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Selective Extraction of Critical Metal Resources from Spent Li-ion Batteries

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ABSTRACT

The age of the electric car is all but upon us. Lithium-ion batteries (LIBs) are among the costliest components of electric vehicles (EVs). Along with the boom of global EV market, billions of LIBs are reaching their expected lifetime. Additional to problems of environmental care and safety, the metals and materials used in LIBs will be lost if not properly handled. Environmental pollution and critical materials loss from spent LIBs is thus a major global concern. Recycling of spent LIBs is urgently needed to address the raised significantly economic and environmental concerns, but traditional recycling pyrometallurgy and hydrometallurgy technologies are not efficient and sustainable. Another challenge in the practical LIB recycling is the selective separation and recovery of multiple metallic elements in the cathode materials. In this talk, I will introduce our recent work on the design of a leaching and separation process system based on the green solvents" to enable the high selective recovery of transition metals and Li from spent LIB cathode [1-3]. Compared to the traditional hydrometallurgy technologies using strong acid and pyrometallurgy using high temperature, the process is low cost and recyclable, and avoids using extreme heat or corrosive acids.

KEY WORDS

Battery recycling

BIOGRAPHY

Associate Professor Jianfeng Mao is an ARC Future Fellow, Clarivate Highly Cited Researcher and the Discipline Lead in Materials Engineering at the School of Chemical Engineering, the University of Adelaide. His current research interests are in developing advanced electrolytes and materials for next-generation batteries, as well as the green battery recycling methods for promoting the sustainability of battery supply chain. He has published over 130 papers (70+ as the first or corresponding author) in the leading discipline journals, such as J. Am. Chem. Soc., Angew. Chem., Adv. Mater., Energy Environ. Sci., Nat. Commun., Sci. Adv., and so on.

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