environmental Pollution Control and Remediation Technology, School of Environmental Science and Engineering, Sun Yat-Sen University, Guangzhou, China	2022	China

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2025**, *354*, 128929	A comprehensive overview of decommissioned lithium-ion battery recycling: Towards green and economical	Chenkai Dong et al	Shandong Key Laboratory of Environmental Processes and Health, School of Environmental Science and Engineering, Shandong University, Qingdao, China	2025	China
Energies **2025**, *18*(2), 398	Optimizing Acidic Reductive Leaching for Lithium Recovery: Enhancing Sustainable Lithium Supply for Energy Markets	Agnieszka Sobianowska-Turek et al	Department of Water and Wastewater Management and Waste Technology, Faculty of Environmental Engineering, Wrocław University of Technology, Poland	2025	Poland
Hydrometallurgy **2024**, *230*, 106362	A zero-liquid discharge process to recover all critical metals from spent NCM111 cathode material of end-of-life lithium-ion batteries: statistically optimized leaching with formic acid and in-situ crystallization	Alexandru Sonoc et al	Mechanical and Materials Engineering Department, Queen's University, Ontario, Canada	2024	Canada
Minerals **2024**, *14*(9), 878	Characterization of Lithium-Ion Batteries from Recycling Perspective towards Circular Economy	Lucas Fonseca Guimaraes et al	Department of Chemical Engineering, Polytechnic School, University of Sao Paulo, Sao Paulo, Brazil	2024	Brazil
Metals **2024**, *14*(1), 80	Co-Precipitation of Metal Oxalates from Organic Leach Solution Derived from Spent Lithium-Ion Batteries (LIBs)	Dominik Schmitz et al	IME Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2024	Germany
Separation and Purification Technology **2024**, *348*, 127771	Eco-friendly closed-loop recycling of nickel, cobalt, manganese, and lithium from spent ternary lithium-ion battery cathodes	Gong Siyu et al	Faculty of Metallurgy and Energy Engineering, Kunming University of Science and Technology, Kunming, Yunnan, China	2024	China
Mineral Processing and Extractive Metallurgy Review, **2024**, *46*(3), 386–399	Glutamate Leaching of Spent Lithium-Ion Battery Cathode in Weak Acidic-Neutral Condition: New Insight on Kinetics and Dissolution Mechanism	Erik Prasetyo et al	Research Center for Mining Technology, National Research and Innovation Agency, Lampung Selatan, Indonesia	2024	Indonesia
Journal of CO_2 Utilization **2024**, *81*, 102703	Implementation of a sub-and supercritical carbon dioxide process for the selective recycling of the electrolyte from spent Li-ion battery	Nils Zachmann et al	Department of Chemistry and Chemical Engineering, Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Gothenburg, Sweden	2024	Sweden
Minerals Engineering **2024**, *215*, 108828	Investigating battery black mass leaching performance as a function of process parameters by combining leaching experiments and regression modeling	Jere Partinen et al	Aalto University, School of Chemical Engineering, Department of Chemical and Metallurgical Engineering, Aalto, Finland	2024	Finland
Scientific Reports **2024**, *14*, 10818	Leaching of NMC industrial black mass in the presence of LFP	Yuanmin Zou et al	Department of Chemical and Metallurgical Engineering, School of Chemical Engineering, Aalto University, Aalto, Finland	2024	Finland

Continued on next page

Reference	Title	Authors	Institution	Year	Country
Environ Sci Pollut Res **2024**	Mechanical Methods for Materials Concentration of Lithium Iron Phosphate (LFP) Cells and Product Potential Evaluation for Recycling	Priscila Silva Silveira Camargo et al	Corrosion, Protection and Recycling of Materials Laboratory (LACOR), Department of Materials Engineering, School of Engineering, Federal University of Rio Grande do Sul, Brazil	2024	Brazil
ACS Sustainable Chem. Eng. **2024**, *12*(45), 16564–16576	Metal Extraction from Commercial Black Mass of Spent Lithium-Ion Batteries Using Food-Waste-Derived Lixiviants through a Biological Process	Joseph Jegan Roy et al	Energy Research Institute at Nanyang Technological University (ERI@N) and SCARCE Lab, Singapore	2024	Singapore
Separation and Purification Technology **2024**, *335*, 126181	Multicomponent solvent extraction modelling of lithium, cobalt, nickel, and manganese from simulated black mass leachate	Junnan Lu et al	Department of Chemical Engineering, The University of Melbourne, VIC, Australia	2024	Australia
Results in Engineering **2024**, *23*, 102802	Optimization of high-temperature thermal pretreatment conditions for maximum enrichment of lithium and cobalt from spent lithium-ion polymer batteries	Lizhen Gao et al	College of Environmental Science and Engineering, Taiyuan University of Technology, Shanxi-Province, China	2024	China
Chemical Engineering Journal **2024**, *500*, 157219	Precise regulation of layered-to-rock structure of spent Li-ion cathodes achieving ultrahigh lithium recovery rate	Xue Bai et al	State Key Laboratory of Chemical Resource Engineering, College of Chemistry, Beijing University of Chemical Technology, Beijing, China	2024	China
Journal of Environmental Chemical Engineering **2024**, *12*, 114346	Selective lithium recovery from waste lithium-ion batteries by H_2SO_4 roasting focused on process intensification and conversion mechanism	Haoyuan Deng et al	State Key Laboratory of Pollution Control and Resources Reuse, Shanghai, China	2024	China
Minerals **2024**, *14*(11), 1155	Spent NCM Lithium-Ion Batteries: Potential Evaluation of Mechanical Pretreatment for Recycling	Priscila Silva Silveira Camargo et al	Laboratory of Corrosion, Protection and Materials Recycling (LACOR), Materials Engineering Department, School of Engineering, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Brazil	2024	Brazil
Separation and Purification Technology **2024**, *348*, 127707	Sustainable recovery of cobalt and lithium from lithium-ion battery cathode material by combining sulfate leachates and aqueous biphasic systems based on tetrabutylphosphonium-ionic liquids	Jasmina Musovic et al	Laboratory of Physical Chemistry, Vinca Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia	2024	Serbia
Metals **2023**, *13*(7), 1276	Acid-Assisted Separation of Cathodic Material from Spent Electric Vehicle Batteries for Recycling	Anton Zorin et al	School of Metallurgy and Materials, University of Birmingham, Birmingham, UK	2023	UK
Waste Management **2023**, *165*, 189–198	Acid-free extraction of valuable metal elements from spent lithium-ion batteries using waste copperas	Xi Jin et al	College of Materials Science and Engineering, Chongqing University, Chongqing, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
Science Advances **2023**, *9*, 39	Battery metal recycling by flash Joule heating	Weiyin Chen et al	Department of Chemistry, Rice University, Houston, TX, USA	2023	USA
Minerals **2023**, *13*(6), 798	Development of a More Sustainable Hybrid Process for Lithium and Cobalt Recovery from Lithium-Ion Batteries	José Cristiano Mengue Model et al	Metallurgy and Materials Engineering, Laboratory of Corrosion, Protection and Materials Recycling, Federal University of Rio Grande do Sul, Porto Alegre, Brazil	2023	Brazil
Materials Today Energy **2023**, *37*, 101374	Direct recycling of degraded lithium-ion batteries of an electric vehicle using hydrothermal relithiation	Ka Ho Chan et al	Laboratory for Strategic Materials, Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, Canada	2023	Canada
Nature Communications **2023**, *14*, 584	Direct regeneration of degraded lithium-ion battery cathodes with a multifunctional organic lithium salt	Guanjun Ji et al	Tsinghua-Berkeley Shenzhen Institute & Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2023	China
Ceramics International **2023**, *49*, 9147–9154	Effective stripping and reutilization of $LiFePO_4$ cathode waste from retired lithium ion batteries	Yucai Zhang et al	School of Chemistry & Chemical Engineering, Xinjiang Key Laboratory of Energy Storage and Photoelectrocatalytic Materials, Xinjiang Normal University, Urumqi, China	2023	China
Journal of Hazardous Materials **2023**, *457*, 131782	In-situ pyrolysis based on alkaline medium removes fluorine-containing contaminants from spent lithium-ion batteries	Hanlin Huang et al	Chemistry and Chemical Engineering Data Center, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2023	China
Journal of Environmental Chemical Engineering **2023**, *11*, 109759	Microwave low-temperature treatment – Step leaching process for recovering black mass from spent lithium-ion batteries	Chao Liu et al	School of Water Resources and Environmental Engineering, East China University of Technology, Nanchang, Jiangxi, China	2023	China
Journal of Cleaner Production **2023**, *431*, 139645	Novel approach to recycling of valuable metals from spent lithium-ion batteries using hydrometallurgy, focused on preferential extraction of lithium	Jialin Qing et al	School of Metallurgy and Environment, Central South University, Changsha, China	2023	China
Resources, Conservation & Recycling **2023**, *190*, 106782	Oriented conversion of spent $LiCoO_2$-lithium battery cathode materials to high-value products via thermochemical reduction with common ammonium oxalate	Chunli Liu et al	National-Local Joint Engineering Research Center of Heavy Metals Pollutants Control and Resource Utilization, School of Environmental and Chemical Engineering, Nanchang Hangkong University, Jiangxi, China	2023	China
Recycling **2023**, *8*(5), 79	Recovery of Graphite from Spent Lithium-Ion Batteries	Charlotte Badenhorst et al	Institute of Earth Sciences—Porto, Department of Geosciences, Environment and Land Use Planning, Faculty of Sciences, University of Porto, Porto, Portugal	2023	Portugal

Continued on next page

Reference	Title	Authors	Institution	Year	Country
Batteries **2023**, *9*(11), 549	Sequential Recovery of Critical Metals from Leached Liquor of Processed Spent Lithium-Ion Batteries	Ayorinde Emmanuel Ajiboye et al	Applied Materials Division, Argonne National Laboratory, Chicago, IL, USA	2023	USA
Molecules **2023**, *28*(6), 2558	Upcycling of Acid-Leaching Solutions from Li-Ion Battery Waste Treatment through the Facile Synthesis of Magnetorheological Fluid	Magdalena Abramowicz et al	Faculty of Chemistry, University of Warsaw, Warsaw, Poland	2023	Poland
Journal of Environmental Chemical Engineering **2022**, *10*, 108627	A novel ternary deep eutectic solvent for efficient recovery of critical metals from spent lithium-ion batteries under mild conditions	Yanshun Liao et al	School of Materials Science and Engineering, Beijing Institute of Technology, Beijing, China	2022	China
Waste Management **2023**, *156*, 247–254	A sustainable approach for selective recovery of lithium from cathode materials of spent lithium-ion batteries by induced phase transition	Fu Rao et al	School of Resources and Environmental Engineering, Shanghai Polytechnic University,Shanghai Collaborative Innovation Center for WEEE Recycling, Shanghai, China	2022	China
J. Am. Chem. Soc. **2022**, *144*, 20306−20314	Adaptable Eutectic Salt for the Direct Recycling of Highly Degraded Layer Cathodes	Jun Ma et al	Tsinghua-Berkeley Shenzhen Institute and Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2022	China
Chemistry A European Journal **2022**, *28*, 22	Comprehensive Characterization of Shredded Lithium-Ion Battery Recycling Material	Christoph Peschel et al	University of Munster, MEET Battery Research Center, Munster, Germany	2022	Germany
Chem **2022**, *8*(7), 1944-1955	Direct upcycling of mixed Ni-lean polycrystals to single-crystal Ni-rich cathode materials	Xiaotu Ma et al	Department of Mechanical Engineering, Worcester Polytechnic Institute, Worcester, USA	2022	USA
Waste Management **2022**, *148*, 12–21	Efficient recovery of valuable metals from cathode materials of spent $LiCoO_2$ batteries via co-pyrolysis with cheap carbonaceous materials	Yiming Lai et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2022	China
Metals **2022**, *12*(4), 677	Recovery of Graphite and Cathode Active Materials from Spent Lithium-Ion Batteries by Applying Two Pretreatment Methods and Flotation Combined with a Rapid Analysis Technique	Hao Qiu et al	Institute of Mineral and Waste Processing, Waste Disposal and Geomechanics (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2022	Germany
Waste Management **2021**, *131*, 20–30	A novel pulsated pneumatic separation with variable-diameter structure and its application in the recycling spent lithium-ion batteries	Xueshuai Zhu et al	School of Chemical and Environmental Engineering, China University of Mining and Technology, Beijing, China	2021	China
Resources, Conservation & Recycling **2021**, *175*, 105863	A technology for recycling lithium-ion batteries promoting the circular economy: The RecycLib	M.P. dos Santos et al	Center for Advanced and Sustainable Technologies (CAST), Sao Paulo State University (UNESP), Brazil	2021	Brazil

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Reference	Title	Authors	Institution	Year	Country
Metals **2021**, *11*(2), 177	Early-Stage Recovery of Lithium from Tailored Thermal Conditioned Black Mass Part I: Mobilizing Lithium via Supercritical CO_2-Carbonation	Lilian Schwich et al	IME, Institute for Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2021	Germany
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Resources, Conservation & Recycling **2022**, *176*, 105921	Recovery of spent $LiCoO_2$ lithium-ion battery via environmentally friendly pyrolysis and hydrometallurgical leaching	Ren Tao et al	CAS Key Laboratory of Green Process and Engineering, National Engineering Laboratory for Hydrometallurgical Cleaner Production Technology, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2021	China
Sustainable Materials and Technologies **2020**, *25*, e00152	A direct recycling case study from a lithium-ion battery recall	Steve Sloop et al	OnTo Technology LLC, Bend, OR, USA	2020	USA
Journal of Hazardous Materials **2021**, *410*, 124610	A green, efficient, closed-loop direct regeneration technology for reconstructing of the $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ cathode material from spent lithium-ion batteries	Xiaoping Fan et al	Guangxi Key Laboratory of Low Carbon Energy Materials, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
Journal of Hazardous Materials **2020**, *398*, 122955	Pyrolysis kinetics and reaction mechanism of the electrode materials during the spent $LiCoO_2$ batteries recovery process	Jun Lia et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2020	China
Journal of Hazardous Materials **2020**, *396*, 122667	Rapid leaching and recovery of valuable metals from spent Lithium Ion batteries (LIBs) via environmentally benign subcritical nickel-containing water over chlorinated polyvinyl chloride	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2020	Korea
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Journal of Hazardous Materials **2019**, *375*, 43–51	A green process for exfoliating electrode materials and simultaneously extracting electrolyte from spent lithium-ion batteries	Kai He et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China	2019	China
Separation and Purification Technology **2019**, *215*, 398–402	A more simple and efficient process for recovery of cobalt and lithium from spent lithium-ion batteries with citric acid	Min Yu et al	School of Chemistry and Chemical Engineering, Wuhan University of Science and Technology, Wuhan, China	2019	China

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Reference	Title	Authors	Institution	Year	Country
Waste Management **2018**, *79*, 545–553	A sustainable process for metal recycling from spent lithium-ion batteries using ammonium chloride	Weiguang Lv et al	Beijing Engineering Research Center of Process Pollution Control, Division of Environment Technology and Engineering, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2018	China
Metals **2018**, *8*(5), 321	Recovery of Valuable Metals from Lithium-Ion Batteries NMC Cathode Waste Materials by Hydrometallurgical Methods	Wei-Sheng Chen et al	Department of Resources Engineering, National Cheng Kung University, Tainan, Taiwan	2018	Taiwan
Journal of Industrial and Engineering Chemistry **2016**, *43*, 117–126	Acid baking of spent lithium ion batteries for selective recovery of major metals: A two-step process	Pratima Meshram et al	CSIR-National Metallurgical Laboratory (NML), Jamshedpur, India	2016	India
Waste Management **2016**, *51*, 239–244	An environmental benign process for cobalt and lithium recovery from spent lithium-ion batteries by mechanochemical approach	Meng-Meng Wang et al	Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2016	China

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2025**, *354*, 128929	A comprehensive overview of decommissioned lithium-ion battery recycling: Towards green and economical	Chenkai Dong et al	Shandong Key Laboratory of Environmental Processes and Health, School of Environmental Science and Engineering, Shandong University, Qingdao, China	2025	China
Energies **2025**, *18*(2), 398	Optimizing Acidic Reductive Leaching for Lithium Recovery: Enhancing Sustainable Lithium Supply for Energy Markets	Agnieszka Sobianowska-Turek et al	Department of Water and Wastewater Management and Waste Technology, Faculty of Environmental Engineering, Wrocław University of Technology, Poland	2025	Poland
Journal of Alloys and Compounds **2024**, *993*, 174691	A facile approach for regeneration of graphite anodes from spent lithium-ion battery	Rongchang Li et al	Institute of New Carbon Materials, College of Materials Science and Engineering, Taiyuan University of Technology, Taiyuan, China	2024	China
Separation and Purification Technology **2025**, *354*, 129035	A process for preferential recovery of lithium and manganese from spent NCM by vacuum carbothermal reduction method	Jun Li et al	Key Laboratory for Nonferrous Vacuum Metallurgy of Yunnan Province, Kunming University of Science and Technology, Kunming, China	2024	China
Hydrometallurgy **2024**, *230*, 106362	A zero-liquid discharge process to recover all critical metals from spent NCM111 cathode material of end-of-life lithium-ion batteries: statistically optimized leaching with formic acid and in-situ crystallization	Alexandru Sonoc et al	Mechanical and Materials Engineering Department, Queen's University, Ontario, Canada	2024	Canada
Chemical Engineering Journal **2024**, *494*, 153199	Closed-loop resynthesis of $LiNiCoAlO_2$ cathode active materials from the industrial leachate of spent li-ion batteries	Seoa Kim et al	Department of Energy & Mineral Resources Engineering, Sejong University, Seoul, Republic of Korea	2024	Korea
Metals **2024**, *14*(1), 80	Co-Precipitation of Metal Oxalates from Organic Leach Solution Derived from Spent Lithium-Ion Batteries (LIBs)	Dominik Schmitz et al	IME Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2024	Germany
Separation and Purification Technology **2024**, *348*, 127771	Eco-friendly closed-loop recycling of nickel, cobalt, manganese, and lithium from spent ternary lithium-ion battery cathodes	Gong Siyu et al	Faculty of Metallurgy and Energy Engineering, Kunming University of Science and Technology, Kunming, Yunnan, China	2024	China
Journal of Cleaner Production **2024**, *480*, 144128	Efficient leaching of valuable metals from spent lithium-ion batteries using green deep eutectic solvents: Process optimization, mechanistic analysis, and environmental impact assessment	Songming Zheng et al	College of Material Science and Engineering, Chongqing University, Chongqing, China	2024	China

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Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2025**, *354*, 128808	Green recycling of spent $LiCoO_2$ cathodes using a water-based deep eutectic solvent	Xi Wu et al	Key Laboratory of Materials Physics, Centre for Environmental and Energy Nanomaterials, Anhui Key Laboratory of Nanomaterials and Nanotechnology, Institute of Solid State Physics, Hefei Institutes of Physical Science, Chinese Academy of Sciences, Hefei, China	2024	China
Minerals Engineering **2024**, *215*, 108828	Investigating battery black mass leaching performance as a function of process parameters by combining leaching experiments and regression modeling	Jere Partinen et al	Aalto University, School of Chemical Engineering, Department of Chemical and Metallurgical Engineering, Aalto, Finland	2024	Finland
Waste Management Bulletin **2024**, *2*, 275–288	Investigation of hydrohalic acids as lixiviants for the leaching of cathode metals from spent lithium-ion batteries	Prichard M. Tembo et al	Department of Chemical and Materials Engineering, University of Nevada-Reno, Nevada, USA	2024	USA
Scientific Reports **2024**, *14*, 10818	Leaching of NMC industrial black mass in the presence of LFP	Yuanmin Zou et al	Department of Chemical and Metallurgical Engineering, School of Chemical Engineering, Aalto University, Aalto, Finland	2024	Finland
Environ Sci Pollut Res **2024**	Mechanical Methods for Materials Concentration of Lithium Iron Phosphate (LFP) Cells and Product Potential Evaluation for Recycling	Priscila Silva Silveira Camargo et al	Corrosion, Protection and Recycling of Materials Laboratory (LACOR), Department of Materials Engineering, School of Engineering, Federal University of Rio Grande do Sul, Brazil	2024	Brazil
Environ. Sci. Technol. **2024**, *58*(48), 21362−21373	Mechanisms of Thermal Decomposition in Spent NCM Lithium-Ion Battery Cathode Materials with Carbon Defects and Oxygen Vacancies	Kang Liu et al	Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology, Hong Kong, China	2024	China
Separation and Purification Technology **2024**, *345*, 127415	Novel targeted extraction of lithium: An environment-friendly controlled sulfidation roasting technology and mechanism for recovering spent lithium-ion batteries	Wencan Quan et al	School of Metallurgy Engineering, Jiangxi University of Science and Technology, Ganzhou, China	2024	China
Environmental Advances **2024**, *17*, 100570	On the effect of cavitation on particles in leaching processes: implications to battery recycling	Chiara Canciani et al	CCRC, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia	2024	Saudi Arabia
Results in Engineering **2024**, *23*, 102802	Optimization of high-temperature thermal pretreatment conditions for maximum enrichment of lithium and cobalt from spent lithium-ion polymer batteries	Lizhen Gao et al	College of Environmental Science and Engineering, Taiyuan University of Technology, Shanxi-Province, China	2024	China
Joule **2024**, *8*(10), 2735-2754	Phase-selective recovery and regeneration of end-of-life electric vehicle blended cathodes via selective leaching and direct recycling	Laura L. Driscoll et al	School of Chemistry, University of Birmingham, Birmingham, UK	2024	UK

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Reference	Title	Authors	Institution	Year	Country
Chemical Engineering Journal **2024**, *500*, 157219	Precise regulation of layered-to-rock structure of spent Li-ion cathodes achieving ultrahigh lithium recovery rate	Xue Bai et al	State Key Laboratory of Chemical Resource Engineering, College of Chemistry, Beijing University of Chemical Technology, Beijing, China	2024	China
Journal of Industrial and Engineering Chemistry **2024**, *139*, 111–124	Recent recycling methods for spent cathode materials from lithium-ion batteries: A review	Karmegam Dhanabalan et al	School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea	2024	Korea
Separation and Purification Technology **2024**, *348*, 127777	Review on the sustainable recycling of spent ternary lithium-ion batteries: From an eco-friendly and efficient perspective	Xiang-nan Zhu et al	College of Energy and Mining Engineering, Shandong University of Science and Technology, Shandong, China	2024	China
Separation and Purification Technology **2024**, *348*, 127707	Sustainable recovery of cobalt and lithium from lithium-ion battery cathode material by combining sulfate leachates and aqueous biphasic systems based on tetrabutylphosphonium-ionic liquids	Jasmina Musovic et al	Laboratory of Physical Chemistry, Vinca Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia	2024	Serbia
Chemical Engineering Journal **2024**, *481*, 148516	Sustainable recycling of spent ternary lithium-ion batteries via an environmentally friendly process: Selective recovery of lithium and non-hazardous upcycling of residue	Jianxing Liang et al	School of Environmental Science and Engineering, Shanghai Jiao Tong University, Shanghai, China	2024	China
Journal of Cleaner Production **2024**, *438*, 140798	Sustainable regeneration of high-performance cathode materials from spent lithium-ion batteries through magnetic separation and coprecipitation	Wei Ding et al	School of Resources and Environmental Engineering, Wuhan University of Technology, Wuhan, China	2024	China
Waste Management **2024**, *183*, 209–219	Sustainable reprocessing of lithium iron phosphate batteries: A recovery approach using liquid-phase method at reduced temperature	Tingyan Ren et al	South China Institute of Environmental Sciences, Ministry of Ecology and Environment of China, Guangzhou, China	2024	China
Chemical Engineering Journal **2024**, *499*, 156114	Synergistic ternary deep eutectic solvents: An archetype for sustainable and eco-conscious Li and Co recovery from spent batteries	Hussein K. Amusa et al	Department of Chemical and Petroleum Engineering, Khalifa University, Abu Dhabi, United Arab Emirates	2024	UAE
Environ. Sci. Technol. **2024**, *58*(43), 19486−19500	Toward a Circular Lithium Economy with Electrodialysis: Upcycling Spent Battery Leachates with Selective and Bipolar Ion-Exchange Membranes | Environmental Science & Technology	Zi Hao Foo et al	Department of Mechanical Engineering, Massachusetts Institute of Technology, Massachusetts, USA	2024	USA

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Reference	Title	Authors	Institution	Year	Country
Minerals Engineering **2024**, *217*, 108918	Valorization of lithium containing slags from pyrometallurgical recycling route of spent lithium-ion batteries: The enrichment of γ-$LiAlO_2$ phase from thermodynamic controlled and modified slags	Hao Qiu et al	Institute of Mineral and Waste Processing, Recycling and Circular Economy Systems (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2024	Germany
Journal of Energy Storage **2023**, *72*, 108486	A comprehensive review of full recycling and utilization of cathode and anode as well as electrolyte from spent lithium-ion batteries	Gongchu Shi et al	School of Material Science and Engineering, Beijing Institute of Technology, Beijing, China	2023	China
Nature Energy **2023**, *8*, 1137–1144	A contact-electro-catalytic cathode recycling method for spent lithium-ion batteries	Huifan Li et al	CAS Center for Excellence in Nanoscience, Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, Beijing, China	2023	China
Waste Management **2023**, *165*, 189–198	Acid-free extraction of valuable metal elements from spent lithium-ion batteries using waste copperas	Xi Jin et al	College of Materials Science and Engineering, Chongqing University, Chongqing, China	2023	China
Metals **2023**, *13*(5), 834	Acid Leaching of Al- and Ta-Substituted $Li_7La_3Zr_2O_{12}$ (LLZO) Solid Electrolyte	Kristin Schneider et al	Institute of Mineral and Waster Processing, Recycling and Circular Economy Systems, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2023	Germany
Science Advances **2023**, *9*, 39	Battery metal recycling by flash Joule heating	Weiyin Chen et al	Department of Chemistry, Rice University, Houston, TX, USA	2023	USA
Science of the Total Environment **2024**, *924*, 171453	Can e-waste recycling provide a solution to the scarcity of rare earth metals? An overview of e-waste recycling methods	Sai Sree Varsha Vuppaladadiyam et al	Department of Chemical and Biological Engineering, Monash University, Australia	2023	Australia
Waste Management **2023**, *166*, 122–132	Chemical speciation changes of an all-solid-state lithium-ion battery caused by roasting determined by sequential acid leaching	Yutaro Takaya et al	Faculty of Engineering, The University of Tokyo, Tokyo, Japan	2023	Japan
Journal of Environmental Chemical Engineering **2023**, *11*, 110979	Comparative of malonic acid aqueous solution and malonic acid-based deep eutectic solvent for $LiCoO_2$ cathode materials recovery: Leaching efficiency and mechanism	Yunpeng Wen et al	School of Metallurgical Engineering, Xi'an University of Architecture and Technology, Xi'an, China	2023	China
Waste Management **2024**, *187*, 1–10	Conversion and fate of waste Li-ion battery electrolyte in a two-stage thermal treatment process	Li-Jun Wu et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
Journal of Industrial and Engineering Chemistry **2024**, *134*, 112–122	Design of a novel magnetic composite catalyst with highly efficient cobalt circulation for activating peroxymonosulfate to degrade tetracycline	Lei Wang et al	School of Materials Science and Engineering, Anhui University of Science and Technology, Huainan, China	2023	China
Minerals **2023**, *13*(6), 798	Development of a More Sustainable Hybrid Process for Lithium and Cobalt Recovery from Lithium-Ion Batteries	José Cristiano Mengue Model et al	Metallurgy and Materials Engineering, Laboratory of Corrosion, Protection and Materials Recycling, Federal University of Rio Grande do Sul, Porto Alegre, Brazil	2023	Brazil
Materials Today Energy **2023**, *37*, 101374	Direct recycling of degraded lithium-ion batteries of an electric vehicle using hydrothermal relithiation	Ka Ho Chan et al	Laboratory for Strategic Materials, Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, Canada	2023	Canada
Ceramics International **2023**, *49*, 9147–9154	Effective stripping and reutilization of $LiFePO_4$ cathode waste from retired lithium ion batteries	Yucai Zhang et al	School of Chemistry & Chemical Engineering, Xinjiang Key Laboratory of Energy Storage and Photoelectrocatalytic Materials, Xinjiang Normal University, Urumqi, China	2023	China
Energy Storage Materials **2023**, *63*, 103025	Efficient separation and coprecipitation for simplified cathode recycling	Lu Yu et al	Electrification and Energy Infrastructures Division, Oak Ridge National Laboratory, Oak Ridge, USA	2023	USA
Journal of Industrial and Engineering Chemistry **2023**, *118*, 351-361	Electrolyte recovery from spent Lithium-Ion batteries using a low temperature thermal treatment process	Nils Zachmann et al	Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Nuclear Chemistry and Industrial Material Recycling, Gothenburg, Sweden	2023	Sweden
Chemical Engineering Journal **2023**, *467*, 143441	Green recovery of Li, Ni, and Mn from spent $xLi_2MnO_3 \cdot (1-x) LiMO_2$ cathode materials: Experimental study and mechanism analysis	Yifan Wang et al	Institute of Circular Economy, Beijing University of Technology, Beijing, China	2023	China
ACS Omega **2023**, *8*(7), 6959–6967	Highly Efficient Recovery and Recycling of Cobalt from Spent Lithium-Ion Batteries Using an N-Methylurea–Acetamide Nonionic Deep Eutectic Solvent	Subramanian Suriyanarayanan et al	Bioorganic and Biophysical Chemistry Laboratory, Linnaeus Centre for Biomaterials Chemistry, Department of Chemistry and Biomedical Sciences, Linnaeus University, Kalmar, Sweden	2023	Sweden
Journal of Materials Chemistry A **2024**, *12*, 7321-7328	High-power recycling: upcycling to the next generation of high-power anodes for Li-ion battery applications	A. J. Green et al	School of Chemistry, University of Birmingham, Birmingham, UK	2023	UK
Industrial Chemistry & Materials **2023**, *1*(2), 254-261	Large-scale direct regeneration of $LiFePO_4$@C based on spray drying	Yongxing Zou et al	Sauvage Laboratory for Smart Materials, Harbin Institute of Technology, Shenzhen, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
Journal of Environmental Chemical Engineering **2023**, *11*, 109759	Microwave low-temperature treatment – Step leaching process for recovering black mass from spent lithium-ion batteries	Chao Liu et al	School of Water Resources and Environmental Engineering, East China University of Technology, Nanchang, Jiangxi, China	2023	China
Journal of Cleaner Production **2023**, *431*, 139645	Novel approach to recycling of valuable metals from spent lithium-ion batteries using hydrometallurgy, focused on preferential extraction of lithium	Jialin Qing et al	School of Metallurgy and Environment, Central South University, Changsha, China	2023	China
Resources, Conservation & Recycling **2023**, *190*, 106782	Oriented conversion of spent $LiCoO_2$-lithium battery cathode materials to high-value products via thermochemical reduction with common ammonium oxalate	Chunli Liu et al	National-Local Joint Engineering Research Center of Heavy Metals Pollutants Control and Resource Utilization, School of Environmental and Chemical Engineering, Nanchang Hangkong University, Jiangxi, China	2023	China
Resources, Conservation and Recycling **2023**, *192*, 106937	Priority Lithium recovery from spent Li-ion batteries via carbothermal reduction with water leaching	Zhiming Yan et al	WMG, University of Warwick, Coventry, UK	2023	UK
Journal of Environmental Chemical Engineering **2023**, *11*, 109160	Rare metals recycling from spent NCM cathode materials and simultaneous dehydrofluorination of polyvinylidene fluoride (PVDF) in subcritical water	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2023	Korea
New Carbon Materials **2023**, *38*(5), 787-803	Recent developments and the future of the recycling of spent graphite for energy storage applications	Ji-Rui Wang et al	School of Materials Science and Engineering, Hefei University of Technology, Hefei, China	2023	China
Chemical Engineering Journal **2023**, *476*, 146733	Recent progress on sustainable recycling of spent lithium-ion battery: Efficient and closed-loop regeneration strategies for high-capacity layered NCM cathode materials	Liuyang Yu et al	State Key Laboratory of Chemical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin, China	2023	China
Recycling **2023**, *8*(5), 79	Recovery of Graphite from Spent Lithium-Ion Batteries	Charlotte Badenhorst et al	Institute of Earth Sciences—Porto, Department of Geosciences, Environment and Land Use Planning, Faculty of Sciences, University of Porto, Porto, Portugal	2023	Portugal
Separation and Purification Technology **2024**, *330*, 125498	Recyclable deep eutectic solvents for recycling $LiCoO_2$ from spent lithium-ion batteries with high selectivity	Yaozhi Zhang et al	State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing, China	2023	China
Journal of Energy Storage **2023**, *73*, 109073	Recycling valuable materials from the cathodes of spent lithium-ion batteries: A comprehensive review	Sezgin Yasa et al	Yildiz Technical University, Faculty of Chemical and Metallurgical Engineering, Department of Metallurgy and Materials Engineering, Istanbul, Turkey	2023	Turkey

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Reference	Title	Authors	Institution	Year	Country
Journal of Industrial and Engineering Chemistry **2024**, *134*, 281–288	Research on the separation process of positive electrode active material and aluminum foil	Yuhui Zhao et al	School of Resources and Environmental Engineering, Jiangsu University of Technology, Changzhou, China	2023	China
Separation and Purification Technology **2023**, *315*, 123684	Review on comprehensive recycling of spent lithium-ion batteries: A full component utilization process for green and sustainable production	Si-qi Jiang et al	College of Chemical and Biological Engineering, Shandong University of Science and Technology, Shandong, China	2023	China
Separation and Purification Technology **2023**, *306*, 122559	Separation and recovery of nickel cobalt manganese lithium from waste ternary lithium-ion batteries	Chunyan Li et al	Key Laboratory of Coal Processing and Efficient Utilization of Ministry of Education, School of Chemical Engineering and Technology, China University of Mining and Technology, Xuzhou, China	2023	China
Batteries **2023**, *9*(11), 549	Sequential Recovery of Critical Metals from Leached Liquor of Processed Spent Lithium-Ion Batteries	Ayorinde Emmanuel Ajiboye et al	Applied Materials Division, Argonne National Laboratory, Chicago, IL, USA	2023	USA
Journal of Hazardous Materials **2023**, *458*, 131959	Shearing-enhanced mechanical exfoliation with mild-temperature pretreatment for cathode active material recovery from spent LIBs	Chenyu Zhang et al	School of Chemical and Environmental Engineering, China University of Mining and Technology, Beijing, China	2023	China
Communications Chemistry **2023**, *6*, 49	Universal and efficient extraction of lithium for lithium-ion battery recycling using mechanochemistry	Oleksandr Dolotko et al	Karlsruhe Institute of Technology (KIT), Institute for Applied Materials-Energy Storage Systems (IAM-ESS), Karlsruhe, Germany	2023	Germany
Molecules **2023**, *28*(6), 2558	Upcycling of Acid-Leaching Solutions from Li-Ion Battery Waste Treatment through the Facile Synthesis of Magnetorheological Fluid	Magdalena Abramowicz et al	Faculty of Chemistry, University of Warsaw, Warsaw, Poland	2023	Poland
Science Advances **2022**, *8*, 40	A green and sustainable strategy toward lithium resources recycling from spent batteries	Jing Xu et al	Research Center of Grid Energy Storage and Battery Application, School of Electrical Engineering, Zhengzhou University, Zhengzhou, China	2022	China
Journal of Environmental Chemical Engineering **2022**, *10*, 108627	A novel ternary deep eutectic solvent for efficient recovery of critical metals from spent lithium-ion batteries under mild conditions	Yanshun Liao et al	School of Materials Science and Engineering, Beijing Institute of Technology, Beijing, China	2022	China
Waste Management **2023**, *156*, 247–254	A sustainable approach for selective recovery of lithium from cathode materials of spent lithium-ion batteries by induced phase transition	Fu Rao et al	School of Resources and Environmental Engineering, Shanghai Polytechnic University,Shanghai Collaborative Innovation Center for WEEE Recycling, Shanghai, China	2022	China

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Reference	Title	Authors	Institution	Year	Country
J. Am. Chem. Soc. **2022**, *144*, 20306−20314	Adaptable Eutectic Salt for the Direct Recycling of Highly Degraded Layer Cathodes	Jun Ma et al	Tsinghua-Berkeley Shenzhen Institute and Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2022	China
Green Chemistry **2023**, *25*, 3503-3514	Direct reuse of aluminium and copper current collectors from spent lithium-ion batteries	Pengcheng Zhu et al	School of Chemistry, The University of Birmingham, Birmingham, UK	2022	UK
Chemical Engineering Journal **2022**, *447*, 137507	Downstream recovery of Li and value-added metals (Ni, Co, and Mn) from leach liquor of spent lithium-ion batteries using a membrane-integrated hybrid system	Ramesh Kumar et al	Department of Earth Resources & Environmental Engineering, Hanyang University, Seoul, Republic of Korea	2022	Korea
Waste Management **2022**, *148*, 12–21	Efficient recovery of valuable metals from cathode materials of spent $LiCoO_2$ batteries via co-pyrolysis with cheap carbonaceous materials	Yiming Lai et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2022	China
Metals **2022**, *12*(4), 677	Recovery of Graphite and Cathode Active Materials from Spent Lithium-Ion Batteries by Applying Two Pretreatment Methods and Flotation Combined with a Rapid Analysis Technique	Hao Qiu et al	Institute of Mineral and Waste Processing, Waste Disposal and Geomechanics (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2022	Germany
Resources, Conservation and Recycling **2022**, *186*, 106579	Recycling cathode material $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ by leaching with a deep eutectic solvent and metal recovery with antisolvent crystallization	Chunyan Ma et al	Department of Chemical Engineering, KTH Royal Institute of Technology, Stockholm, Sweden	2022	Sweden
Chemical Engineering Journal **2022**, *434*, 134542	Selective recycling of valuable metals from waste $LiCoO_2$ cathode material of spent lithium-ion batteries through low-temperature thermochemistry	Xiangping Chen et al	School of Environmental Science and Engineering, Shaanxi University of Science & Technology, Xi'an, China	2022	China
Carbon **2022**, *189*, 293e304	A new approach to regenerate high-performance graphite from spent lithium-ion batteries	Qinghao Chen et al	College of Materials Science and Engineering, Sichuan University, Chengdu, China	2021	China
Resources, Conservation & Recycling **2021**, *175*, 105863	A technology for recycling lithium-ion batteries promoting the circular economy: The RecycLib	M.P. dos Santos et al	Center for Advanced and Sustainable Technologies (CAST), Sao Paulo State University (UNESP), Brazil	2021	Brazil
Separation and Purification Technology **2021**, *276*, 119307	Development of heterogeneous equilibrium model for lithium solvent extraction using organophosphinic acid	Junnan Lu et al	Department of Chemical Engineering, The University of Melbourne, VIC, Australia	2021	Australia

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Reference	Title	Authors	Institution	Year	Country
Metals **2021**, *11*(2), 177	Early-Stage Recovery of Lithium from Tailored Thermal Conditioned Black Mass Part I: Mobilizing Lithium via Supercritical CO_2-Carbonation	Lilian Schwich et al	IME, Institute for Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2021	Germany
Hydrometallurgy **2021**, *203*, 105694	Lithium and cobalt recovery for lithium-ion battery recycle using an improved oxalate process with hydrogen peroxide	Ankit Verma et al	Institute for Sustainable Engineering, University of Kansas, Lawrence, USA	2021	USA
Resources, Conservation & Recycling **2021**, *170*, 105551	Recovery of cathode materials from spent lithium-ion batteries using eutectic system of lithium compounds	Yi Ji et al	Environmental and Ecological Engineering, Purdue University, West Lafayette, USA	2021	USA
Resources, Conservation & Recycling **2022**, *176*, 105921	Recovery of spent $LiCoO_2$ lithium-ion battery via environmentally friendly pyrolysis and hydrometallurgical leaching	Ren Tao et al	CAS Key Laboratory of Green Process and Engineering, National Engineering Laboratory for Hydrometallurgical Cleaner Production Technology, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2021	China
Journal of Hazardous Materials **2021**, *405*, 124211	Recycling lithium cobalt oxide from its spent batteries: An electrochemical approach combining extraction and synthesis	Jianbo Wang et al	Key Laboratory of Solid Waste Treatment and Resource Recycle, Ministry of Education, School of Environment and Resource, Southwest University of Science and Technology, Sichuan, China	2021	China
Journal of Environmental Chemical Engineering **2021**, *9*, 104689	Recycling of graphite and metals from spent Li-ion batteries aiming the production of graphene/CoO-based electrochemical sensors	Jessielem S. Ribeiro et al	Laboratory of Carbon and Ceramic Materials, Department of Physics, Federal University of Espirito Santo (UFES), Vitoria, Brazil	2021	Brazil
Nature Communications **2021**, *12*, 6554	Selective cobalt and nickel electrodeposition for lithium-ion battery recycling through integrated electrolyte and interface control	Kwiyong Kim et al	Department of Chemical and Biomolecular Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA	2021	USA
Metals **2021**, *11*(2), 188	Speciation of Manganese in a Synthetic Recycling Slag Relevant for Lithium Recycling from Lithium-Ion Batteries	Alena Wittkowski et al	Institute of Inorganic and Analytical Chemistry, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2021	Germany
Science of the Total Environment **2021**, *759*, 143478	Sustainable recycling of $LiCoO_2$ cathode scrap on the basis of successive peroxymonosulfate activation and recovery of valuable metals	Hao Guo et al	Shanghai Key Laboratory of Materials Protection and Advanced Materials in Electric Power, Shanghai University of Electric Power, Shanghai, China	2021	China
Metals **2020**, *10*(8), 1069	A Combined Pyro- and Hydrometallurgical Approach to Recycle Pyrolyzed Lithium-Ion Battery Black Mass Part 1: Production of Lithium Concentrates in an Electric Arc Furnace	Marcus Sommerfeld et al	IME Process Metallurgy and Metal Recycling, Institute of RWTH University, Aachen, Germany	2020	Germany

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Reference	Title	Authors	Institution	Year	Country
Sustainable Materials and Technologies **2020**, *25*, e00152	A direct recycling case study from a lithium-ion battery recall	Steve Sloop et al	OnTo Technology LLC, Bend, OR, USA	2020	USA
Journal of Hazardous Materials **2021**, *410*, 124610	A green, efficient, closed-loop direct regeneration technology for reconstructing of the $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ cathode material from spent lithium-ion batteries	Xiaoping Fan et al	Guangxi Key Laboratory of Low Carbon Energy Materials, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
ACS Applied Energy Materials **2020**, *3*(5), 4767-4776	Innovative Electrochemical Strategy to Recovery of Cathode and Efficient Lithium Leaching from Spent Lithium-Ion Batteries	Kui Liu et al	Guangxi Key Laboratory of Low Carbon Energy, Materials, Guangxi New Energy Ship Battery Engineering, Technology Research Center, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
Energies **2020**, *13*(24), 6732	Investigation of the Physico-Chemical Properties of the Products Obtained after Mixed Organic-Inorganic Leaching of Spent Li-Ion Batteries	Weronika Urbanska et al	Department of Environmental Engineering, Wrocław University of Science and Technology, Wrocław, Poland	2020	Poland
Metals **2020**, *10*(12), 1633	Li-Distribution in Compounds of the Li_2O-MgO-Al_2O_3-SiO_2-CaO System—A First Survey	Thomas Schirmer et al	Department of Mineralogy, Geochemistry, Salt Deposits, Institute of Disposal Research, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2020	Germany
Journal of Hazardous Materials **2020**, *398*, 122955	Pyrolysis kinetics and reaction mechanism of the electrode materials during the spent $LiCoO_2$ batteries recovery process	Jun Lia et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2020	China
Journal of Hazardous Materials **2020**, *396*, 122667	Rapid leaching and recovery of valuable metals from spent Lithium Ion batteries (LIBs) via environmentally benign subcritical nickel-containing water over chlorinated polyvinyl chloride	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2020	Korea
Minerals **2020**, *10*(6), 555	Recovery of Co, Li, and Ni from Spent Li-Ion Batteries by the Inorganic and/or Organic Reducer Assisted Leaching Method	Weronika Urbanska et al	Department of Environmental Engineering, Wrocław University of Science and Technology, Wrocław, Poland	2020	Poland
Chemosphere **2020**, *254*, 126670	Ultrasound-assisted leaching of spent lithium ion batteries by natural organic acids and H_2O_2	M. Esmaeili et al	Department of Chemical Engineering, University of Kurdistan, Sanandaj, Iran	2020	Iran
Journal of Hazardous Materials **2019**, *375*, 43–51	A green process for exfoliating electrode materials and simultaneously extracting electrolyte from spent lithium-ion batteries	Kai He et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China	2019	China

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Reference	Title	Authors	Institution	Year	Country
Nature Energy **2019**, *4*, 339-345	Deep eutectic solvents for cathode recycling of Li-ion batteries	Mai K. Tran et al	Rice University, Houston, TX, USA	2019	USA
Journal of Power Sources **2019**, *440*, 227140	The strategy of entire recovery: From spent cathode material with high nickel content to new $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ and Li_2CO_3 powders	Shiting Yan et al	College of Chemistry and Molecular Sciences, Wuhan University, Wuhan, China	2019	China
Waste Management **2018**, *79*, 545–553	A sustainable process for metal recycling from spent lithium-ion batteries using ammonium chloride	Weiguang Lv et al	Beijing Engineering Research Center of Process Pollution Control, Division of Environment Technology and Engineering, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2018	China
Ceramics International **2018**, *44*, 351–357	Performance of $LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$ prepared from spent lithium-ion batteries by a carbonate co-precipitation method	Li-Po He et al	National Engineering Research Center for Integrated Utilization of Salt Lake Resource, East China University of Science and Technology, Shanghai, PR China	2018	China
Metals **2018**, *8*(5), 321	Recovery of Valuable Metals from Lithium-Ion Batteries NMC Cathode Waste Materials by Hydrometallurgical Methods	Wei-Sheng Chen et al	Department of Resources Engineering, National Cheng Kung University, Tainan, Taiwan	2018	Taiwan
Minerals Engineering **2018**, *126*, 28–35	Separation of Li and Co from the active mass of spent Li-ion batteries by selective sulfating roasting with sodium bisulfate and water leaching	Dahui Wang et al	State Key Laboratory of Advance Processing and Recycling of Nonferrous Metals, Lanzhou University of Technology, Lanzhou, China	2018	China
Journal of Industrial and Engineering Chemistry **2016**, *43*, 117–126	Acid baking of spent lithium ion batteries for selective recovery of major metals: A two-step process	Pratima Meshram et al	CSIR-National Metallurgical Laboratory (NML), Jamshedpur, India	2016	India
Waste Management **2016**, *51*, 239–244	An environmental benign process for cobalt and lithium recovery from spent lithium-ion batteries by mechanochemical approach	Meng-Meng Wang et al	Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2016	China
Chemical Engineering Journal **2015**, *281*, 418–427	Hydrometallurgical processing of spent lithium ion batteries (LIBs) in the presence of a reducing agent with emphasis on kinetics of leaching	Pratima Meshram et al	CSIR-National Metallurgical Laboratory, Jamshedpur, India	2015	India
Journal of Power Sources **2015**, *282*, 544e551	Succinic acid-based leaching system: A sustainable process for recovery of valuable metals from spent Li-ion batteries	Li Li et al	School of Chemical Engineering and the Environment, Beijing Key Laboratory of Environmental Science and Engineering, Beijing Institute of Technology,Beijing, China	2015	China

Continued on next page

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2015**, *144*, 197–205	Separation and recovery of metal values from leaching liquor of mixed-type of spent lithium-ion batteries	Xiangping Chen et al	Key Laboratory of Resources Chemistry of Nonferrous Metals, College of Chemistry and Chemical Engineering, Central South University, Changsha, China	2014	China

Reference	Title	Authors	Institution	Year	Country
Hydrometallurgy **2024**, *230*, 106362	A zero-liquid discharge process to recover all critical metals from spent NCM111 cathode material of end-of-life lithium-ion batteries: statistically optimized leaching with formic acid and in-situ crystallization	Alexandru Sonoc et al	Mechanical and Materials Engineering Department, Queen's University, Ontario, Canada	2024	Canada
Separation and Purification Technology **2024**, *345*, 127415	Novel targeted extraction of lithium: An environment-friendly controlled sulfidation roasting technology and mechanism for recovering spent lithium-ion batteries	Wencan Quan et al	School of Metallurgy Engineering, Jiangxi University of Science and Technology, Ganzhou, China	2024	China
Metals **2023**, *13*(5), 834	Acid Leaching of Al- and Ta-Substituted $Li_7La_3Zr_2O_{12}$ (LLZO) Solid Electrolyte	Kristin Schneider et al	Institute of Mineral and Waster Processing, Recycling and Circular Economy Systems, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2023	Germany
ChemElectroChem **2023**, *10*(17), e202300265	Co-precipitation of NCM 811 Using Recycled and Purified Manganese: Effect of Impurities on the Battery Cell Performance	Toni Kauppinen et al	University of Oulu, Research unit of Sustainable chemistry, Oulu, Finland	2023	Finland
Industrial Chemistry & Materials **2023**, *1*(2), 254-261	Large-scale direct regeneration of $LiFePO_4$@C based on spray drying	Yongxing Zou et al	Sauvage Laboratory for Smart Materials, Harbin Institute of Technology, Shenzhen, China	2023	China

Reference	Title	Authors	Institution	Year	Country
Journal of CO_2 Utilization **2024**, *81*, 102703	Implementation of a sub-and supercritical carbon dioxide process for the selective recycling of the electrolyte from spent Li-ion battery	Nils Zachmann et al	Department of Chemistry and Chemical Engineering, Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Gothenburg, Sweden	2024	Sweden
Environ. Sci. Technol. **2024**, *58*(48), 21362−21373	Mechanisms of Thermal Decomposition in Spent NCM Lithium-Ion Battery Cathode Materials with Carbon Defects and Oxygen Vacancies	Kang Liu et al	Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology, Hong Kong, China	2024	China
ACS Sustainable Chem. Eng. **2024**, *12*(45), 16564−16576	Metal Extraction from Commercial Black Mass of Spent Lithium-Ion Batteries Using Food-Waste-Derived Lixiviants through a Biological Process	Joseph Jegan Roy et al	Energy Research Institute at Nanyang Technological University (ERI@N) and SCARCE Lab, Singapore	2024	Singapore
Journal of Analytical and Applied Pyrolysis **2024**, *179*, 106466	Sustainable method for disposing of ceramic-coated battery separator via carbon dioxide-assisted thermochemical process	Sangyoon Lee et al	Department of Earth Resource and Environmental Engineering, Hanyang University, Seoul, Republic of Korea	2024	Korea
Chemical Engineering Journal **2024**, *481*, 148516	Sustainable recycling of spent ternary lithium-ion batteries via an environmentally friendly process: Selective recovery of lithium and non-hazardous upcycling of residue	Jianxing Liang et al	School of Environmental Science and Engineering, Shanghai Jiao Tong University, Shanghai, China	2024	China
Chemical Engineering Journal **2024**, *499*, 156114	Synergistic ternary deep eutectic solvents: An archetype for sustainable and eco-conscious Li and Co recovery from spent batteries	Hussein K. Amusa et al	Department of Chemical and Petroleum Engineering, Khalifa University, Abu Dhabi, United Arab Emirates	2024	UAE
Waste Management **2023**, *165*, 189−198	Acid-free extraction of valuable metal elements from spent lithium-ion batteries using waste copperas	Xi Jin et al	College of Materials Science and Engineering, Chongqing University, Chongqing, China	2023	China
Waste Management **2024**, *187*, 1−10	Conversion and fate of waste Li-ion battery electrolyte in a two-stage thermal treatment process	Li-Jun Wu et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2023	China
Journal of Hazardous Materials **2023**, *457*, 131782	In-situ pyrolysis based on alkaline medium removes fluorine-containing contaminants from spent lithium-ion batteries	Hanlin Huang et al	Chemistry and Chemical Engineering Data Center, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2023	China
Chemical Engineering Journal **2024**, *481*, 148564	Recovery and reuse of spent lithium-ion batteries as catalysts for low-temperature NH_3-SCR	Na Wu et al	Key Laboratory of Special Functional Materials for Ecological Environment and Information, Hebei University of Technology, Tianjin, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2024**, *330*, 125498	Recyclable deep eutectic solvents for recycling $LiCoO_2$ from spent lithium-ion batteries with high selectivity	Yaozhi Zhang et al	State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing, China	2023	China
ACS Sustainable Chem. Eng. **2022**, *10*(46), 15297−15304	Occupational Threat of Recycling Spent Lithium-Ion Batteries by Vacuum Reduction	Keyi Lin et al	Guangdong Provincial Key Laboratory of Environmental Pollution Control and Remediation Technology, School of Environmental Science and Engineering, Sun Yat-Sen University, Guangzhou, China	2022	China
Resources, Conservation and Recycling **2022**, *186*, 106579	Recycling cathode material $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ by leaching with a deep eutectic solvent and metal recovery with antisolvent crystallization	Chunyan Ma et al	Department of Chemical Engineering, KTH Royal Institute of Technology, Stockholm, Sweden	2022	Sweden
Resources, Conservation & Recycling **2022**, *176*, 105921	Recovery of spent $LiCoO_2$ lithium-ion battery via environmentally friendly pyrolysis and hydrometallurgical leaching	Ren Tao et al	CAS Key Laboratory of Green Process and Engineering, National Engineering Laboratory for Hydrometallurgical Cleaner Production Technology, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2021	China
Science of the Total Environment **2021**, *759*, 143478	Sustainable recycling of $LiCoO_2$ cathode scrap on the basis of successive peroxymonosulfate activation and recovery of valuable metals	Hao Guo et al	Shanghai Key Laboratory of Materials Protection and Advanced Materials in Electric Power, Shanghai University of Electric Power, Shanghai, China	2021	China

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2025**, *354*, 128929	A comprehensive overview of decommissioned lithium-ion battery recycling: Towards green and economical	Chenkai Dong et al	Shandong Key Laboratory of Environmental Processes and Health, School of Environmental Science and Engineering, Shandong University, Qingdao, China	2025	China
Energies **2025**, *18*(2), 398	Optimizing Acidic Reductive Leaching for Lithium Recovery: Enhancing Sustainable Lithium Supply for Energy Markets	Agnieszka Sobianowska-Turek et al	Department of Water and Wastewater Management and Waste Technology, Faculty of Environmental Engineering, Wrocław University of Technology, Poland	2025	Poland
Journal of Alloys and Compounds **2024**, *993*, 174691	A facile approach for regeneration of graphite anodes from spent lithium-ion battery	Rongchang Li et al	Institute of New Carbon Materials, College of Materials Science and Engineering, Taiyuan University of Technology, Taiyuan, China	2024	China
Hydrometallurgy **2024**, *230*, 106362	A zero-liquid discharge process to recover all critical metals from spent NCM111 cathode material of end-of-life lithium-ion batteries: statistically optimized leaching with formic acid and in-situ crystallization	Alexandru Sonoc et al	Mechanical and Materials Engineering Department, Queen's University, Ontario, Canada	2024	Canada
Minerals **2024**, *14*(9), 878	Characterization of Lithium-Ion Batteries from Recycling Perspective towards Circular Economy	Lucas Fonseca Guimaraes et al	Department of Chemical Engineering, Polytechnic School, University of Sao Paulo, Sao Paulo, Brazil	2024	Brazil
Chemical Engineering Journal **2024**, *494*, 153199	Closed-loop resynthesis of $LiNiCoAlO_2$ cathode active materials from the industrial leachate of spent li-ion batteries	Seoa Kim et al	Department of Energy & Mineral Resources Engineering, Sejong University, Seoul, Republic of Korea	2024	Korea
Metals **2024**, *14*(1), 80	Co-Precipitation of Metal Oxalates from Organic Leach Solution Derived from Spent Lithium-Ion Batteries (LIBs)	Dominik Schmitz et al	IME Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2024	Germany
Separation and Purification Technology **2024**, *348*, 127771	Eco-friendly closed-loop recycling of nickel, cobalt, manganese, and lithium from spent ternary lithium-ion battery cathodes	Gong Siyu et al	Faculty of Metallurgy and Energy Engineering, Kunming University of Science and Technology, Kunming, Yunnan, China	2024	China
Journal of Cleaner Production **2024**, *480*, 144128	Efficient leaching of valuable metals from spent lithium-ion batteries using green deep eutectic solvents: Process optimization, mechanistic analysis, and environmental impact assessment	Songming Zheng et al	College of Material Science and Engineering, Chongqing University, Chongqing, China	2024	China
Mineral Processing and Extractive Metallurgy Review, **2024**, *46*(3), 386–399	Glutamate Leaching of Spent Lithium-Ion Battery Cathode in Weak Acidic-Neutral Condition: New Insight on Kinetics and Dissolution Mechanism	Erik Prasetyo et al	Research Center for Mining Technology, National Research and Innovation Agency, Lampung Selatan, Indonesia	2024	Indonesia

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Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2025**, *354*, 128808	Green recycling of spent $LiCoO_2$ cathodes using a water-based deep eutectic solvent	Xi Wu et al	Key Laboratory of Materials Physics, Centre for Environmental and Energy Nanomaterials, Anhui Key Laboratory of Nanomaterials and Nanotechnology, Institute of Solid State Physics, Hefei Institutes of Physical Science, Chinese Academy of Sciences, Hefei, China	2024	China
Minerals Engineering **2024**, *215*, 108828	Investigating battery black mass leaching performance as a function of process parameters by combining leaching experiments and regression modeling	Jere Partinen et al	Aalto University, School of Chemical Engineering, Department of Chemical and Metallurgical Engineering, Aalto, Finland	2024	Finland
Waste Management Bulletin **2024**, *2*, 275–288	Investigation of hydrohalic acids as lixiviants for the leaching of cathode metals from spent lithium-ion batteries	Prichard M. Tembo et al	Department of Chemical and Materials Engineering, University of Nevada-Reno, Nevada, USA	2024	USA
Scientific Reports **2024**, *14*, 10818	Leaching of NMC industrial black mass in the presence of LFP	Yuanmin Zou et al	Department of Chemical and Metallurgical Engineering, School of Chemical Engineering, Aalto University, Aalto, Finland	2024	Finland
Separation and Purification Technology **2024**, *335*, 126181	Multicomponent solvent extraction modelling of lithium, cobalt, nickel, and manganese from simulated black mass leachate	Junnan Lu et al	Department of Chemical Engineering, The University of Melbourne, VIC, Australia	2024	Australia
Separation and Purification Technology **2024**, *345*, 127415	Novel targeted extraction of lithium: An environment-friendly controlled sulfidation roasting technology and mechanism for recovering spent lithium-ion batteries	Wencan Quan et al	School of Metallurgy Engineering, Jiangxi University of Science and Technology, Ganzhou, China	2024	China
Environmental Advances **2024**, *17*, 100570	On the effect of cavitation on particles in leaching processes: implications to battery recycling	Chiara Canciani et al	CCRC, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia	2024	Saudi Arabia
Joule **2024**, *8*(10), 2735-2754	Phase-selective recovery and regeneration of end-of-life electric vehicle blended cathodes via selective leaching and direct recycling	Laura L. Driscoll et al	School of Chemistry, University of Birmingham, Birmingham, UK	2024	UK
Chemical Engineering Journal **2024**, *500*, 157219	Precise regulation of layered-to-rock structure of spent Li-ion cathodes achieving ultrahigh lithium recovery rate	Xue Bai et al	State Key Laboratory of Chemical Resource Engineering, College of Chemistry, Beijing University of Chemical Technology, Beijing, China	2024	China
Journal of Industrial and Engineering Chemistry **2024**, *139*, 111–124	Recent recycling methods for spent cathode materials from lithium-ion batteries: A review	Karmegam Dhanabalan et al	School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea	2024	Korea

Continued on next page

Reference	Title	Authors	Institution	Year	Country
Journal of Environmental Chemical Engineering **2024**, *12*, 114346	Selective lithium recovery from waste lithium-ion batteries by H_2SO_4 roasting focused on process intensification and conversion mechanism	Haoyuan Deng et al	State Key Laboratory of Pollution Control and Resources Reuse, Shanghai, China	2024	China
Separation and Purification Technology **2024**, *348*, 127707	Sustainable recovery of cobalt and lithium from lithium-ion battery cathode material by combining sulfate leachates and aqueous biphasic systems based on tetrabutylphosphonium-ionic liquids	Jasmina Musovic et al	Laboratory of Physical Chemistry, Vinca Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia	2024	Serbia
Chemical Engineering Journal **2024**, *481*, 148516	Sustainable recycling of spent ternary lithium-ion batteries via an environmentally friendly process: Selective recovery of lithium and non-hazardous upcycling of residue	Jianxing Liang et al	School of Environmental Science and Engineering, Shanghai Jiao Tong University, Shanghai, China	2024	China
Journal of Cleaner Production **2024**, *438*, 140798	Sustainable regeneration of high-performance cathode materials from spent lithium-ion batteries through magnetic separation and coprecipitation	Wei Ding et al	School of Resources and Environmental Engineering, Wuhan University of Technology, Wuhan, China	2024	China
Waste Management **2024**, *183*, 209–219	Sustainable reprocessing of lithium iron phosphate batteries: A recovery approach using liquid-phase method at reduced temperature	Tingyan Ren et al	South China Institute of Environmental Sciences, Ministry of Ecology and Environment of China, Guangzhou, China	2024	China
Environ. Sci. Technol. **2024**, *58*(43), 19486−19500	Toward a Circular Lithium Economy with Electrodialysis: Upcycling Spent Battery Leachates with Selective and Bipolar Ion-Exchange Membranes | Environmental Science & Technology	Zi Hao Foo et al	Department of Mechanical Engineering, Massachusetts Institute of Technology, Massachusetts, USA	2024	USA
Journal of Energy Storage **2023**, *72*, 108486	A comprehensive review of full recycling and utilization of cathode and anode as well as electrolyte from spent lithium-ion batteries	Gongchu Shi et al	School of Material Science and Engineering, Beijing Institute of Technology, Beijing, China	2023	China
Nature Energy **2023**, *8*, 1137–1144	A contact-electro-catalytic cathode recycling method for spent lithium-ion batteries	Huifan Li et al	CAS Center for Excellence in Nanoscience, Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, Beijing, China	2023	China
Metals **2023**, *13*(7), 1276	Acid-Assisted Separation of Cathodic Material from Spent Electric Vehicle Batteries for Recycling	Anton Zorin et al	School of Metallurgy and Materials, University of Birmingham, Birmingham, UK	2023	UK
Waste Management **2023**, *165*, 189–198	Acid-free extraction of valuable metal elements from spent lithium-ion batteries using waste copperas	Xi Jin et al	College of Materials Science and Engineering, Chongqing University, Chongqing, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
Metals **2023**, *13*(5), 834	Acid Leaching of Al- and Ta-Substituted $Li_7La_3Zr_2O_{12}$ (LLZO) Solid Electrolyte	Kristin Schneider et al	Institute of Mineral and Waster Processing, Recycling and Circular Economy Systems, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2023	Germany
Science Advances **2023**, *9*, 39	Battery metal recycling by flash Joule heating	Weiyin Chen et al	Department of Chemistry, Rice University, Houston, TX, USA	2023	USA
Science of the Total Environment **2024**, *924*, 171453	Can e-waste recycling provide a solution to the scarcity of rare earth metals? An overview of e-waste recycling methods	Sai Sree Varsha Vuppaladadiyam et al	Department of Chemical and Biological Engineering, Monash University, Australia	2023	Australia
Waste Management **2023**, *166*, 122–132	Chemical speciation changes of an all-solid-state lithium-ion battery caused by roasting determined by sequential acid leaching	Yutaro Takaya et al	Faculty of Engineering, The University of Tokyo, Tokyo, Japan	2023	Japan
Journal of Environmental Chemical Engineering **2023**, *11*, 110979	Comparative of malonic acid aqueous solution and malonic acid-based deep eutectic solvent for $LiCoO_2$ cathode materials recovery: Leaching efficiency and mechanism	Yunpeng Wen et al	School of Metallurgical Engineering, Xi'an University of Architecture and Technology, Xi'an, China	2023	China
ChemElectroChem **2023**, *10*(17), e202300265	Co-precipitation of NCM 811 Using Recycled and Purified Manganese: Effect of Impurities on the Battery Cell Performance	Toni Kauppinen et al	University of Oulu, Research unit of Sustainable chemistry, Oulu, Finland	2023	Finland
Journal of Industrial and Engineering Chemistry **2024**, *134*, 112–122	Design of a novel magnetic composite catalyst with highly efficient cobalt circulation for activating peroxymonosulfate to degrade tetracycline	Lei Wang et al	School of Materials Science and Engineering, Anhui University of Science and Technology, Huainan, China	2023	China
Minerals **2023**, *13*(6), 798	Development of a More Sustainable Hybrid Process for Lithium and Cobalt Recovery from Lithium-Ion Batteries	José Cristiano Mengue Model et al	Metallurgy and Materials Engineering, Laboratory of Corrosion, Protection and Materials Recycling, Federal University of Rio Grande do Sul, Porto Alegre, Brazil	2023	Brazil
Energy Storage Materials **2023**, *63*, 103025	Efficient separation and coprecipitation for simplified cathode recycling	Lu Yu et al	Electrification and Energy Infrastructures Division, Oak Ridge National Laboratory, Oak Ridge, USA	2023	USA
Chemical Engineering Journal **2023**, *467*, 143441	Green recovery of Li, Ni, and Mn from spent $xLi_2MnO_3 \cdot (1-x)$ $LiMO_2$ cathode materials: Experimental study and mechanism analysis	Yifan Wang et al	Institute of Circular Economy, Beijing University of Technology, Beijing, China	2023	China
ACS Omega **2023**, *8*(7), 6959–6967	Highly Efficient Recovery and Recycling of Cobalt from Spent Lithium-Ion Batteries Using an N-Methylurea–Acetamide Nonionic Deep Eutectic Solvent	Subramanian Suriyanarayanan et al	Bioorganic and Biophysical Chemistry Laboratory, Linnaeus Centre for Biomaterials Chemistry, Department of Chemistry and Biomedical Sciences, Linnaeus University, Kalmar, Sweden	2023	Sweden

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Reference	Title	Authors	Institution	Year	Country
Journal of Materials Chemistry A **2024**, *12*, 7321-7328	High-power recycling: upcycling to the next generation of high-power anodes for Li-ion battery applications	A. J. Green et al	School of Chemistry, University of Birmingham, Birmingham, UK	2023	UK
Journal of Environmental Chemical Engineering **2023**, *11*, 109759	Microwave low-temperature treatment – Step leaching process for recovering black mass from spent lithium-ion batteries	Chao Liu et al	School of Water Resources and Environmental Engineering, East China University of Technology, Nanchang, Jiangxi, China	2023	China
Journal of Cleaner Production **2023**, *431*, 139645	Novel approach to recycling of valuable metals from spent lithium-ion batteries using hydrometallurgy, focused on preferential extraction of lithium	Jialin Qing et al	School of Metallurgy and Environment, Central South University, Changsha, China	2023	China
Resources, Conservation & Recycling **2023**, *190*, 106782	Oriented conversion of spent $LiCoO_2$-lithium battery cathode materials to high-value products via thermochemical reduction with common ammonium oxalate	Chunli Liu et al	National-Local Joint Engineering Research Center of Heavy Metals Pollutants Control and Resource Utilization, School of Environmental and Chemical Engineering, Nanchang Hangkong University, Jiangxi, China	2023	China
Resources, Conservation and Recycling **2023**, *192*, 106937	Priority Lithium recovery from spent Li-ion batteries via carbothermal reduction with water leaching	Zhiming Yan et al	WMG, University of Warwick, Coventry, UK	2023	UK
Journal of Environmental Chemical Engineering **2023**, *11*, 109160	Rare metals recycling from spent NCM cathode materials and simultaneous dehydrofluorination of polyvinylidene fluoride (PVDF) in subcritical water	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2023	Korea
New Carbon Materials **2023**, *38*(5), 787-803	Recent developments and the future of the recycling of spent graphite for energy storage applications	Ji-Rui Wang et al	School of Materials Science and Engineering, Hefei University of Technology, Hefei, China	2023	China
Chemical Engineering Journal **2023**, *476*, 146733	Recent progress on sustainable recycling of spent lithium-ion battery: Efficient and closed-loop regeneration strategies for high-capacity layered NCM cathode materials	Liuyang Yu et al	State Key Laboratory of Chemical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin, China	2023	China
Chemical Engineering Journal **2024**, *481*, 148564	Recovery and reuse of spent lithium-ion batteries as catalysts for low-temperature NH_3-SCR	Na Wu et al	Key Laboratory of Special Functional Materials for Ecological Environment and Information, Hebei University of Technology, Tianjin, China	2023	China
Recycling **2023**, *8*(5), 79	Recovery of Graphite from Spent Lithium-Ion Batteries	Charlotte Badenhorst et al	Institute of Earth Sciences—Porto, Department of Geosciences, Environment and Land Use Planning, Faculty of Sciences, University of Porto, Porto, Portugal	2023	Portugal

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Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2024**, *330*, 125498	Recyclable deep eutectic solvents for recycling $LiCoO_2$ from spent lithium-ion batteries with high selectivity	Yaozhi Zhang et al	State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing, China	2023	China
Journal of Energy Storage **2023**, *73*, 109073	Recycling valuable materials from the cathodes of spent lithium-ion batteries: A comprehensive review	Sezgin Yasa et al	Yildiz Technical University, Faculty of Chemical and Metallurgical Engineering, Department of Metallurgy and Materials Engineering, Istanbul, Turkey	2023	Turkey
Separation and Purification Technology **2023**, *315*, 123684	Review on comprehensive recycling of spent lithium-ion batteries: A full component utilization process for green and sustainable production	Si-qi Jiang et al	College of Chemical and Biological Engineering, Shandong University of Science and Technology, Shandong, China	2023	China
Separation and Purification Technology **2023**, *306*, 122559	Separation and recovery of nickel cobalt manganese lithium from waste ternary lithium-ion batteries	Chunyan Li et al	Key Laboratory of Coal Processing and Efficient Utilization of Ministry of Education, School of Chemical Engineering and Technology, China University of Mining and Technology, Xuzhou, China	2023	China
Batteries **2023**, *9*(11), 549	Sequential Recovery of Critical Metals from Leached Liquor of Processed Spent Lithium-Ion Batteries	Ayorinde Emmanuel Ajiboye et al	Applied Materials Division, Argonne National Laboratory, Chicago, IL, USA	2023	USA
Communications Chemistry **2023**, *6*, 49	Universal and efficient extraction of lithium for lithium-ion battery recycling using mechanochemistry	Oleksandr Dolotko et al	Karlsruhe Institute of Technology (KIT), Institute for Applied Materials-Energy Storage Systems (IAM-ESS), Karlsruhe, Germany	2023	Germany
Molecules **2023**, *28*(6), 2558	Upcycling of Acid-Leaching Solutions from Li-Ion Battery Waste Treatment through the Facile Synthesis of Magnetorheological Fluid	Magdalena Abramowicz et al	Faculty of Chemistry, University of Warsaw, Warsaw, Poland	2023	Poland
Journal of Environmental Chemical Engineering **2022**, *10*, 108627	A novel ternary deep eutectic solvent for efficient recovery of critical metals from spent lithium-ion batteries under mild conditions	Yanshun Liao et al	School of Materials Science and Engineering, Beijing Institute of Technology, Beijing, China	2022	China
Chemistry A European Journal **2022**, *28*, 22	Comprehensive Characterization of Shredded Lithium-Ion Battery Recycling Material	Christoph Peschel et al	University of Munster, MEET Battery Research Center, Munster, Germany	2022	Germany
Chemical Engineering Journal **2022**, *447*, 137507	Downstream recovery of Li and value-added metals (Ni, Co, and Mn) from leach liquor of spent lithium-ion batteries using a membrane-integrated hybrid system	Ramesh Kumar et al	Department of Earth Resources & Environmental Engineering, Hanyang University, Seoul, Republic of Korea	2022	Korea

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Reference	Title	Authors	Institution	Year	Country
Resources, Conservation and Recycling **2022**, *186*, 106579	Recycling cathode material $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ by leaching with a deep eutectic solvent and metal recovery with antisolvent crystallization	Chunyan Ma et al	Department of Chemical Engineering, KTH Royal Institute of Technology, Stockholm, Sweden	2022	Sweden
Chemical Engineering Journal **2022**, *434*, 134542	Selective recycling of valuable metals from waste $LiCoO_2$ cathode material of spent lithium-ion batteries through low-temperature thermochemistry	Xiangping Chen et al	School of Environmental Science and Engineering, Shaanxi University of Science & Technology, Xi'an, China	2022	China
Resources, Conservation & Recycling **2021**, *175*, 105863	A technology for recycling lithium-ion batteries promoting the circular economy: The RecycLib	M.P. dos Santos et al	Center for Advanced and Sustainable Technologies (CAST), Sao Paulo State University (UNESP), Brazil	2021	Brazil
Separation and Purification Technology **2021**, *276*, 119307	Development of heterogeneous equilibrium model for lithium solvent extraction using organophosphinic acid	Junnan Lu et al	Department of Chemical Engineering, The University of Melbourne, VIC, Australia	2021	Australia
Metals **2021**, *11*(2), 177	Early-Stage Recovery of Lithium from Tailored Thermal Conditioned Black Mass Part I: Mobilizing Lithium via Supercritical CO_2-Carbonation	Lilian Schwich et al	IME, Institute for Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2021	Germany
Renewable Energy **2022**, *181*, 714–724	High temperature microwave dielectric and thermochemical properties of waste $Li_xMn_2O_4$ battery cathode materials reduced by moso bamboo	Shunda Lin et al	Key Laboratory of Unconventional Metallurgy, Ministry of Education, Faculty of Metallurgical and Energy Engineering, Kunming University of Science and Technology, Kunming, China	2021	China
Hydrometallurgy **2021**, *203*, 105694	Lithium and cobalt recovery for lithium-ion battery recycle using an improved oxalate process with hydrogen peroxide	Ankit Verma et al	Institute for Sustainable Engineering, University of Kansas, Lawrence, USA	2021	USA
Resources, Conservation & Recycling **2022**, *176*, 105921	Recovery of spent $LiCoO_2$ lithium-ion battery via environmentally friendly pyrolysis and hydrometallurgical leaching	Ren Tao et al	CAS Key Laboratory of Green Process and Engineering, National Engineering Laboratory for Hydrometallurgical Cleaner Production Technology, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2021	China
Journal of Environmental Chemical Engineering **2021**, *9*, 104689	Recycling of graphite and metals from spent Li-ion batteries aiming the production of graphene/CoO-based electrochemical sensors	Jessielem S. Ribeiro et al	Laboratory of Carbon and Ceramic Materials, Department of Physics, Federal University of Espirito Santo (UFES), Vitoria, Brazil	2021	Brazil
Nature Communications **2021**, *12*, 6554	Selective cobalt and nickel electrodeposition for lithium-ion battery recycling through integrated electrolyte and interface control	Kwiyong Kim et al	Department of Chemical and Biomolecular Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA	2021	USA

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Reference	Title	Authors	Institution	Year	Country
Metals **2020**, *10*(8), 1069	A Combined Pyro- and Hydrometallurgical Approach to Recycle Pyrolyzed Lithium-Ion Battery Black Mass Part 1: Production of Lithium Concentrates in an Electric Arc Furnace	Marcus Sommerfeld et al	IME Process Metallurgy and Metal Recycling, Institute of RWTH University, Aachen, Germany	2020	Germany
Energies **2020**, *13*(24), 6732	Investigation of the Physico-Chemical Properties of the Products Obtained after Mixed Organic-Inorganic Leaching of Spent Li-Ion Batteries	Weronika Urbanska et al	Department of Environmental Engineering, Wrocław University of Science and Technology, Wrocław, Poland	2020	Poland
Journal of Hazardous Materials **2020**, *396*, 122667	Rapid leaching and recovery of valuable metals from spent Lithium Ion batteries (LIBs) via environmentally benign subcritical nickel-containing water over chlorinated polyvinyl chloride	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2020	Korea
Minerals **2020**, *10*(6), 555	Recovery of Co, Li, and Ni from Spent Li-Ion Batteries by the Inorganic and/or Organic Reducer Assisted Leaching Method	Weronika Urbanska et al	Department of Environmental Engineering, Wrocław University of Science and Technology, Wrocław, Poland	2020	Poland
Separation and Purification Technology **2019**, *215*, 398–402	A more simple and efficient process for recovery of cobalt and lithium from spent lithium-ion batteries with citric acid	Min Yu et al	School of Chemistry and Chemical Engineering, Wuhan University of Science and Technology, Wuhan, China	2019	China
Nature Energy **2019**, *4*, 339-345	Deep eutectic solvents for cathode recycling of Li-ion batteries	Mai K. Tran et al	Rice University, Houston, TX, USA	2019	USA
Journal of Power Sources **2019**, *440*, 227140	The strategy of entire recovery: From spent cathode material with high nickel content to new $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ and Li_2CO_3 powders	Shiting Yan et al	College of Chemistry and Molecular Sciences, Wuhan University, Wuhan, China	2019	China
Waste Management **2018**, *79*, 545–553	A sustainable process for metal recycling from spent lithium-ion batteries using ammonium chloride	Weiguang Lv et al	Beijing Engineering Research Center of Process Pollution Control, Division of Environment Technology and Engineering, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2018	China
Metals **2018**, *8*(5), 321	Recovery of Valuable Metals from Lithium-Ion Batteries NMC Cathode Waste Materials by Hydrometallurgical Methods	Wei-Sheng Chen et al	Department of Resources Engineering, National Cheng Kung University, Tainan, Taiwan	2018	Taiwan
Journal of Industrial and Engineering Chemistry **2016**, *43*, 117–126	Acid baking of spent lithium ion batteries for selective recovery of major metals: A two-step process	Pratima Meshram et al	CSIR-National Metallurgical Laboratory (NML), Jamshedpur, India	2016	India

Continued on next page

Reference	Title	Authors	Institution	Year	Country
Waste Management **2016**, *51*, 239–244	An environmental benign process for cobalt and lithium recovery from spent lithium-ion batteries by mechanochemical approach	Meng-Meng Wang et al	Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2016	China
Chemical Engineering Journal **2015**, *281*, 418–427	Hydrometallurgical processing of spent lithium ion batteries (LIBs) in the presence of a reducing agent with emphasis on kinetics of leaching	Pratima Meshram et al	CSIR-National Metallurgical Laboratory, Jamshedpur, India	2015	India
Journal of Power Sources **2015**, *282*, 544e551	Succinic acid-based leaching system: A sustainable process for recovery of valuable metals from spent Li-ion batteries	Li Li et al	School of Chemical Engineering and the Environment, Beijing Key Laboratory of Environmental Science and Engineering, Beijing Institute of Technology, Beijing, China	2015	China
Separation and Purification Technology **2015**, *144*, 197–205	Separation and recovery of metal values from leaching liquor of mixed-type of spent lithium-ion batteries	Xiangping Chen et al	Key Laboratory of Resources Chemistry of Nonferrous Metals, College of Chemistry and Chemical Engineering, Central South University, Changsha, China	2014	China

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2025**, *354*, 128929	A comprehensive overview of decommissioned lithium-ion battery recycling: Towards green and economical	Chenkai Dong et al	Shandong Key Laboratory of Environmental Processes and Health, School of Environmental Science and Engineering, Shandong University, Qingdao, China	2025	China
Journal of Alloys and Compounds **2024**, *993*, 174691	A facile approach for regeneration of graphite anodes from spent lithium-ion battery	Rongchang Li et al	Institute of New Carbon Materials, College of Materials Science and Engineering, Taiyuan University of Technology, Taiyuan, China	2024	China
Separation and Purification Technology **2025**, *354*, 129035	A process for preferential recovery of lithium and manganese from spent NCM by vacuum carbothermal reduction method	Jun Li et al	Key Laboratory for Nonferrous Vacuum Metallurgy of Yunnan Province, Kunming University of Science and Technology, Kunming, China	2024	China
Environ. Sci. Technol. **2024**, *58*(48), 21362−21373	Mechanisms of Thermal Decomposition in Spent NCM Lithium-Ion Battery Cathode Materials with Carbon Defects and Oxygen Vacancies	Kang Liu et al	Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology, Hong Kong, China	2024	China
Separation and Purification Technology **2024**, *345*, 127415	Novel targeted extraction of lithium: An environment-friendly controlled sulfidation roasting technology and mechanism for recovering spent lithium-ion batteries	Wencan Quan et al	School of Metallurgy Engineering, Jiangxi University of Science and Technology, Ganzhou, China	2024	China
Results in Engineering **2024**, *23*, 102802	Optimization of high-temperature thermal pretreatment conditions for maximum enrichment of lithium and cobalt from spent lithium-ion polymer batteries	Lizhen Gao et al	College of Environmental Science and Engineering, Taiyuan University of Technology, Shanxi-Province, China	2024	China
Chemical Engineering Journal **2024**, *500*, 157219	Precise regulation of layered-to-rock structure of spent Li-ion cathodes achieving ultrahigh lithium recovery rate	Xue Bai et al	State Key Laboratory of Chemical Resource Engineering, College of Chemistry, Beijing University of Chemical Technology, Beijing, China	2024	China
Journal of Industrial and Engineering Chemistry **2024**, *139*, 111−124	Recent recycling methods for spent cathode materials from lithium-ion batteries: A review	Karmegam Dhanabalan et al	School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea	2024	Korea
Journal of Environmental Chemical Engineering **2024**, *12*, 114346	Selective lithium recovery from waste lithium-ion batteries by H_2SO_4 roasting focused on process intensification and conversion mechanism	Haoyuan Deng et al	State Key Laboratory of Pollution Control and Resources Reuse, Shanghai, China	2024	China
Minerals Engineering **2024**, *217*, 108918	Valorization of lithium containing slags from pyrometallurgical recycling route of spent lithium-ion batteries: The enrichment of γ-$LiAlO_2$ phase from thermodynamic controlled and modified slags	Hao Qiu et al	Institute of Mineral and Waste Processing, Recycling and Circular Economy Systems (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2024	Germany

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Reference	Title	Authors	Institution	Year	Country
Journal of Energy Storage **2023**, *72*, 108486	A comprehensive review of full recycling and utilization of cathode and anode as well as electrolyte from spent lithium-ion batteries	Gongchu Shi et al	School of Material Science and Engineering, Beijing Institute of Technology, Beijing, China	2023	China
Science of the Total Environment **2024**, *924*, 171453	Can e-waste recycling provide a solution to the scarcity of rare earth metals? An overview of e-waste recycling methods	Sai Sree Varsha Vuppaladadiyam et al	Department of Chemical and Biological Engineering, Monash University, Australia	2023	Australia
Waste Management **2023**, *166*, 122–132	Chemical speciation changes of an all-solid-state lithium-ion battery caused by roasting determined by sequential acid leaching	Yutaro Takaya et al	Faculty of Engineering, The University of Tokyo, Tokyo, Japan	2023	Japan
Waste Management **2024**, *187*, 1–10	Conversion and fate of waste Li-ion battery electrolyte in a two-stage thermal treatment process	Li-Jun Wu et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2023	China
Minerals **2023**, *13*(6), 798	Development of a More Sustainable Hybrid Process for Lithium and Cobalt Recovery from Lithium-Ion Batteries	José Cristiano Mengue Model et al	Metallurgy and Materials Engineering, Laboratory of Corrosion, Protection and Materials Recycling, Federal University of Rio Grande do Sul, Porto Alegre, Brazil	2023	Brazil
Chemical Engineering Journal **2023**, *467*, 143441	Green recovery of Li, Ni, and Mn from spent $xLi_2MnO_3 \cdot (1-x)LiMO_2$ cathode materials: Experimental study and mechanism analysis	Yifan Wang et al	Institute of Circular Economy, Beijing University of Technology, Beijing, China	2023	China
Journal of Environmental Chemical Engineering **2023**, *11*, 109759	Microwave low-temperature treatment – Step leaching process for recovering black mass from spent lithium-ion batteries	Chao Liu et al	School of Water Resources and Environmental Engineering, East China University of Technology, Nanchang, Jiangxi, China	2023	China
Resources, Conservation & Recycling **2023**, *190*, 106782	Oriented conversion of spent $LiCoO_2$-lithium battery cathode materials to high-value products via thermochemical reduction with common ammonium oxalate	Chunli Liu et al	National-Local Joint Engineering Research Center of Heavy Metals Pollutants Control and Resource Utilization, School of Environmental and Chemical Engineering, Nanchang Hangkong University, Jiangxi, China	2023	China
Resources, Conservation and Recycling **2023**, *192*, 106937	Priority Lithium recovery from spent Li-ion batteries via carbothermal reduction with water leaching	Zhiming Yan et al	WMG, University of Warwick, Coventry, UK	2023	UK
New Carbon Materials **2023**, *38*(5), 787-803	Recent developments and the future of the recycling of spent graphite for energy storage applications	Ji-Rui Wang et al	School of Materials Science and Engineering, Hefei University of Technology, Hefei, China	2023	China

Continued on next page

Reference	Title	Authors	Institution	Year	Country
Chemical Engineering Journal **2023**, *476*, 146733	Recent progress on sustainable recycling of spent lithium-ion battery: Efficient and closed-loop regeneration strategies for high-capacity layered NCM cathode materials	Liuyang Yu et al	State Key Laboratory of Chemical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin, China	2023	China
Journal of Energy Storage **2023**, *73*, 109073	Recycling valuable materials from the cathodes of spent lithium-ion batteries: A comprehensive review	Sezgin Yasa et al	Yildiz Technical University, Faculty of Chemical and Metallurgical Engineering, Department of Metallurgy and Materials Engineering, Istanbul, Turkey	2023	Turkey
Separation and Purification Technology **2023**, *315*, 123684	Review on comprehensive recycling of spent lithium-ion batteries: A full component utilization process for green and sustainable production	Si-qi Jiang et al	College of Chemical and Biological Engineering, Shandong University of Science and Technology, Shandong, China	2023	China
Chemistry A European Journal **2022**, *28*, 22	Comprehensive Characterization of Shredded Lithium-Ion Battery Recycling Material	Christoph Peschel et al	University of Munster, MEET Battery Research Center, Munster, Germany	2022	Germany
Waste Management **2022**, *148*, 12–21	Efficient recovery of valuable metals from cathode materials of spent $LiCoO_2$ batteries via co-pyrolysis with cheap carbonaceous materials	Yiming Lai et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2022	China
ACS Sustainable Chem. Eng. **2022**, *10*(46), 15297−15304	Occupational Threat of Recycling Spent Lithium-Ion Batteries by Vacuum Reduction	Keyi Lin et al	Guangdong Provincial Key Laboratory of Environmental Pollution Control and Remediation Technology, School of Environmental Science and Engineering, Sun Yat-Sen University, Guangzhou, China	2022	China
Metals **2022**, *12*(4), 677	Recovery of Graphite and Cathode Active Materials from Spent Lithium-Ion Batteries by Applying Two Pretreatment Methods and Flotation Combined with a Rapid Analysis Technique	Hao Qiu et al	Institute of Mineral and Waste Processing, Waste Disposal and Geomechanics (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2022	Germany
Chemical Engineering Journal **2022**, *434*, 134542	Selective recycling of valuable metals from waste $LiCoO_2$ cathode material of spent lithium-ion batteries through low-temperature thermochemistry	Xiangping Chen et al	School of Environmental Science and Engineering, Shaanxi University of Science & Technology, Xi'an, China	2022	China
Metals **2021**, *11*(2), 177	Early-Stage Recovery of Lithium from Tailored Thermal Conditioned Black Mass Part I: Mobilizing Lithium via Supercritical CO_2-Carbonation	Lilian Schwich et al	IME, Institute for Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2021	Germany
Renewable Energy **2022**, *181*, 714–724	High temperature microwave dielectric and thermochemical properties of waste $Li_xMn_2O_4$ battery cathode materials reduced by moso bamboo	Shunda Lin et al	Key Laboratory of Unconventional Metallurgy, Ministry of Education, Faculty of Metallurgical and Energy Engineering, Kunming University of Science and Technology, Kunming, China	2021	China

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Reference	Title	Authors	Institution	Year	Country
Metals **2020**, *10*(8), 1069	A Combined Pyro- and Hydrometallurgical Approach to Recycle Pyrolyzed Lithium-Ion Battery Black Mass Part 1: Production of Lithium Concentrates in an Electric Arc Furnace	Marcus Sommerfeld et al	IME Process Metallurgy and Metal Recycling, Institute of RWTH University, Aachen, Germany	2020	Germany
Metals **2020**, *10*(12), 1633	Li-Distribution in Compounds of the Li_2O-MgO-Al_2O_3-SiO_2-CaO System—A First Survey	Thomas Schirmer et al	Department of Mineralogy, Geochemistry, Salt Deposits, Institute of Disposal Research, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2020	Germany
Journal of Hazardous Materials **2020**, *398*, 122955	Pyrolysis kinetics and reaction mechanism of the electrode materials during the spent $LiCoO_2$ batteries recovery process	Jun Lia et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2020	China
Minerals Engineering **2018**, *126*, 28–35	Separation of Li and Co from the active mass of spent Li-ion batteries by selective sulfating roasting with sodium bisulfate and water leaching	Dahui Wang et al	State Key Laboratory of Advance Processing and Recycling of Nonferrous Metals, Lanzhou University of Technology, Lanzhou, China	2018	China

Reference	Title	Authors	Institution	Year	Country
Environ Sci Pollut Res **2024**	Mechanical Methods for Materials Concentration of Lithium Iron Phosphate (LFP) Cells and Product Potential Evaluation for Recycling	Priscila Silva Silveira Camargo et al	Corrosion, Protection and Recycling of Materials Laboratory (LACOR), Department of Materials Engineering, School of Engineering, Federal University of Rio Grande do Sul, Brazil	2024	Brazil
Joule **2024**, *8*(10), 2735-2754	Phase-selective recovery and regeneration of end-of-life electric vehicle blended cathodes via selective leaching and direct recycling	Laura L. Driscoll et al	School of Chemistry, University of Birmingham, Birmingham, UK	2024	UK
Journal of Industrial and Engineering Chemistry **2024**, *139*, 111–124	Recent recycling methods for spent cathode materials from lithium-ion batteries: A review	Karmegam Dhanabalan et al	School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea	2024	Korea
Separation and Purification Technology **2024**, *348*, 127777	Review on the sustainable recycling of spent ternary lithium-ion batteries: From an eco-friendly and efficient perspective	Xiang-nan Zhu et al	College of Energy and Mining Engineering, Shandong University of Science and Technology, Shandong, China	2024	China
Minerals **2024**, *14*(11), 1155	Spent NCM Lithium-Ion Batteries: Potential Evaluation of Mechanical Pretreatment for Recycling	Priscila Silva Silveira Camargo et al	Laboratory of Corrosion, Protection and Materials Recycling (LACOR), Materials Engineering Department, School of Engineering, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Brazil	2024	Brazil
Journal of Energy Storage **2023**, *72*, 108486	A comprehensive review of full recycling and utilization of cathode and anode as well as electrolyte from spent lithium-ion batteries	Gongchu Shi et al	School of Material Science and Engineering, Beijing Institute of Technology, Beijing, China	2023	China
Science of the Total Environment **2024**, *924*, 171453	Can e-waste recycling provide a solution to the scarcity of rare earth metals? An overview of e-waste recycling methods	Sai Sree Varsha Vuppaladadiyam et al	Department of Chemical and Biological Engineering, Monash University, Australia	2023	Australia
Materials Today Energy **2023**, *37*, 101374	Direct recycling of degraded lithium-ion batteries of an electric vehicle using hydrothermal relithiation	Ka Ho Chan et al	Laboratory for Strategic Materials, Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, Canada	2023	Canada
Nature Communications **2023**, *14*, 584	Direct regeneration of degraded lithium-ion battery cathodes with a multifunctional organic lithium salt	Guanjun Ji et al	Tsinghua-Berkeley Shenzhen Institute & Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2023	China
Ceramics International **2023**, *49*, 9147–9154	Effective stripping and reutilization of $LiFePO_4$ cathode waste from retired lithium ion batteries	Yucai Zhang et al	School of Chemistry & Chemical Engineering, Xinjiang Key Laboratory of Energy Storage and Photoelectrocatalytic Materials, Xinjiang Normal University, Urumqi, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
Industrial Chemistry & Materials **2023**, *1*(2), 254-261	Large-scale direct regeneration of $LiFePO_4$@C based on spray drying	Yongxing Zou et al	Sauvage Laboratory for Smart Materials, Harbin Institute of Technology, Shenzhen, China	2023	China
Journal of Energy Storage **2023**, *73*, 109073	Recycling valuable materials from the cathodes of spent lithium-ion batteries: A comprehensive review	Sezgin Yasa et al	Yildiz Technical University, Faculty of Chemical and Metallurgical Engineering, Department of Metallurgy and Materials Engineering, Istanbul, Turkey	2023	Turkey
Journal of Industrial and Engineering Chemistry **2024**, *134*, 281–288	Research on the separation process of positive electrode active material and aluminum foil	Yuhui Zhao et al	School of Resources and Environmental Engineering, Jiangsu University of Technology, Changzhou, China	2023	China
Separation and Purification Technology **2023**, *315*, 123684	Review on comprehensive recycling of spent lithium-ion batteries: A full component utilization process for green and sustainable production	Si-qi Jiang et al	College of Chemical and Biological Engineering, Shandong University of Science and Technology, Shandong, China	2023	China
Journal of Hazardous Materials **2023**, *458*, 131959	Shearing-enhanced mechanical exfoliation with mild-temperature pretreatment for cathode active material recovery from spent LIBs	Chenyu Zhang et al	School of Chemical and Environmental Engineering, China University of Mining and Technology, Beijing, China	2023	China
Communications Chemistry **2023**, *6*, 49	Universal and efficient extraction of lithium for lithium-ion battery recycling using mechanochemistry	Oleksandr Dolotko et al	Karlsruhe Institute of Technology (KIT), Institute for Applied Materials-Energy Storage Systems (IAM-ESS), Karlsruhe, Germany	2023	Germany
Molecules **2023**, *28*(6), 2558	Upcycling of Acid-Leaching Solutions from Li-Ion Battery Waste Treatment through the Facile Synthesis of Magnetorheological Fluid	Magdalena Abramowicz et al	Faculty of Chemistry, University of Warsaw, Warsaw, Poland	2023	Poland
Science Advances **2022**, *8*, 40	A green and sustainable strategy toward lithium resources recycling from spent batteries	Jing Xu et al	Research Center of Grid Energy Storage and Battery Application, School of Electrical Engineering, Zhengzhou University, Zhengzhou, China	2022	China
J. Am. Chem. Soc. **2022**, *144*, 20306–20314	Adaptable Eutectic Salt for the Direct Recycling of Highly Degraded Layer Cathodes	Jun Ma et al	Tsinghua-Berkeley Shenzhen Institute and Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2022	China
Chemistry A European Journal **2022**, *28*, 22	Comprehensive Characterization of Shredded Lithium-Ion Battery Recycling Material	Christoph Peschel et al	University of Munster, MEET Battery Research Center, Munster, Germany	2022	Germany
Green Chemistry **2023**, *25*, 3503-3514	Direct reuse of aluminium and copper current collectors from spent lithium-ion batteries	Pengcheng Zhu et al	School of Chemistry, The University of Birmingham, Birmingham, UK	2022	UK

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Reference	Title	Authors	Institution	Year	Country
Chem **2022**, *8*(7), 1944-1955	Direct upcycling of mixed Ni-lean polycrystals to single-crystal Ni-rich cathode materials	Xiaotu Ma et al	Department of Mechanical Engineering, Worcester Polytechnic Institute, Worcester, USA	2022	USA
Carbon **2022**, *189*, 293e304	A new approach to regenerate high-performance graphite from spent lithium-ion batteries	Qinghao Chen et al	College of Materials Science and Engineering, Sichuan University, Chengdu, China	2021	China
Waste Management **2021**, *131*, 20–30	A novel pulsated pneumatic separation with variable-diameter structure and its application in the recycling spent lithium-ion batteries	Xueshuai Zhu et al	School of Chemical and Environmental Engineering, China University of Mining and Technology, Beijing, China	2021	China
Resources, Conservation & Recycling **2021**, *170*, 105551	Recovery of cathode materials from spent lithium-ion batteries using eutectic system of lithium compounds	Yi Ji et al	Environmental and Ecological Engineering, Purdue University, West Lafayette, USA	2021	USA
Sustainable Materials and Technologies **2020**, *25*, e00152	A direct recycling case study from a lithium-ion battery recall	Steve Sloop et al	OnTo Technology LLC, Bend, OR, USA	2020	USA
Journal of Hazardous Materials **2021**, *410*, 124610	A green, efficient, closed-loop direct regeneration technology for reconstructing of the $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ cathode material from spent lithium-ion batteries	Xiaoping Fan et al	Guangxi Key Laboratory of Low Carbon Energy Materials, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
Ceramics International **2018**, *44*, 351–357	Performance of $LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$ prepared from spent lithium-ion batteries by a carbonate co-precipitation method	Li-Po He et al	National Engineering Research Center for Integrated Utilization of Salt Lake Resource, East China University of Science and Technology, Shanghai, PR China	2018	China

Other Approaches

Reference	Title	Authors	Institution	Year	Country
Journal of CO_2 Utilization **2024**, *81*, 102703	Implementation of a sub-and supercritical carbon dioxide process for the selective recycling of the electrolyte from spent Li-ion battery	Nils Zachmann et al	Department of Chemistry and Chemical Engineering, Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Gothenburg, Sweden	2024	Sweden
ACS Sustainable Chem. Eng. **2024**, *12*(45), 16564−16576	Metal Extraction from Commercial Black Mass of Spent Lithium-Ion Batteries Using Food-Waste-Derived Lixiviants through a Biological Process	Joseph Jegan Roy et al	Energy Research Institute at Nanyang Technological University (ERI@N) and SCARCE Lab, Singapore	2024	Singapore
Journal of Analytical and Applied Pyrolysis **2024**, *179*, 106466	Sustainable method for disposing of ceramic-coated battery separator via carbon dioxide-assisted thermochemical process	Sangyoon Lee et al	Department of Earth Resource and Environmental Engineering, Hanyang University, Seoul, Republic of Korea	2024	Korea
Chemical Engineering Journal **2024**, *499*, 156114	Synergistic ternary deep eutectic solvents: An archetype for sustainable and eco-conscious Li and Co recovery from spent batteries	Hussein K. Amusa et al	Department of Chemical and Petroleum Engineering, Khalifa University, Abu Dhabi, United Arab Emirates	2024	UAE
Environ. Sci. Technol. **2024**, *58*(43), 19486−19500	Toward a Circular Lithium Economy with Electrodialysis: Upcycling Spent Battery Leachates with Selective and Bipolar Ion-Exchange Membranes | Environmental Science & Technology	Zi Hao Foo et al	Department of Mechanical Engineering, Massachusetts Institute of Technology, Massachusetts, USA	2024	USA
Journal of Industrial and Engineering Chemistry **2024**, *134*, 112−122	Design of a novel magnetic composite catalyst with highly efficient cobalt circulation for activating peroxymonosulfate to degrade tetracycline	Lei Wang et al	School of Materials Science and Engineering, Anhui University of Science and Technology, Huainan, China	2023	China
Energy Storage Materials **2023**, *63*, 103025	Efficient separation and coprecipitation for simplified cathode recycling	Lu Yu et al	Electrification and Energy Infrastructures Division, Oak Ridge National Laboratory, Oak Ridge, USA	2023	USA
Journal of Industrial and Engineering Chemistry **2023**, *118*, 351-361	Electrolyte recovery from spent Lithium-Ion batteries using a low temperature thermal treatment process	Nils Zachmann et al	Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Nuclear Chemistry and Industrial Material Recycling, Gothenburg, Sweden	2023	Sweden
ACS Omega **2023**, *8*(7), 6959−6967	Highly Efficient Recovery and Recycling of Cobalt from Spent Lithium-Ion Batteries Using an N-Methylurea−Acetamide Nonionic Deep Eutectic Solvent	Subramanian Suriyanarayanan et al	Bioorganic and Biophysical Chemistry Laboratory, Linnaeus Centre for Biomaterials Chemistry, Department of Chemistry and Biomedical Sciences, Linnaeus University, Kalmar, Sweden	2023	Sweden
Journal of Hazardous Materials **2023**, *457*, 131782	In-situ pyrolysis based on alkaline medium removes fluorine-containing contaminants from spent lithium-ion batteries	Hanlin Huang et al	Chemistry and Chemical Engineering Data Center, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2023	China

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Other Approaches

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2024**, *330*, 125498	Recyclable deep eutectic solvents for recycling $LiCoO_2$ from spent lithium-ion batteries with high selectivity	Yaozhi Zhang et al	State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing, China	2023	China
Waste Management **2023**, *156*, 247–254	A sustainable approach for selective recovery of lithium from cathode materials of spent lithium-ion batteries by induced phase transition	Fu Rao et al	School of Resources and Environmental Engineering, Shanghai Polytechnic University,Shanghai Collaborative Innovation Center for WEEE Recycling, Shanghai, China	2022	China
Resources, Conservation and Recycling **2022**, *186*, 106579	Recycling cathode material $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ by leaching with a deep eutectic solvent and metal recovery with antisolvent crystallization	Chunyan Ma et al	Department of Chemical Engineering, KTH Royal Institute of Technology, Stockholm, Sweden	2022	Sweden
Journal of Hazardous Materials **2021**, *405*, 124211	Recycling lithium cobalt oxide from its spent batteries: An electrochemical approach combining extraction and synthesis	Jianbo Wang et al	Key Laboratory of Solid Waste Treatment and Resource Recycle, Ministry of Education, School of Environment and Resource, Southwest University of Science and Technology, Sichuan, China	2021	China
Nature Communications **2021**, *12*, 6554	Selective cobalt and nickel electrodeposition for lithium-ion battery recycling through integrated electrolyte and interface control	Kwiyong Kim et al	Department of Chemical and Biomolecular Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA	2021	USA
Metals **2021**, *11*(2), 188	Speciation of Manganese in a Synthetic Recycling Slag Relevant for Lithium Recycling from Lithium-Ion Batteries	Alena Wittkowski et al	Institute of Inorganic and Analytical Chemistry, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2021	Germany
Science of the Total Environment **2021**, *759*, 143478	Sustainable recycling of $LiCoO_2$ cathode scrap on the basis of successive peroxymonosulfate activation and recovery of valuable metals	Hao Guo et al	Shanghai Key Laboratory of Materials Protection and Advanced Materials in Electric Power, Shanghai University of Electric Power, Shanghai, China	2021	China
ACS Applied Energy Materials **2020**, *3*(5), 4767-4776	Innovative Electrochemical Strategy to Recovery of Cathode and Efficient Lithium Leaching from Spent Lithium-Ion Batteries	Kui Liu et al	Guangxi Key Laboratory of Low Carbon Energy, Materials, Guangxi New Energy Ship Battery Engineering, Technology Research Center, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
Chemosphere **2020**, *254*, 126670	Ultrasound-assisted leaching of spent lithium ion batteries by natural organic acids and H_2O_2	M. Esmaeili et al	Department of Chemical Engineering, University of Kurdistan, Sanandaj, Iran	2020	Iran
Journal of Hazardous Materials **2019**, *375*, 43–51	A green process for exfoliating electrode materials and simultaneously extracting electrolyte from spent lithium-ion batteries	Kai He et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China	2019	China
Nature Energy **2019**, *4*, 339-345	Deep eutectic solvents for cathode recycling of Li-ion batteries	Mai K. Tran et al	Rice University, Houston, TX, USA	2019	USA

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2025**, *354*, 128929	A comprehensive overview of decommissioned lithium-ion battery recycling: Towards green and economical	Chenkai Dong et al	Shandong Key Laboratory of Environmental Processes and Health, School of Environmental Science and Engineering, Shandong University, Qingdao, China	2025	China
Journal of Alloys and Compounds **2024**, *993*, 174691	A facile approach for regeneration of graphite anodes from spent lithium-ion battery	Rongchang Li et al	Institute of New Carbon Materials, College of Materials Science and Engineering, Taiyuan University of Technology, Taiyuan, China	2024	China
Separation and Purification Technology **2025**, *354*, 129035	A process for preferential recovery of lithium and manganese from spent NCM by vacuum carbothermal reduction method	Jun Li et al	Key Laboratory for Nonferrous Vacuum Metallurgy of Yunnan Province, Kunming University of Science and Technology, Kunming, China	2024	China
Separation and Purification Technology **2024**, *348*, 127771	Eco-friendly closed-loop recycling of nickel, cobalt, manganese, and lithium from spent ternary lithium-ion battery cathodes	Gong Siyu et al	Faculty of Metallurgy and Energy Engineering, Kunming University of Science and Technology, Kunming, Yunnan, China	2024	China
Journal of Cleaner Production **2024**, *480*, 144128	Efficient leaching of valuable metals from spent lithium-ion batteries using green deep eutectic solvents: Process optimization, mechanistic analysis, and environmental impact assessment	Songming Zheng et al	College of Material Science and Engineering, Chongqing University, Chongqing, China	2024	China
Separation and Purification Technology **2025**, *354*, 128808	Green recycling of spent $LiCoO_2$ cathodes using a water-based deep eutectic solvent	Xi Wu et al	Key Laboratory of Materials Physics, Centre for Environmental and Energy Nanomaterials, Anhui Key Laboratory of Nanomaterials and Nanotechnology, Institute of Solid State Physics, Hefei Institutes of Physical Science, Chinese Academy of Sciences, Hefei, China	2024	China
Environ. Sci. Technol. **2024**, *58*(48), 21362–21373	Mechanisms of Thermal Decomposition in Spent NCM Lithium-Ion Battery Cathode Materials with Carbon Defects and Oxygen Vacancies	Kang Liu et al	Department of Civil and Environmental Engineering, The Hong Kong University of Science and Technology, Hong Kong, China	2024	China
Separation and Purification Technology **2024**, *345*, 127415	Novel targeted extraction of lithium: An environment-friendly controlled sulfidation roasting technology and mechanism for recovering spent lithium-ion batteries	Wencan Quan et al	School of Metallurgy Engineering, Jiangxi University of Science and Technology, Ganzhou, China	2024	China
Results in Engineering **2024**, *23*, 102802	Optimization of high-temperature thermal pretreatment conditions for maximum enrichment of lithium and cobalt from spent lithium-ion polymer batteries	Lizhen Gao et al	College of Environmental Science and Engineering, Taiyuan University of Technology, Shanxi-Province, China	2024	China

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Reference	Title	Authors	Institution	Year	Country
Chemical Engineering Journal **2024**, *500*, 157219	Precise regulation of layered-to-rock structure of spent Li-ion cathodes achieving ultrahigh lithium recovery rate	Xue Bai et al	State Key Laboratory of Chemical Resource Engineering, College of Chemistry, Beijing University of Chemical Technology, Beijing, China	2024	China
Separation and Purification Technology **2024**, *348*, 127777	Review on the sustainable recycling of spent ternary lithium-ion batteries: From an eco-friendly and efficient perspective	Xiang-nan Zhu et al	College of Energy and Mining Engineering, Shandong University of Science and Technology, Shandong, China	2024	China
Journal of Environmental Chemical Engineering **2024**, *12*, 114346	Selective lithium recovery from waste lithium-ion batteries by H_2SO_4 roasting focused on process intensification and conversion mechanism	Haoyuan Deng et al	State Key Laboratory of Pollution Control and Resources Reuse, Shanghai, China	2024	China
Chemical Engineering Journal **2024**, *481*, 148516	Sustainable recycling of spent ternary lithium-ion batteries via an environmentally friendly process: Selective recovery of lithium and non-hazardous upcycling of residue	Jianxing Liang et al	School of Environmental Science and Engineering, Shanghai Jiao Tong University, Shanghai, China	2024	China
Journal of Cleaner Production **2024**, 438, 140798	Sustainable regeneration of high-performance cathode materials from spent lithium-ion batteries through magnetic separation and coprecipitation	Wei Ding et al	School of Resources and Environmental Engineering, Wuhan University of Technology, Wuhan, China	2024	China
Waste Management **2024**, *183*, 209–219	Sustainable reprocessing of lithium iron phosphate batteries: A recovery approach using liquid-phase method at reduced temperature	Tingyan Ren et al	South China Institute of Environmental Sciences, Ministry of Ecology and Environment of China, Guangzhou, China	2024	China
Journal of Energy Storage **2023**, *72*, 108486	A comprehensive review of full recycling and utilization of cathode and anode as well as electrolyte from spent lithium-ion batteries	Gongchu Shi et al	School of Material Science and Engineering, Beijing Institute of Technology, Beijing, China	2023	China
Nature Energy **2023**, *8*, 1137–1144	A contact-electro-catalytic cathode recycling method for spent lithium-ion batteries	Huifan Li et al	CAS Center for Excellence in Nanoscience, Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, Beijing, China	2023	China
Waste Management **2023**, *165*, 189–198	Acid-free extraction of valuable metal elements from spent lithium-ion batteries using waste copperas	Xi Jin et al	College of Materials Science and Engineering, Chongqing University, Chongqing, China	2023	China
Journal of Environmental Chemical Engineering **2023**, *11*, 110979	Comparative of malonic acid aqueous solution and malonic acid-based deep eutectic solvent for $LiCoO_2$ cathode materials recovery: Leaching efficiency and mechanism	Yunpeng Wen et al	School of Metallurgical Engineering, Xi'an University of Architecture and Technology, Xi'an, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
Waste Management **2024**, *187*, 1–10	Conversion and fate of waste Li-ion battery electrolyte in a two-stage thermal treatment process	Li-Jun Wu et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2023	China
Journal of Industrial and Engineering Chemistry **2024**, *134*, 112–122	Design of a novel magnetic composite catalyst with highly efficient cobalt circulation for activating peroxymonosulfate to degrade tetracycline	Lei Wang et al	School of Materials Science and Engineering, Anhui University of Science and Technology, Huainan, China	2023	China
Nature Communications **2023**, *14*, 584	Direct regeneration of degraded lithium-ion battery cathodes with a multifunctional organic lithium salt	Guanjun Ji et al	Tsinghua-Berkeley Shenzhen Institute & Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2023	China
Ceramics International **2023**, *49*, 9147–9154	Effective stripping and reutilization of $LiFePO_4$ cathode waste from retired lithium ion batteries	Yucai Zhang et al	School of Chemistry & Chemical Engineering, Xinjiang Key Laboratory of Energy Storage and Photoelectrocatalytic Materials, Xinjiang Normal University, Urumqi, China	2023	China
Chemical Engineering Journal **2023**, *467*, 143441	Green recovery of Li, Ni, and Mn from spent $xLi_2MnO_3 \cdot (1-x)LiMO_2$ cathode materials: Experimental study and mechanism analysis	Yifan Wang et al	Institute of Circular Economy, Beijing University of Technology, Beijing, China	2023	China
Journal of Hazardous Materials **2023**, *457*, 131782	In-situ pyrolysis based on alkaline medium removes fluorine-containing contaminants from spent lithium-ion batteries	Hanlin Huang et al	Chemistry and Chemical Engineering Data Center, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2023	China
Industrial Chemistry & Materials **2023**, *1*(2), 254-261	Large-scale direct regeneration of $LiFePO_4$@C based on spray drying	Yongxing Zou et al	Sauvage Laboratory for Smart Materials, Harbin Institute of Technology, Shenzhen, China	2023	China
Journal of Environmental Chemical Engineering **2023**, *11*, 109759	Microwave low-temperature treatment – Step leaching process for recovering black mass from spent lithium-ion batteries	Chao Liu et al	School of Water Resources and Environmental Engineering, East China University of Technology, Nanchang, Jiangxi, China	2023	China
Journal of Cleaner Production **2023**, *431*, 139645	Novel approach to recycling of valuable metals from spent lithium-ion batteries using hydrometallurgy, focused on preferential extraction of lithium	Jialin Qing et al	School of Metallurgy and Environment, Central South University, Changsha, China	2023	China
Resources, Conservation & Recycling **2023**, *190*, 106782	Oriented conversion of spent $LiCoO_2$-lithium battery cathode materials to high-value products via thermochemical reduction with common ammonium oxalate	Chunli Liu et al	National-Local Joint Engineering Research Center of Heavy Metals Pollutants Control and Resource Utilization, School of Environmental and Chemical Engineering, Nanchang Hangkong University, Jiangxi, China	2023	China

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Reference	Title	Authors	Institution	Year	Country
New Carbon Materials **2023**, *38*(5), 787-803	Recent developments and the future of the recycling of spent graphite for energy storage applications	Ji-Rui Wang et al	School of Materials Science and Engineering, Hefei University of Technology, Hefei, China	2023	China
Chemical Engineering Journal **2023**, *476*, 146733	Recent progress on sustainable recycling of spent lithium-ion battery: Efficient and closed-loop regeneration strategies for high-capacity layered NCM cathode materials	Liuyang Yu et al	State Key Laboratory of Chemical Engineering, School of Chemical Engineering and Technology, Tianjin University, Tianjin, China	2023	China
Chemical Engineering Journal **2024**, *481*, 148564	Recovery and reuse of spent lithium-ion batteries as catalysts for low-temperature NH_3-SCR	Na Wu et al	Key Laboratory of Special Functional Materials for Ecological Environment and Information, Hebei University of Technology, Tianjin, China	2023	China
Separation and Purification Technology **2024**, *330*, 125498	Recyclable deep eutectic solvents for recycling $LiCoO_2$ from spent lithium-ion batteries with high selectivity	Yaozhi Zhang et al	State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing, China	2023	China
Journal of Industrial and Engineering Chemistry **2024**, *134*, 281–288	Research on the separation process of positive electrode active material and aluminum foil	Yuhui Zhao et al	School of Resources and Environmental Engineering, Jiangsu University of Technology, Changzhou, China	2023	China
Separation and Purification Technology **2023**, *315*, 123684	Review on comprehensive recycling of spent lithium-ion batteries: A full component utilization process for green and sustainable production	Si-qi Jiang et al	College of Chemical and Biological Engineering, Shandong University of Science and Technology, Shandong, China	2023	China
Separation and Purification Technology **2023**, *306*, 122559	Separation and recovery of nickel cobalt manganese lithium from waste ternary lithium-ion batteries	Chunyan Li et al	Key Laboratory of Coal Processing and Efficient Utilization of Ministry of Education, School of Chemical Engineering and Technology, China University of Mining and Technology, Xuzhou, China	2023	China
Journal of Hazardous Materials **2023**, *458*, 131959	Shearing-enhanced mechanical exfoliation with mild-temperature pretreatment for cathode active material recovery from spent LIBs	Chenyu Zhang et al	School of Chemical and Environmental Engineering, China University of Mining and Technology, Beijing, China	2023	China
Science Advances **2022**, *8*, 40	A green and sustainable strategy toward lithium resources recycling from spent batteries	Jing Xu et al	Research Center of Grid Energy Storage and Battery Application, School of Electrical Engineering, Zhengzhou University, Zhengzhou, China	2022	China
Journal of Environmental Chemical Engineering **2022**, *10*, 108627	A novel ternary deep eutectic solvent for efficient recovery of critical metals from spent lithium-ion batteries under mild conditions	Yanshun Liao et al	School of Materials Science and Engineering, Beijing Institute of Technology, Beijing, China	2022	China

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Reference	Title	Authors	Institution	Year	Country
Waste Management **2023**, *156*, 247–254	A sustainable approach for selective recovery of lithium from cathode materials of spent lithium-ion batteries by induced phase transition	Fu Rao et al	School of Resources and Environmental Engineering, Shanghai Polytechnic University,Shanghai Collaborative Innovation Center for WEEE Recycling, Shanghai, China	2022	China
J. Am. Chem. Soc. **2022**, *144*, 20306−20314	Adaptable Eutectic Salt for the Direct Recycling of Highly Degraded Layer Cathodes	Jun Ma et al	Tsinghua-Berkeley Shenzhen Institute and Tsinghua Shenzhen International Graduate School, Tsinghua University, Shenzhen, China	2022	China
Waste Management **2022**, *148*, 12–21	Efficient recovery of valuable metals from cathode materials of spent $LiCoO_2$ batteries via co-pyrolysis with cheap carbonaceous materials	Yiming Lai et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2022	China
ACS Sustainable Chem. Eng. **2022**, *10*(46), 15297−15304	Occupational Threat of Recycling Spent Lithium-Ion Batteries by Vacuum Reduction	Keyi Lin et al	Guangdong Provincial Key Laboratory of Environmental Pollution Control and Remediation Technology, School of Environmental Science and Engineering, Sun Yat-Sen University, Guangzhou, China	2022	China
Chemical Engineering Journal **2022**, *434*, 134542	Selective recycling of valuable metals from waste $LiCoO_2$ cathode material of spent lithium-ion batteries through low-temperature thermochemistry	Xiangping Chen et al	School of Environmental Science and Engineering, Shaanxi University of Science & Technology, Xi'an, China	2022	China
Carbon **2022**, *189*, 293e304	A new approach to regenerate high-performance graphite from spent lithium-ion batteries	Qinghao Chen et al	College of Materials Science and Engineering, Sichuan University, Chengdu, China	2021	China
Waste Management **2021**, *131*, 20–30	A novel pulsated pneumatic separation with variable-diameter structure and its application in the recycling spent lithium-ion batteries	Xueshuai Zhu et al	School of Chemical and Environmental Engineering, China University of Mining and Technology, Beijing, China	2021	China
Renewable Energy **2022**, *181*, 714–724	High temperature microwave dielectric and thermochemical properties of waste $Li_xMn_2O_4$ battery cathode materials reduced by moso bamboo	Shunda Lin et al	Key Laboratory of Unconventional Metallurgy, Ministry of Education, Faculty of Metallurgical and Energy Engineering, Kunming University of Science and Technology, Kunming, China	2021	China
Resources, Conservation & Recycling **2022**, *176*, 105921	Recovery of spent $LiCoO_2$ lithium-ion battery via environmentally friendly pyrolysis and hydrometallurgical leaching	Ren Tao et al	CAS Key Laboratory of Green Process and Engineering, National Engineering Laboratory for Hydrometallurgical Cleaner Production Technology, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2021	China
Journal of Hazardous Materials **2021**, *405*, 124211	Recycling lithium cobalt oxide from its spent batteries: An electrochemical approach combining extraction and synthesis	Jianbo Wang et al	Key Laboratory of Solid Waste Treatment and Resource Recycle, Ministry of Education, School of Environment and Resource, Southwest University of Science and Technology, Sichuan, China	2021	China

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Reference	Title	Authors	Institution	Year	Country
Science of the Total Environment **2021**, *759*, 143478	Sustainable recycling of $LiCoO_2$ cathode scrap on the basis of successive peroxymonosulfate activation and recovery of valuable metals	Hao Guo et al	Shanghai Key Laboratory of Materials Protection and Advanced Materials in Electric Power, Shanghai University of Electric Power, Shanghai, China	2021	China
Journal of Hazardous Materials **2021**, *410*, 124610	A green, efficient, closed-loop direct regeneration technology for reconstructing of the $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ cathode material from spent lithium-ion batteries	Xiaoping Fan et al	Guangxi Key Laboratory of Low Carbon Energy Materials, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
ACS Applied Energy Materials **2020**, *3*(5), 4767-4776	Innovative Electrochemical Strategy to Recovery of Cathode and Efficient Lithium Leaching from Spent Lithium-Ion Batteries	Kui Liu et al	Guangxi Key Laboratory of Low Carbon Energy, Materials, Guangxi New Energy Ship Battery Engineering, Technology Research Center, School of Chemical and Pharmaceutical Science, Guangxi Normal University, Guilin, China	2020	China
Journal of Hazardous Materials **2020**, *398*, 122955	Pyrolysis kinetics and reaction mechanism of the electrode materials during the spent $LiCoO_2$ batteries recovery process	Jun Lia et al	Key Laboratory of Low-grade Energy Utilization Technologies and Systems, Chongqing University, Chongqing, China	2020	China
Journal of Hazardous Materials **2019**, *375*, 43–51	A green process for exfoliating electrode materials and simultaneously extracting electrolyte from spent lithium-ion batteries	Kai He et al	Department of Solid Waste Treatment and Recycling, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China	2019	China
Separation and Purification Technology **2019**, *215*, 398–402	A more simple and efficient process for recovery of cobalt and lithium from spent lithium-ion batteries with citric acid	Min Yu et al	School of Chemistry and Chemical Engineering, Wuhan University of Science and Technology, Wuhan, China	2019	China
Journal of Power Sources **2019**, *440*, 227140	The strategy of entire recovery: From spent cathode material with high nickel content to new $LiNi_{0.5}Co_{0.2}Mn_{0.3}O_2$ and Li_2CO_3 powders	Shiting Yan et al	College of Chemistry and Molecular Sciences, Wuhan University, Wuhan, China	2019	China
Waste Management **2018**, *79*, 545–553	A sustainable process for metal recycling from spent lithium-ion batteries using ammonium chloride	Weiguang Lv et al	Beijing Engineering Research Center of Process Pollution Control, Division of Environment Technology and Engineering, Institute of Process Engineering, Chinese Academy of Sciences, Beijing, China	2018	China
Ceramics International **2018**, *44*, 351–357	Performance of $LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$ prepared from spent lithium-ion batteries by a carbonate co-precipitation method	Li-Po He et al	National Engineering Research Center for Integrated Utilization of Salt Lake Resource, East China University of Science and Technology, Shanghai, PR China	2018	China
Minerals Engineering **2018**, *126*, 28–35	Separation of Li and Co from the active mass of spent Li-ion batteries by selective sulfating roasting with sodium bisulfate and water leaching	Dahui Wang et al	State Key Laboratory of Advance Processing and Recycling of Nonferrous Metals, Lanzhou University of Technology, Lanzhou, China	2018	China

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Reference	Title	Authors	Institution	Year	Country
Waste Management **2016**, *51*, 239–244	An environmental benign process for cobalt and lithium recovery from spent lithium-ion batteries by mechanochemical approach	Meng-Meng Wang et al	Research Center for Eco-environmental Sciences, Chinese Academy of Sciences, Beijing, China	2016	China
Journal of Power Sources **2015**, *282*, 544e551	Succinic acid-based leaching system: A sustainable process for recovery of valuable metals from spent Li-ion batteries	Li Li et al	School of Chemical Engineering and the Environment, Beijing Key Laboratory of Environmental Science and Engineering, Beijing Institute of Technology,Beijing, China	2015	China
Separation and Purification Technology **2015**, *144*, 197–205	Separation and recovery of metal values from leaching liquor of mixed-type of spent lithium-ion batteries	Xiangping Chen et al	Key Laboratory of Resources Chemistry of Nonferrous Metals, College of Chemistry and Chemical Engineering, Central South University, Changsha, China	2014	China

Reference	Title	Authors	Institution	Year	Country
Minerals Engineering **2024**, *215*, 108828	Investigating battery black mass leaching performance as a function of process parameters by combining leaching experiments and regression modeling	Jere Partinen et al	Aalto University, School of Chemical Engineering, Department of Chemical and Metallurgical Engineering, Aalto, Finland	2024	Finland
Scientific Reports **2024**, *14*, 10818	Leaching of NMC industrial black mass in the presence of LFP	Yuanmin Zou et al	Department of Chemical and Metallurgical Engineering, School of Chemical Engineering, Aalto University, Aalto, Finland	2024	Finland
ChemElectroChem **2023**, *10*(17), e202300265	Co-precipitation of NCM 811 Using Recycled and Purified Manganese: Effect of Impurities on the Battery Cell Performance	Toni Kauppinen et al	University of Oulu, Research unit of Sustainable chemistry, Oulu, Finland	2023	Finland
Metals **2024**, *14*(1), 80	Co-Precipitation of Metal Oxalates from Organic Leach Solution Derived from Spent Lithium-Ion Batteries (LIBs)	Dominik Schmitz et al	IME Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2024	Germany
Minerals Engineering **2024**, *217*, 108918	Valorization of lithium containing slags from pyrometallurgical recycling route of spent lithium-ion batteries: The enrichment of γ-$LiAlO_2$ phase from thermodynamic controlled and modified slags	Hao Qiu et al	Institute of Mineral and Waste Processing, Recycling and Circular Economy Systems (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2024	Germany
Metals **2023**, *13*(5), 834	Acid Leaching of Al- and Ta-Substituted $Li_7La_3Zr_2O_{12}$ (LLZO) Solid Electrolyte	Kristin Schneider et al	Institute of Mineral and Waster Processing, Recycling and Circular Economy Systems, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2023	Germany
Communications Chemistry **2023**, *6*, 49	Universal and efficient extraction of lithium for lithium-ion battery recycling using mechanochemistry	Oleksandr Dolotko et al	Karlsruhe Institute of Technology (KIT), Institute for Applied Materials-Energy Storage Systems (IAM-ESS), Karlsruhe, Germany	2023	Germany
Chemistry A European Journal **2022**, *28*, 22	Comprehensive Characterization of Shredded Lithium-Ion Battery Recycling Material	Christoph Peschel et al	University of Munster, MEET Battery Research Center, Munster, Germany	2022	Germany
Metals **2022**, *12*(4), 677	Recovery of Graphite and Cathode Active Materials from Spent Lithium-Ion Batteries by Applying Two Pretreatment Methods and Flotation Combined with a Rapid Analysis Technique	Hao Qiu et al	Institute of Mineral and Waste Processing, Waste Disposal and Geomechanics (IFAD), Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2022	Germany
Metals **2021**, *11*(2), 177	Early-Stage Recovery of Lithium from Tailored Thermal Conditioned Black Mass Part I: Mobilizing Lithium via Supercritical CO_2-Carbonation	Lilian Schwich et al	IME, Institute for Process Metallurgy and Metal Recycling, RWTH Aachen University, Aachen, Germany	2021	Germany
Metals **2021**, *11*(2), 188	Speciation of Manganese in a Synthetic Recycling Slag Relevant for Lithium Recycling from Lithium-Ion Batteries	Alena Wittkowski et al	Institute of Inorganic and Analytical Chemistry, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2021	Germany

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Reference	Title	Authors	Institution	Year	Country
Metals **2020**, *10*(8), 1069	A Combined Pyro- and Hydrometallurgical Approach to Recycle Pyrolyzed Lithium-Ion Battery Black Mass Part 1: Production of Lithium Concentrates in an Electric Arc Furnace	Marcus Sommerfeld et al	IME Process Metallurgy and Metal Recycling, Institute of RWTH University, Aachen, Germany	2020	Germany
Metals **2020**, *10*(12), 1633	Li-Distribution in Compounds of the Li_2O-MgO-Al_2O_3-SiO_2-CaO System—A First Survey	Thomas Schirmer et al	Department of Mineralogy, Geochemistry, Salt Deposits, Institute of Disposal Research, Clausthal University of Technology, Clausthal-Zellerfeld, Germany	2020	Germany
Energies **2025**, *18*(2), 398	Optimizing Acidic Reductive Leaching for Lithium Recovery: Enhancing Sustainable Lithium Supply for Energy Markets	Agnieszka Sobianowska-Turek et al	Department of Water and Wastewater Management and Waste Technology, Faculty of Environmental Engineering, Wrocław University of Technology, Poland	2025	Poland
Molecules **2023**, *28*(6), 2558	Upcycling of Acid-Leaching Solutions from Li-Ion Battery Waste Treatment through the Facile Synthesis of Magnetorheological Fluid	Magdalena Abramowicz et al	Faculty of Chemistry, University of Warsaw, Warsaw, Poland	2023	Poland
Energies **2020**, *13*(24), 6732	Investigation of the Physico-Chemical Properties of the Products Obtained after Mixed Organic-Inorganic Leaching of Spent Li-Ion Batteries	Weronika Urbanska et al	Department of Environmental Engineering, Wrocław University of Science and Technology, Wrocław, Poland	2020	Poland
Minerals **2020**, *10*(6), 555	Recovery of Co, Li, and Ni from Spent Li-Ion Batteries by the Inorganic and/or Organic Reducer Assisted Leaching Method	Weronika Urbanska et al	Department of Environmental Engineering, Wrocław University of Science and Technology, Wrocław, Poland	2020	Poland
Recycling **2023**, *8*(5), 79	Recovery of Graphite from Spent Lithium-Ion Batteries	Charlotte Badenhorst et al	Institute of Earth Sciences—Porto, Department of Geosciences, Environment and Land Use Planning, Faculty of Sciences, University of Porto, Porto, Portugal	2023	Portugal
Separation and Purification Technology **2024**, *348*, 127707	Sustainable recovery of cobalt and lithium from lithium-ion battery cathode material by combining sulfate leachates and aqueous biphasic systems based on tetrabutylphosphonium-ionic liquids	Jasmina Musovic et al	Laboratory of Physical Chemistry, Vinca Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia	2024	Serbia
Journal of CO_2 Utilization **2024**, *81*, 102703	Implementation of a sub-and supercritical carbon dioxide process for the selective recycling of the electrolyte from spent Li-ion battery	Nils Zachmann et al	Department of Chemistry and Chemical Engineering, Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Gothenburg, Sweden	2024	Sweden
Journal of Industrial and Engineering Chemistry **2023**, *118*, 351-361	Electrolyte recovery from spent Lithium-Ion batteries using a low temperature thermal treatment process	Nils Zachmann et al	Chalmers University of Technology, Department of Chemistry and Chemical Engineering, Nuclear Chemistry and Industrial Material Recycling, Gothenburg, Sweden	2023	Sweden

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Reference	Title	Authors	Institution	Year	Country
ACS Omega **2023**, *8*(7), 6959–6967	Highly Efficient Recovery and Recycling of Cobalt from Spent Lithium-Ion Batteries Using an N-Methylurea–Acetamide Nonionic Deep Eutectic Solvent	Subramanian Suriyanarayanan et al	Bioorganic and Biophysical Chemistry Laboratory, Linnaeus Centre for Biomaterials Chemistry, Department of Chemistry and Biomedical Sciences, Linnaeus University, Kalmar, Sweden	2023	Sweden
Resources, Conservation and Recycling **2022**, *186*, 106579	Recycling cathode material $LiCo_{1/3}Ni_{1/3}Mn_{1/3}O_2$ by leaching with a deep eutectic solvent and metal recovery with antisolvent crystallization	Chunyan Ma et al	Department of Chemical Engineering, KTH Royal Institute of Technology, Stockholm, Sweden	2022	Sweden
Joule **2024**, *8*(10), 2735-2754	Phase-selective recovery and regeneration of end-of-life electric vehicle blended cathodes via selective leaching and direct recycling	Laura L. Driscoll et al	School of Chemistry, University of Birmingham, Birmingham, UK	2024	UK
Metals **2023**, *13*(7), 1276	Acid-Assisted Separation of Cathodic Material from Spent Electric Vehicle Batteries for Recycling	Anton Zorin et al	School of Metallurgy and Materials, University of Birmingham, Birmingham, UK	2023	UK
Journal of Materials Chemistry A **2024**, *12*, 7321-7328	High-power recycling: upcycling to the next generation of high-power anodes for Li-ion battery applications	A. J. Green et al	School of Chemistry, University of Birmingham, Birmingham, UK	2023	UK
Green Chemistry **2023**, *25*, 3503-3514	Direct reuse of aluminium and copper current collectors from spent lithium-ion batteries	Pengcheng Zhu et al	School of Chemistry, The University of Birmingham, Birmingham, UK	2022	UK
Resources, Conservation and Recycling **2023**, *192*, 106937	Priority Lithium recovery from spent Li-ion batteries via carbothermal reduction with water leaching	Zhiming Yan et al	WMG, University of Warwick, Coventry, UK	2023	UK

Reference	Title	Authors	Institution	Year	Country
Chemosphere **2020**, *254*, 126670	Ultrasound-assisted leaching of spent lithium ion batteries by natural organic acids and H_2O_2	M. Esmaeili et al	Department of Chemical Engineering, University of Kurdistan, Sanandaj, Iran	2020	Iran
Environmental Advances **2024**, *17*, 100570	On the effect of cavitation on particles in leaching processes: implications to battery recycling	Chiara Canciani et al	CCRC, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia	2024	Saudi Arabia
Journal of Energy Storage **2023**, *73*, 109073	Recycling valuable materials from the cathodes of spent lithium-ion batteries: A comprehensive review	Sezgin Yasa et al	Yildiz Technical University, Faculty of Chemical and Metallurgical Engineering, Department of Metallurgy and Materials Engineering, Istanbul, Turkey	2023	Turkey
Chemical Engineering Journal **2024**, *499*, 156114	Synergistic ternary deep eutectic solvents: An archetype for sustainable and eco-conscious Li and Co recovery from spent batteries	Hussein K. Amusa et al	Department of Chemical and Petroleum Engineering, Khalifa University, Abu Dhabi, United Arab Emirates	2024	UAE

Reference	Title	Authors	Institution	Year	Country
Hydrometallurgy **2024**, *230*, 106362	A zero-liquid discharge process to recover all critical metals from spent NCM111 cathode material of end-of-life lithium-ion batteries: statistically optimized leaching with formic acid and in-situ crystallization	Alexandru Sonoc et al	Mechanical and Materials Engineering Department, Queen's University, Ontario, Canada	2024	Canada
Materials Today Energy **2023**, *37*, 101374	Direct recycling of degraded lithium-ion batteries of an electric vehicle using hydrothermal relithiation	Ka Ho Chan et al	Laboratory for Strategic Materials, Department of Chemical Engineering and Applied Chemistry, University of Toronto, Toronto, Canada	2023	Canada
Waste Management Bulletin **2024**, *2*, 275–288	Investigation of hydrohalic acids as lixiviants for the leaching of cathode metals from spent lithium-ion batteries	Prichard M. Tembo et al	Department of Chemical and Materials Engineering, University of Nevada-Reno, Nevada, USA	2024	USA
Environ. Sci. Technol. **2024**, *58*(43), 19486−19500	Toward a Circular Lithium Economy with Electrodialysis: Upcycling Spent Battery Leachates with Selective and Bipolar Ion-Exchange Membranes | Environmental Science & Technology	Zi Hao Foo et al	Department of Mechanical Engineering, Massachusetts Institute of Technology, Massachusetts, USA	2024	USA
Science Advances **2023**, *9*, 39	Battery metal recycling by flash Joule heating	Weiyin Chen et al	Department of Chemistry, Rice University, Houston, TX, USA	2023	USA
Energy Storage Materials **2023**, *63*, 103025	Efficient separation and coprecipitation for simplified cathode recycling	Lu Yu et al	Electrification and Energy Infrastructures Division, Oak Ridge National Laboratory, Oak Ridge, USA	2023	USA
Batteries **2023**, *9*(11), 549	Sequential Recovery of Critical Metals from Leached Liquor of Processed Spent Lithium-Ion Batteries	Ayorinde Emmanuel Ajiboye et al	Applied Materials Division, Argonne National Laboratory, Chicago, IL, USA	2023	USA
Chem **2022**, *8*(7), 1944-1955	Direct upcycling of mixed Ni-lean polycrystals to single-crystal Ni-rich cathode materials	Xiaotu Ma et al	Department of Mechanical Engineering, Worcester Polytechnic Institute, Worcester, USA	2022	USA
Hydrometallurgy **2021**, *203*, 105694	Lithium and cobalt recovery for lithium-ion battery recycle using an improved oxalate process with hydrogen peroxide	Ankit Verma et al	Institute for Sustainable Engineering, University of Kansas, Lawrence, USA	2021	USA
Resources, Conservation & Recycling **2021**, *170*, 105551	Recovery of cathode materials from spent lithium-ion batteries using eutectic system of lithium compounds	Yi Ji et al	Environmental and Ecological Engineering, Purdue University, West Lafayette, USA	2021	USA
Nature Communications **2021**, *12*, 6554	Selective cobalt and nickel electrodeposition for lithium-ion battery recycling through integrated electrolyte and interface control	Kwiyong Kim et al	Department of Chemical and Biomolecular Engineering, University of Illinois at Urbana-Champaign, Urbana, IL, USA	2021	USA

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Reference	Title	Authors	Institution	Year	Country
Sustainable Materials and Technologies **2020**, *25*, e00152	A direct recycling case study from a lithium-ion battery recall	Steve Sloop et al	OnTo Technology LLC, Bend, OR, USA	2020	USA
Nature Energy **2019**, *4*, 339-345	Deep eutectic solvents for cathode recycling of Li-ion batteries	Mai K. Tran et al	Rice University, Houston, TX, USA	2019	USA

Reference	Title	Authors	Institution	Year	Country
Minerals **2024**, *14*(9), 878	Characterization of Lithium-Ion Batteries from Recycling Perspective towards Circular Economy	Lucas Fonseca Guimaraes et al	Department of Chemical Engineering, Polytechnic School, University of Sao Paulo, Sao Paulo, Brazil	2024	Brazil
Environ Sci Pollut Res **2024**	Mechanical Methods for Materials Concentration of Lithium Iron Phosphate (LFP) Cells and Product Potential Evaluation for Recycling	Priscila Silva Silveira Camargo et al	Corrosion, Protection and Recycling of Materials Laboratory (LACOR), Department of Materials Engineering, School of Engineering, Federal University of Rio Grande do Sul, Brazil	2024	Brazil
Minerals **2024**, *14*(11), 1155	Spent NCM Lithium-Ion Batteries: Potential Evaluation of Mechanical Pretreatment for Recycling	Priscila Silva Silveira Camargo et al	Laboratory of Corrosion, Protection and Materials Recycling (LACOR), Materials Engineering Department, School of Engineering, Federal University of Rio Grande do Sul (UFRGS), Porto Alegre, Brazil	2024	Brazil
Minerals **2023**, *13*(6), 798	Development of a More Sustainable Hybrid Process for Lithium and Cobalt Recovery from Lithium-Ion Batteries	José Cristiano Mengue Model et al	Metallurgy and Materials Engineering, Laboratory of Corrosion, Protection and Materials Recycling, Federal University of Rio Grande do Sul, Porto Alegre, Brazil	2023	Brazil
Resources, Conservation & Recycling **2021**, *175*, 105863	A technology for recycling lithium-ion batteries promoting the circular economy: The RecycLib	M.P. dos Santos et al	Center for Advanced and Sustainable Technologies (CAST), Sao Paulo State University (UNESP), Brazil	2021	Brazil
Journal of Environmental Chemical Engineering **2021**, *9*, 104689	Recycling of graphite and metals from spent Li-ion batteries aiming the production of graphene/CoO-based electrochemical sensors	Jessielem S. Ribeiro et al	Laboratory of Carbon and Ceramic Materials, Department of Physics, Federal University of Espirito Santo (UFES), Vitoria, Brazil	2021	Brazil

Reference	Title	Authors	Institution	Year	Country
Separation and Purification Technology **2024**, *335*, 126181	Multicomponent solvent extraction modelling of lithium, cobalt, nickel, and manganese from simulated black mass leachate	Junnan Lu et al	Department of Chemical Engineering, The University of Melbourne, VIC, Australia	2024	Australia
Science of the Total Environment **2024**, *924*, 171453	Can e-waste recycling provide a solution to the scarcity of rare earth metals? An overview of e-waste recycling methods	Sai Sree Varsha Vuppaladadiyam et al	Department of Chemical and Biological Engineering, Monash University, Australia	2023	Australia
Separation and Purification Technology **2021**, *276*, 119307	Development of heterogeneous equilibrium model for lithium solvent extraction using organophosphinic acid	Junnan Lu et al	Department of Chemical Engineering, The University of Melbourne, VIC, Australia	2021	Australia
Journal of Industrial and Engineering Chemistry **2016**, *43*, 117–126	Acid baking of spent lithium ion batteries for selective recovery of major metals: A two-step process	Pratima Meshram et al	CSIR-National Metallurgical Laboratory (NML), Jamshedpur, India	2016	India
Chemical Engineering Journal **2015**, *281*, 418–427	Hydrometallurgical processing of spent lithium ion batteries (LIBs) in the presence of a reducing agent with emphasis on kinetics of leaching	Pratima Meshram et al	CSIR-National Metallurgical Laboratory, Jamshedpur, India	2015	India
Mineral Processing and Extractive Metallurgy Review, **2024**, *46*(3), 386–399	Glutamate Leaching of Spent Lithium-Ion Battery Cathode in Weak Acidic-Neutral Condition: New Insight on Kinetics and Dissolution Mechanism	Erik Prasetyo et al	Research Center for Mining Technology, National Research and Innovation Agency, Lampung Selatan, Indonesia	2024	Indonesia
Waste Management **2023**, *166*, 122–132	Chemical speciation changes of an all-solid-state lithium-ion battery caused by roasting determined by sequential acid leaching	Yutaro Takaya et al	Faculty of Engineering, The University of Tokyo, Tokyo, Japan	2023	Japan
Chemical Engineering Journal **2024**, *494*, 153199	Closed-loop resynthesis of $LiNiCoAlO_2$ cathode active materials from the industrial leachate of spent li-ion batteries	Seoa Kim et al	Department of Energy & Mineral Resources Engineering, Sejong University, Seoul, Republic of Korea	2024	Korea
Journal of Industrial and Engineering Chemistry **2024**, *139*, 111–124	Recent recycling methods for spent cathode materials from lithium-ion batteries: A review	Karmegam Dhanabalan et al	School of Chemical Engineering, Yeungnam University, Gyeongsan, Republic of Korea	2024	Korea
Journal of Analytical and Applied Pyrolysis **2024**, *179*, 106466	Sustainable method for disposing of ceramic-coated battery separator via carbon dioxide-assisted thermochemical process	Sangyoon Lee et al	Department of Earth Resource and Environmental Engineering, Hanyang University, Seoul, Republic of Korea	2024	Korea

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Reference	Title	Authors	Institution	Year	Country
Journal of Environmental Chemical Engineering **2023**, *11*, 109160	Rare metals recycling from spent NCM cathode materials and simultaneous dehydrofluorination of polyvinylidene fluoride (PVDF) in subcritical water	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2023	Korea
Chemical Engineering Journal **2022**, *447*, 137507	Downstream recovery of Li and value-added metals (Ni, Co, and Mn) from leach liquor of spent lithium-ion batteries using a membrane-integrated hybrid system	Ramesh Kumar et al	Department of Earth Resources & Environmental Engineering, Hanyang University, Seoul, Republic of Korea	2022	Korea
Journal of Hazardous Materials **2020**, *396*, 122667	Rapid leaching and recovery of valuable metals from spent Lithium Ion batteries (LIBs) via environmentally benign subcritical nickel-containing water over chlorinated polyvinyl chloride	Theoneste Nshizirungu et al	Department of Environment and Energy Engineering, Chonnam National University, Gwangju, Republic of Korea	2020	Korea
ACS Sustainable Chem. Eng. **2024**, *12*(45), 16564−16576	Metal Extraction from Commercial Black Mass of Spent Lithium-Ion Batteries Using Food-Waste-Derived Lixiviants through a Biological Process	Joseph Jegan Roy et al	Energy Research Institute at Nanyang Technological University (ERI@N) and SCARCE Lab, Singapore	2024	Singapore
Metals **2018**, *8*(5), 321	Recovery of Valuable Metals from Lithium-Ion Batteries NMC Cathode Waste Materials by Hydrometallurgical Methods	Wei-Sheng Chen et al	Department of Resources Engineering, National Cheng Kung University, Tainan, Taiwan	2018	Taiwan

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