LITHIUM-ION BATTERY RECYCLING PRIZE

Primary Submitter Name:	Ricardo Kreyhsig
City and State:	Silver Spring - Maryland
Member Names (including partners and affiliates):	Bruna Dias Pires de Souza, David Romão Noronha, Ivan Aritz Aldaya Garde, José Augusto de Oliveira, Jozué Vieira Filho, Letícia Barbosa Fidanza, Marcelo Luis Francisco Abbade, Mirian Paula dos Santos and Peter Matthiesen
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AMERICAN MADE BATTERY RECYCLING PRIZE

U.S. DEPARTMENT OF ENERGY

Concept

The reuse and recycling of lithium ion batteries (LIBs) are processes of increasing interest, where the development of technologies and regulations are being stimulated worldwide (Huang, Pan, Su, & An, 2018). In this context, we propose an integrated process to close the LIBs' life cycle in a non-destructive, industrially scalable and low-cost way. According to preliminary experimental tests, our approach is capable to achieve 99% recovery efficiency through either refurbishing or recycling LIBs.

Approach

We propose an integrated and standardized solution for processing discarded LIBs, offering refurbish for second life and recycling. Refurbish is applied to different kinds of LIBs that have potential for reuse, covering all the marketed models in USA. LIBs that cannot be reconditioned will be destined for recycling. The separation of anodic material and cathodic material from copper and aluminum sheets is performed using a sodium hydroxide solution, which outperforms previous approaches in terms of separation efficiency, scalability and environmental impact.

Potential Impact

Our solution can achieve a 99% recovery rate of all constitutive materials. Regarding to economic impact the recovered materials can then be destinated for application within the process itself, or for external consumers in the form of raw materials, which is critical considering the rising prices of metals like cobalt, nickel and lithium. From the environmental point of view, the refurbishment and recycling of LIBs significantly reduce the impact of extraction and the energy required to produce new batteries.