

On the Development of Recycling Strategies for All-Solid-State Lithium-Ion Batteries with Oxide Electrolytes

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With the rise of new mobile technologies, most importantly e-mobility, the demand for lithium-ion batteries (LIBs) is increasing tremendously. Therefore, it is predicted¹ that millions of tons of spent LIBs will soon reach the end of their service lives. As of today, not much of the spent LIBs are being recycled as compared to, for example, common lead-acid batteries. Furthermore, there are no well-established strategies for recycling the newly emerged LIB systems such as all-solid-state LIBs which seem to be the future of battery technology due to their high energy density and low safety risk. In our current study, effective strategies to recycle the key components of all-solid-state battery cells with oxide electrolytes in the context of complex systems such as LFP/LLZO/LTO are investigated. The hydrometallurgical approach appears to be a powerful technique to recycle precious elements present in the system like Zr, Ti, and La in desired forms such as oxides. By using the recovered components, it is possible to recycle the cubic garnet-type LLZO solid electrolyte.

1. M. Jacoby, *Chem. Eng. News*, 2019, **97**.