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MITSUI CHEMICALS, INC.

2021.11.18

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Mitsui Chemicals Launches Microwave-Based Direct Monomerization Project for Plastic Waste

Aiming to commercialize chemical recycling of hard-to-recycle ASR and SMC

Mitsui Chemicals, Inc. (Tokyo: 4183; President & CEO: HASHIMOTO Osamu) and Microwave Chemical Co. Ltd. (Suita, Osaka Prefecture; CEO: YOSHINO Iwao) have launched a new initiative aimed at commercializing the use of microwave technology in the chemical recycling of plastic waste. The project involves directly producing raw monomers from plastics that have conventionally been tricky to recycle, including automotive shredder residue (ASR) – a mixture of principally polypropylene-based plastics – and thermosetting sheet molding compound (SMC), which is used in bathtubs and vehicle parts.

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 at leveraging microwave technology for a variety of chemical processes.

This new initiative is an attempt to commercialize a chemical recycling technique that uses the PlaWave™ microwave-based plastic degradation technology developed by Microwave Chemical to directly break down ASR and SMC products into raw monomers. As it eliminates an intermediate step, direct monomerization is a more efficient means of recycling plastic waste into plastic than the conventional approach, which involves turning the waste into oil before monomerization. The technique also promises to reduce CO2 emissions through the use of electricity generated from renewable energy to power the decomposition process.

With initial deliberations having yielded positive results, the project will proceed to verification using Microwave Chemical's bench-scale equipment before the end of fiscal 2021. A move to full implementation will be then be considered with the objective of promptly commencing demonstration tests.

Microwave Chemical's facility

Microwaves

Microwaves are an electromagnetic wave which is frequently used for microwave oven and communication applications, which can transfer energy to materials directly and selectively. As microwaves can be generated from renewable energy sources, this technology is environmentally friendly, which promotes a reduction of CO2 emissions.

The Mitsui Chemicals Group's recycling initiatives

Mitsui Chemicals has set the target of achieving carbon neutrality by 2050 to ensure that it can continue contributing to society as a chemical company. Seeing climate change and the problems posed by plastic as part of the same challenge, Mitsui Chemicals aims to create a circular economy by developing recycling technologies and systems, and also by enhancing its range of biomass-based products. In pursuit of the prompt social implementation of recycling technologies, Mitsui Chemicals intends to take part in more such collaborative initiatives with other companies that possess outstanding technologies in the fields of both material and chemical recycling.

Microwave Chemical

Established in 2007, Microwave Chemical is technology-based startup which is enhancing and improving conventional manufacturing processes by utilizing microwave technology to develop new materials, which are difficult to produce with conventional manufacturing methods. The technology is applicable to a wide range of regions such as pharmaceuticals, electronic materials, food and fuel, and the company has ongoing collaborative R&D and commercialization projects with domestic and foreign companies.

For realizing carbon neutrality of the industrial sector by 2050 through the expansion of the manufacturing processes using microwaves, Microwave Chemical is developing a concept named "C NEUTRAL™ 2050 design".