

FOR IMMEDIATE RELEASE

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Kao Delegated by NEDO to Begin a Study on a Manufacturing Model for Utilizing Cassava Residue

A new project^{*1} launched by Kao Corporation and Kao Industrial (Thailand) Co. Ltd. to utilize cassava residue as biomass was selected in the New Energy and Industrial Technology Development Organization (NEDO)'s first public contest for an International Demonstration Project on Japan's Energy Efficiency Technologies (Study of Suitability of Demonstration Requirements) in FY2022, and Kao and Kao Industrial (Thailand) have started a study on the suitability of the project's demonstration requirements.

*1 This technology demonstration project's title is "Manufacturing model project for bio-based nonionic surfactant from non-edible biomass using on-site production system of enzymes optimized for cassava residue (Thailand)."
<https://www.nedo.go.jp/content/100946711.pdf>

■ NEDO's International Demonstration Projects on Japan's Energy Efficiency Technologies

NEDO, a government research and development corporation, creates innovation by supporting the development of technologies needed for achieving sustainability. The goal of international demonstration projects is to promote the spread of demonstration technologies through overseas demonstrations of Japan's advanced technologies to help achieve stable supply, profitability, environmental compatibility and safety. An additional goal of such projects is to bring benefits to Japan through demonstrations in overseas energy markets with an already established institutional framework.

NEDO https://www.nedo.go.jp/english/activities/activities_AT1_00175.html

■ Background

Corporations have a major responsibility and role to play in addressing climate change caused by global warming. To minimize new CO₂ emissions, Kao has been engaged in researching the use of biomass, a renewable plant-based resource, to replace petroleum-based raw materials. Biomass is classed as edible biomass such as corn and sugar cane and non-edible biomass that makes use of agricultural residue and similar materials. Kao has focused on non-edible biomass, from the perspective of stable supply and environmental compatibility and to avoid competing with food sources.

■ Previous results of studies on biomass

Enzymes are used to break biomass down into sugars in order to use it as feedstock for chemical products. Non-edible biomass generally cannot be broken down easily, so profitability has been an issue.

Cassava (Figure 1) is a tuberous root grown extensively in tropical and sub-tropical regions that generates non-edible residue as waste once starch has been extracted from the rhizome. Applying its 30 years of expertise in developing laundry detergent enzymes, Kao developed a saccharification enzyme to break down the cassava residue into sugars to utilize this biomass resource, which Thailand generates in large quantities. Kao also applied its technology for using fungus for simultaneously producing several enzymes to develop a one-pot multi-enzyme production system for making the enzymes needed to break down cassava residue, and has confirmed that with this system, biomass can easily be broken down into sugars (Figure 2).^{*2}



Figure 1. Cassava and cassava starch

^{*2} NEDO report database, Report No. 2018000000244. Title: FY2013–2016 Final Report: Research and Development of Biomass Energy Technology. Project for Development of Enzyme Manufacturing Technology for Biofuel Commercialization. Construction of Innovative Saccharifying Enzyme-producing Microorganism and Development of Manufacturing Technology of the Enzyme for the Biofuel Commercialization.

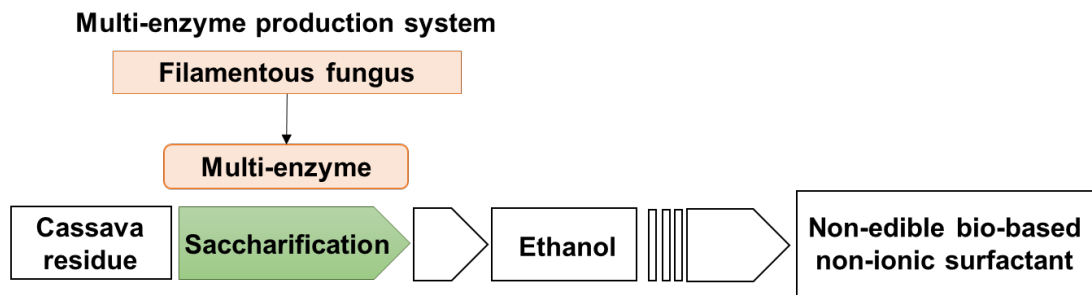


Figure 2. Kao concept for utilizing biomass

Saccharification enzymes needed for using biomass are usually transported by ship or truck to biorefinery plants producing chemicals made from the processed biomass (Figure 3). A multi-enzyme production system, on the other hand, makes it possible to have an on-site production system with a smaller enzyme production facility feeding enzymes directly into the biorefinery plant (Figure 4). Kao is proposing a new manufacturing model using its own on-site production system. Commercializing this system would offer many advantages, from reducing transportation costs and CO₂ emissions to eliminating supply chain uncertainties.

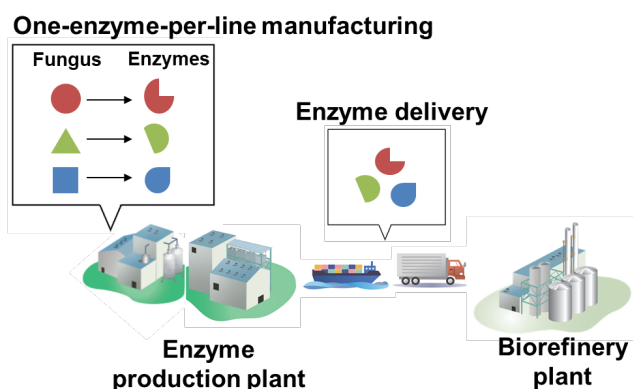


Figure 3. Conventional production system

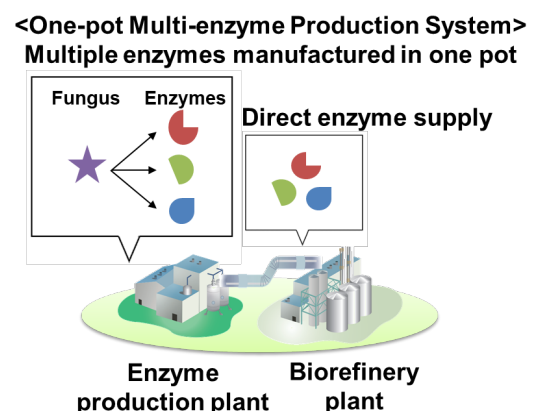


Figure 4. Kao's proposed on-site production system

■ Outline of the project

In this project, which studies suitability of demonstration requirements, Kao is working with Kao Industrial (Thailand) to gather information on energy considerations in Thailand, policies related to this project and business environment to start a basic study on a manufacturing model for utilizing cassava residue.

■ Summary

Kao's chemicals business, bringing new value to chemicals and creating a future for industry and a sustainable society, aims to help customers and industry by offering innovative products and solutions. Kao is now exploring the potential for the future creation and commercialization of an integrated system for manufacturing biochemicals from cassava residue.

About the Kirei Lifestyle Plan

Over the past 130 years, Kao has worked to improve people's lives and help them realize more sustainable lifestyles—a Kirei Lifestyle. The Japanese word 'kirei' describes something that is clean, well-ordered and beautiful, all at the same time. The Kao Group established its ESG strategy, the Kirei Lifestyle Plan in April 2019, which is designed to deliver the vision of a gentler and more sustainable way of living. By 2030, Kao aims to empower at least 1 billion people, to enjoy more beautiful lives and have 100% of its products leave a full lifecycle environmental footprint that science says our natural world can safely absorb.

For more information, please click <https://www.kao.com/global/en/sustainability/>

About Kao

Kao creates high-value-added products and services that provide care and enrichment for the life of all people and the planet. Through its portfolio of over 20 leading brands such as *Attack*, *Bioré*, *Goldwell*, *Jergens*, *John Frieda*, *Kanebo*, *Laurier*, *Merries*, and *Molton Brown*, Kao is part of the everyday lives of people in Asia, Oceania, North America, and Europe. Combined with its chemical business, which contributes to a wide range of industries, Kao generates about 1,420 billion yen in annual sales. Kao employs about 33,500 people worldwide and has 135 years of history in innovation. Please visit the Kao Group website for updated information.

<https://www.kao.com/global/en/>