

# Support for Startup Ecosystem Formation

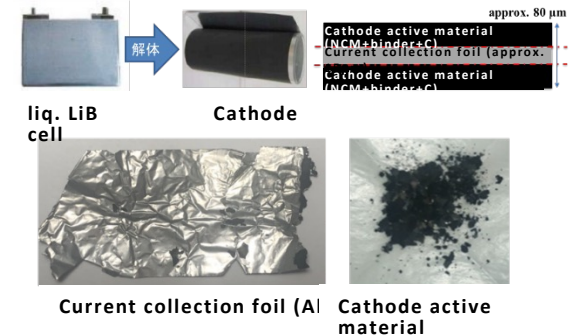
Adoption year: FY 2022 Principal Investigator: Waseda University / Professor / Chiharu TOKORO (As of Aug.2022)

## Subject of Research

## Creation of a New Circulation Value Chain for Lithium-Ion Batteries Using a Novel Electric Pulse Method

### Overview

The demand for lithium ion batteries is expected to increase exponentially in order to achieve carbon neutrality. We will develop a new resource recycling process to recover the "black mass" (cathode active material particles consisting of lithium, cobalt and nickel), using an innovative separation process based on a new electric pulse method, which does not alter the highly valuable original material. Also, a global business for the production of recycled black mass will be established.



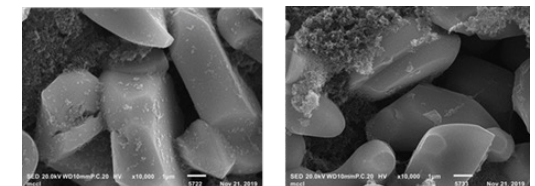
### Business Models(when applying)

The company will act as a recycler that procures and recycles spent lithium-ion batteries in order to sell the cathode materials to battery manufacturers as a commodity. The low cost of recycling and the high degree of difficulty in imitating the technology that makes this recycling process feasible are the sources of the company's competitiveness. When a large initial investment and operating capital are required, the company will consider establishing a joint venture plant with either a recycling company or a metal refining company as potential backers.

### Activity Planning(when applying)

Goal: Achieve stable separation of diverse batteries / clarify advantages to direct recycling

- To quantitatively clarify the relationship between the physical properties of various lithium-ion batteries and electric pulse conditions via experiments and simulation.
- To find out the electrical pulse and pretreatment conditions that can achieve a stable and accurate separation of various types of adhesion between the current collection foil and the cathode active material particles.
- To regenerate the recovered black mass as cathode active material and confirm its battery performance.
- To compare with existing regeneration methods, we will examine the electric pulse conditions and pre/post treatment conditions that guarantee superior results



SEM observations of the black mass before and after separation.

No damage in the separation by the novel electric pulse method.