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Japanese firms to establish revolutionary sugar manufacturing technology in Thailand

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Japanese firms Toray Industries, Inc., and Mitsui DM Sugar Co., Ltd., have jointly demonstrated and established a basic technology to manufacture sugar derived from inedible biomass which is a common raw material in fiber and resin production. The biomass includes surplus bagasse, a pulpy residue from sugarcane processing, and pulp that results from squeezing cassava in starch factories.

Combining this technology with Toray's revolutionary technology to make monomers from sugars will facilitate the integration of biomass-sourced polymers for fibers, films, resins, and other products produced from biomass-derived polymers that contribute to a circular economy.

Toray looks to set up a structure to supply cellulosic sugar in collaboration with Thailand's sugar refineries and starch manufacturers and other companies using biomass resources.

Toray proved the separation, purification, and concentration of cellulose-derived sugars in inedible biomass as part of this demonstration project. It leveraged a membrane-based bioprocess that combines the companyâ??s water treatment membrane technology and enzymes that employ biotechnology. Toray undertook this effort at a demonstration facility in Thailand as part of a project the New Energy and Industrial Technology Development Organization (NEDO) supports. Compared to conventional processes that concentrate sugar solutions by evaporating water, this process emits less than half the carbon dioxide.

The breakthrough demonstration is a first step toward creating a technology to make cellulosic sugar from biomass, putting it on track to mass production. Earlier in 2022, Toray developed 100% bio-based adipic acid, a raw material for polyamide 66 (nylon 66), from sugars derived from inedible biomass. To achieve this, Toray used a proprietary synthesis technique combining the companyâ??s microbial fermentation technology and chemical purification technology that harnesses separation membranes. The company is now looking to establish an integrated technology to manufacture fiber and resin from abundant agricultural residues, avoiding competition with the food chain.

It will endeavor to upscale technology from an effort under development to produce adipic acid from cellulosic sugar. In providing cellulosic sugars to chemical companies around the globe, Toray seeks to help materialize a circular economy by replacing petroleum-based chemicals with plant-derived offerings that are not part of the food chain.