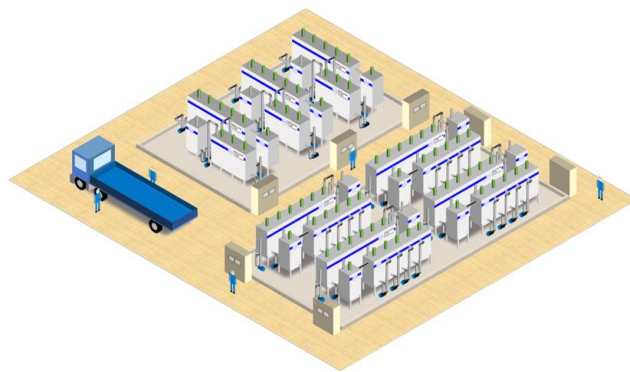


Joint research and development agreement with Emulsion Flow Technologies Ltd. for Rare Metal Recycling in Lithium-Ion Batteries

Iwaki Co., Ltd. has its head office in Chiyoda-ku, Tokyo, with Shigeru Fujinaka serving as president, while Emulsion Flow Technologies Ltd. (hereafter “EFT”) has its head office in Tokai-mura, Naka-gun, Ibaraki Prefecture, with Hiroshi Suzuki serving as president. Iwaki (hereafter “the Company”) and EFT have signed a joint research and development agreement on the development and design of a solvent extraction plant using emulsion flow technology to achieve the recycling of rare metals in lithium-ion batteries.



Due to the rapid spread of electric vehicles and other technologies in recent years, rare metals such as cobalt, nickel, and lithium, which are used in lithium-ion batteries (LIBs), are expected to be in short supply from around 2025. In addition, with the increase in demand for rare metals, there is growing concern about various risks surrounding rare metals, such as resource conflicts, environmental destruction, and human rights violations. There are worldwide calls to secure rare metal resources through recycling.

The Company has recently concluded a joint research and development agreement with EFT, a venture company out of the Japan Atomic Energy Agency, to cooperate in the development of a commercial-scale solvent extraction plant using emulsion flow technology.

EFT is a rare metal recycling venture company, established on April 5, 2021, that operates a business utilizing Emulsion Flow, a solvent extraction technology developed by the Japan Atomic Energy Agency. Emulsion Flow is an innovative technology that enables high purity elemental separation at low cost and high efficiency compared to conventional solvent extraction technologies, and is expected to solve various issues surrounding rare metals. In particular, by utilizing Emulsion Flow, EFT's rare metal recycling business has established a technology to recover rare metals

contained in LIBs at low cost and with high purity, aiming to achieve "horizontal recycling" in which rare metals recovered from LIBs are reused in LIBs.

In this joint R&D, we will combine EFT's innovative solvent extraction technology, Emulsion Flow, with the Company's long-cultivated expertise in fluid control to develop a commercial-scale solvent extraction plant using Emulsion Flow technology, with the aim of creating a small-scale LIB recycling plant with high productivity. Through this initiative, the Company will contribute to solving real-world issues surrounding rare metal resources and to achieving a fully recycling-oriented society that will continue to use terrestrial rare metal resources for a long time to come.

■ Technical Description of Emulsion Flow

Solvent extraction is one of the separation and purification methods for substances. This technology is used to selectively extract only the target component by utilizing the partitioning of substances between liquid phases that do not intermingle with one another.

Emulsion Flow does not require the stationary part (settler part) necessary for a mixer-settler, which has been a typical solvent extraction technology, enabling a production capacity 10 times greater than that of existing technologies, thus enabling a downsizing to 1/10 or less of the conventional scale and a reduction in running costs.

In addition, the multi-stage Emulsion Flow (capable of continuous throughput) achieves a purification rate of 99.99% or higher, making it possible to purify rare metals to a high degree of purity at a lower cost and with higher efficiency than conventional technology mixer-settlers.