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Microwave Chemical Co., Ltd.

Mitsui Chemicals, Inc.

Launch a Chemical Recycling Project of Flexible Polyurethane Foam using Microwave-Based technology

First initiative in Japan aiming at commercialization

Mitsui Chemicals, Inc. (Tokyo: 4183; President & CEO: HASHIMOTO Osamu) and Microwave Chemical Co., Ltd. (Suita, Osaka; CEO: YOSHINO Iwao) have launched a new initiative aiming to commercialize chemical recycling of flexible polyurethane foam using microwave technology. The project involves directly producing raw materials by decomposing offcuts of the foam used to manufacture mattresses and the like.



Small microwave demonstration device for decomposition of plastics

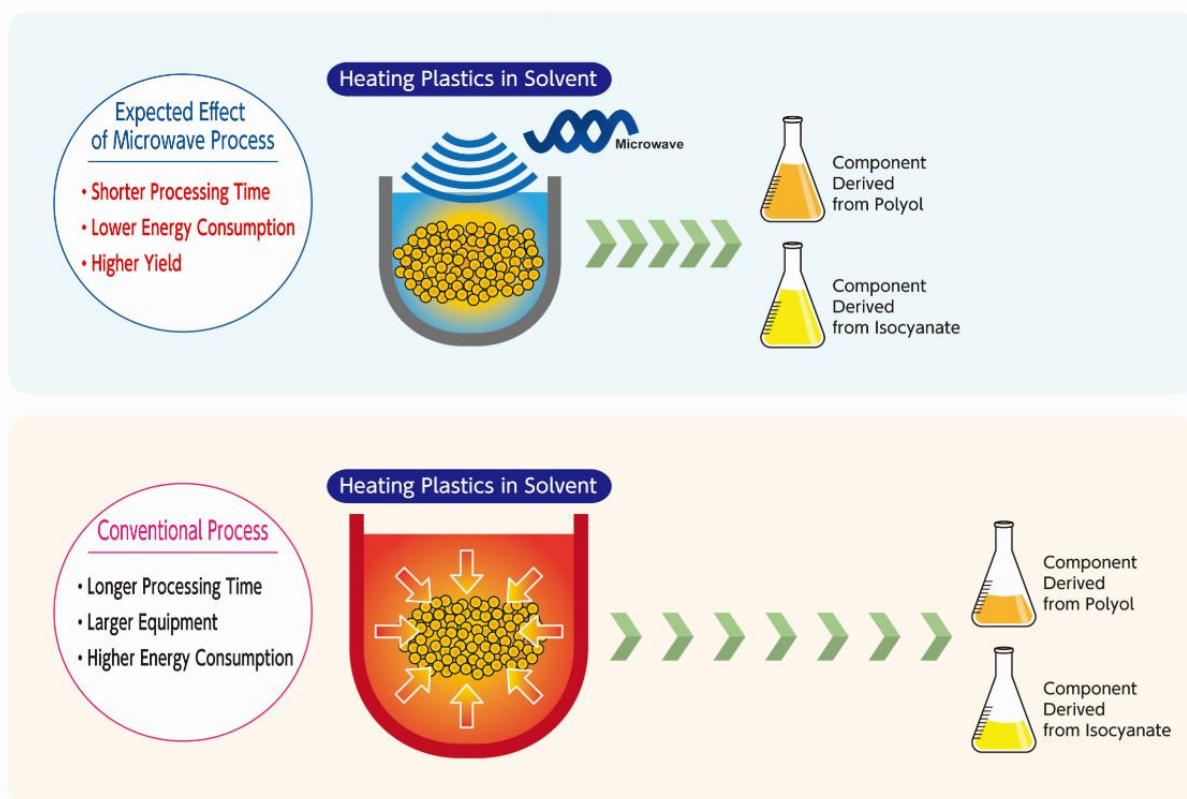
Flexible polyurethane foam is a resin foam principally consisting of polyols and isocyanates whose main features are its softness and high resilience. These characteristics have led to the flexible foam's use in a wide range of applications from industrial goods and materials to daily necessities, including mattresses, car seats, chair cushions and even kitchen sponges. However, chemical recycling of

flexible polyurethane foam and other polyurethanes has not yet been achieved at the commercial level in Japan. Therefore, the development and commercialization of such technology is a pressing issue from the perspective of contributing for a circular economy.

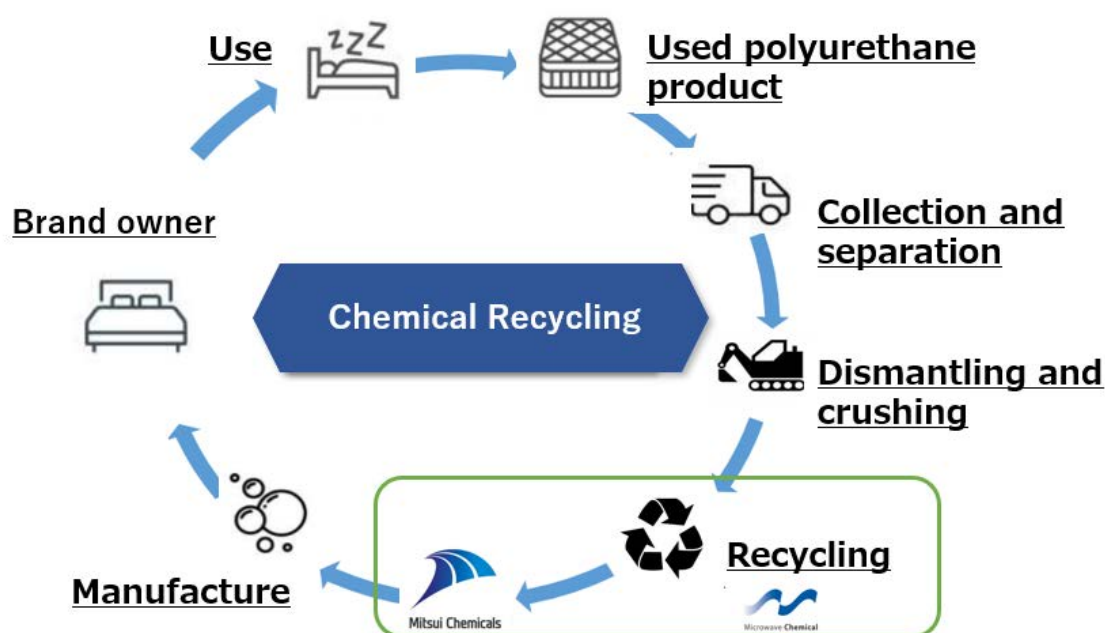
Using the PlaWave™ microwave-based plastic decomposition technology developed by Microwave Chemical, the processing time of decomposing flexible polyurethane foam is expected to be at half or shorter and substantially reduce energy consumption compared with existing technologies. The microwave technology will also contribute to reducing CO₂ emissions, as its efficiency will reduce costs and enable the process to be powered by electricity generated from renewable energy.

Since the initial test achieved positive results, the project will proceed to small-scale demonstration using Microwave Chemical's bench-scale demonstration device by March 2023 and move on to further examination, with the objective of commencing demonstration tests in March 2024 and commercializing the technology by March 2026. In tandem with demonstration tests, we will build a business model that encompasses the whole value chain for the recycling of flexible polyurethane foam to realize a circular economy.

Chemical decomposition process of polyurethane foam



Model for polyurethane chemical recycling



Microwaves

Microwaves are electromagnetic waves that are frequently used for microwave oven and communication applications and able to transfer energy to materials directly and selectively. As microwaves can be generated from renewable energy sources, this is an environmentally friendly technology able to reduce CO₂ emissions.

PlaWave™

PlaWave™ is Microwave Chemical's proprietary technology platform for decomposing plastic using microwaves, that is able to be applied both to pyrolysis and solvolysis. PlaWave™ enables faster reaction speeds and greater energy efficiency in a more compact device. The PlaWave™ logo is inspired by the desire to create a green circular economy with the aid of microwaves.

■ For reference (Previous news releases)

Since entering into a strategic partnership in 2017 to promote joint development of next-generation chemical process technologies, Mitsui Chemicals and Microwave Chemical have built up a solid relationship, including through partial equity investment. The two companies are together looking to apply microwave technology for a variety of chemical processes.

(1) 2017.09.14 Microwave Chemical and Mitsui Chemicals have entered into a Strategic Partnership

<https://jp.mitsuichemicals.com/en/release/2017/170914.htm>

(2) 2021.11.18 Mitsui Chemicals Launches Microwave-Based Direct Monomerization Project for

Plastic Waste

https://jp.mitsuichemicals.com/en/release/2021/2021_1118.htm

(3) 2022.05.09 Mitsui Chemicals and Microwave Chemical Establish an innovative Eco-Friendly CF manufacturing basic technology using microwaves

https://jp.mitsuichemicals.com/en/release/2022/2022_0509.htm