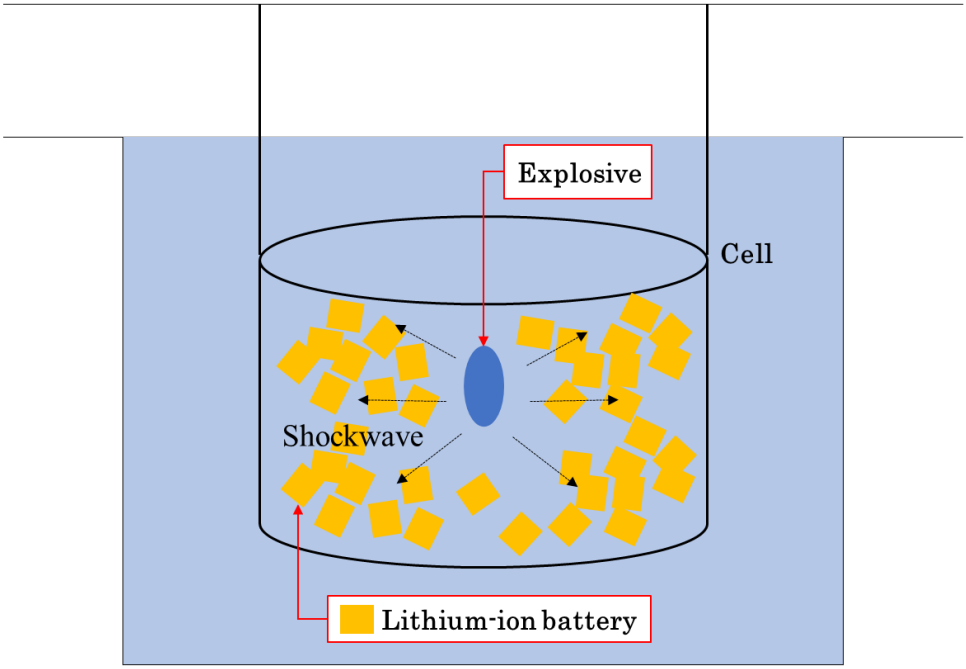
Development of a Pre-Treatment Technology for Recovering Valuable Metals from Waste Lithium Ion Batteries

Presently, the demand of Lithium ion batteries (LIB) is gradually increasing because of its high energy density and long lifespan, as well as its discharge cycle. The increasing use of LIB is generating a considerable amount of spent LIBs. Therefore, recycling of spent LIBs should be considered. Spent LIBs should be handled with care, since some of its components are hazardous and therefore require special treatment. In many studies for recycling of lithium-ion battery, the batteries have been pre-treated mostly by manual dismantling, sieving, grinding, etc. In this project, the underwater explosion is proposed to disintegrate the spent LIBs in order to liberate its components for recycling. In other words, the aim is to use a small amount of explosive in the water in order to generate underwater shock waves in order to liberate the components of LIBs. This project investigated the condition of underwater explosion for pretreatment of LIB waste.



The aim of this project was to investigate the effectiveness of underwater explosion as a pretreatment method for size reduction and liberation of spent LIBs

Deliverables

1. Literature review
2. Testing the underwater explosion for disintegration of spent LIBs in order to liberate their components for recycling, and investigating the effect of various technological parameters.
3. Quantitative and qualitative analysis of LIBs
4. Modeling of underwater explosion, and optimization of the process
5. the economic evaluation of underwater explosion system
6. Application of underwater explosion for big-size, spent LIBs
7. Development of a separation flowsheet for treatment of spent LIBs