14th Minister of Economy, Trade and Industry GSC Award

Development and commercialization of a high performance transparent plastic utilizing a plant-derived raw material

Mitsubishi Chemical Corporation

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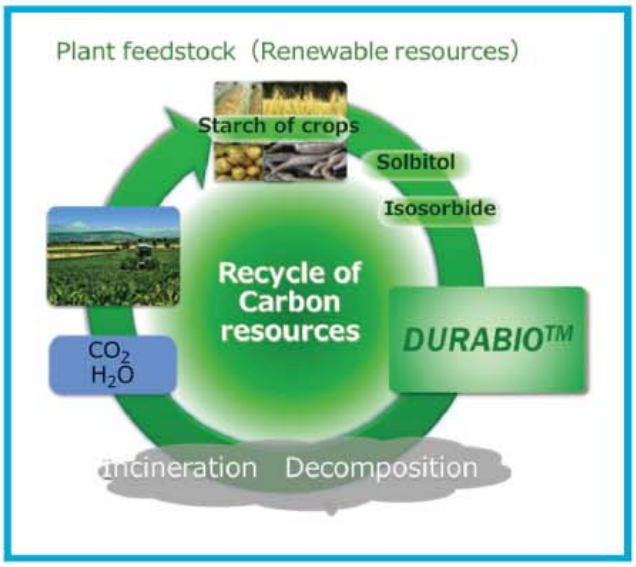
Plastic materials that utilize renewable resources such as plant-derived raw materials hold promise as materials that can contribute to solving issues such as resource depletion and CO_2 emissions. However, when compared with petroleum-derived plastics, they exhibit inferior property attributes and durability and on this account, their application has been limited. Amid this situation, Mitsubishi Chemical has, in a world first, successfully commercialized an amorphous, transparent engineering plastic called DURABIO™ that is polymerized via carbonate bonds and primarily based on isosorbide derived from the low-cost, plant-based renewable resource of glucose.

With isosorbide as the main raw material, DURABIO™ can reduce exhaustable resource raw material usage per ton of polymer by approximately 60 percent compared with polycarbonate resin manufactured using the conventional interfacial process, while it can also reduce exhaustable resource-derived CO_2 emissions over the entire product lifecycle through to disposal by around 40 percent.



In addition, in terms of manufacturing process aspects, Mitsubishi Chemical's proprietary melt phase polymerization process is employed while no organic solvent is used whatsoever, meaning environmental risks have been reduced dramatically. Furthermore, a fully closed loop cycle has been achieved through recycling of a byproduct as a raw material. Through this, the general environmental footprint has been reduced as evidences by SOx reduction of 15 percent, NOx reduction of 19 percent, and a BOD reduction of 98 percent on account of a drastic reduction in effluent emissions.

Besides its high transparency and excellent optical properties, DURABIO™ features excellent scratch resistance, weatherability and impact resistance. Adoption is already making progress in applications such as transparent panels where glass is replaced, thin optical films, and unpainted parts in automobile interiors.

Mitsubishi Chemical aims to carve out new markets for DURABIO™ together with its customers and thereby accelerate its contribution to Green Sustainable Chemistry in future.