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RITE and Honda Jointly Develop New Technology To Produce Ethanol From Cellulosic Biomass

September 14, 2006 Tokyo -- Research Institute of Innovative Technology for the Earth (RITE) and Honda R&D Co., Ltd., the Honda Motor Co., Ltd. subsidiary responsible for research and development, today announced that their cooperative research has resulted in ethanol production technology from soft-biomass*, a renewable resource of plant-derived material.

Carbon dioxide ($CO_{2)}$ released by the combustion of bio-ethanol is balanced by the CO_2 captured by plants through photosynthesis and, thus, does not increase the total amount of CO_2 in the atmosphere. Bio-ethanol, therefore, has attracted attention as a carbon-neutral fuel, an energy source effective as countermeasure to global-warming.

Existing bio-ethanol production, however, faces supply limits, as it is produced primarily from sugar and starch of sugarcane and corn feedstock, which are also utilized as food.
In its collaborative research, RITE and Honda have established the basic technology to produce ethanol fuel from cellulose and hemicellulose*, both found in soft-biomass*, including inedible leaves and stalks of plants, such as rice straw. Until now, such soft-biomass represented a challenge to convert to ethanol. Thus, the new process represents a large step forward for practical application of soft-biomass as a fuel source.

The RITE-Honda process, newly developed as an integration of the sophisticated bio-technology of RITE and the engineering technology of Honda, paves the way to bio-ethanol production from cellulose and hemi-cellulose, with the potential to significantly increase fuel production.

The process consists of the following operations.

I. Pretreatment to separate cellulose from soft-biomass
II. Saccharification of cellulose and hemicellulose
III. Conversion of sugar into ethanol using microorganisms
IV. Ethanol refinement

Current technology allows fermentation inhibitors, collaterally formed primarily during the process of separating cellulose and hemicellulose from soft-biomass, to interfere with the function of microorganisms that convert sugar into alcohol, leading to extremely low ethanol yield. Up to now, an appropriate solution has not been found to this the largest obstacle to

alcohol production from soft-biomass.

World renowned for its development of a bio-process for chemical commodities production utilizing microorganisms, RITE established the RITE process featuring remarkably high production efficiency, and has also reported a number of other achievements, including bio-ethanol production related issues.

Now, RITE and Honda have successfully developed the RITE-Honda process, which substantially reduces the harmful influence of fermentation inhibitors. The RITE-Honda process succeeds through utilization of RITE strain, a microorganism developed by RITE that converts sugar into alcohol, and by application of engineering technology of Honda, enabling a significant increase in alcohol conversion efficiency, in comparison to conventional cellulosic bio-ethanol production processes.

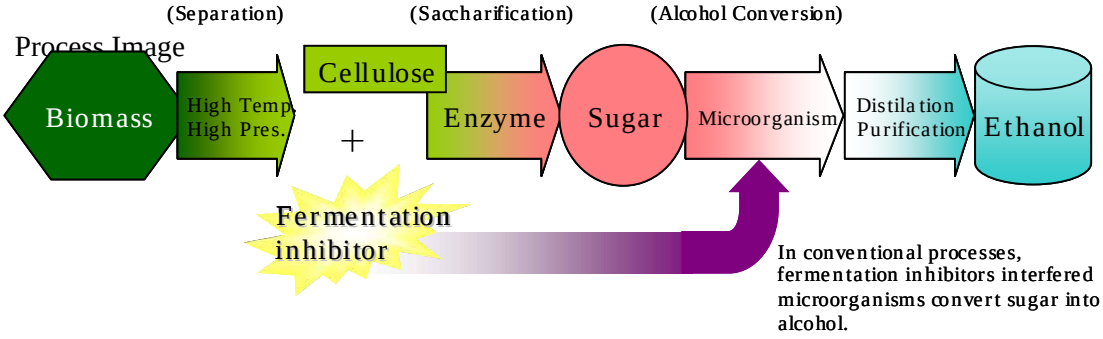
The RITE-Honda process, resulting in a significant increase in production of bio-ethanol, and expansion of biomass utilization, holds enormous potential as a major step forward toward the realization of an energy sustainability society.

The achievement solves the last remaining fundamental hurdle to ethanol production from soft-biomass. Thus, RITE and Honda will pursue research for mass production, including development of systems to integrate four operations, currently operated independently, into a continuous flow within one plant, recycling energy* to pursue energy conservation and cost reduction.

A demonstration project is envisioned within a pilot plant to assess the social compatibility and economic efficiency of the new bio-alcohol production system.

Based on the success of this collaborative research, RITE and Honda, will pursue further advancement to establish a bio-refinery* for production of not only ethanol, but various industrial commodities including automotive materials from biomass. In this way, RITE and Honda will contribute to the prevention of global-warming through the further reduction of CO_2, with the goal of realizing a sustainable society.

Process Image



Research Institute of Innovative Technology for the Earth
(RITE)

Overview
Established in 1990 by the joint investment of the Japanese government and private enterprises, with the goal of conducting fundamental research on countermeasure technology for global-warming, particularly climate change. Engaged in efforts to stabilize climate change through development of alternative energy research and CO_2 sequestration technologies.

Location: Kizugawa-dai, kizu-cho soraku-gun, Kyoto, JAPAN

President:Yoshihisa Akiyama

Honda R&D CO., Ltd.　Fundamental Research Center

Overview:
An operation established for fundamental research and development within Honda R&D Co., the Honda Motor Co., subsidiary responsible for research and development.　The Fundamental Research Center was established in April 1986, and has engaged in the development of the bipedal walking humanoid robot, ASIMO, and HondaJet, as well as fundamental research on the bio- and energy-sector.

Location:Wako-shi, Saitama, JAPAN

Director:Tomohiko Kawanabe (Senior Managing Director of Honda R&D)

* Biomass

Biomass is a renewable organic resource of plant-derived material, excluding fossil resource. In a limited sense, the term refers to livestock excreta, waste wood, and plant residue after the removal of edible parts. Biomass represents organic materials that plants produce through photosynthesis from atmospheric CO_2 and water, and thus does not increase atmospheric CO_2 when burned.

* Cellulose and hemicellulose

The primary ingredients of the fibrous part of plants. Comprises one-third of natural vegetable materials. Conventional technology was insufficient to utilize cellulose for alcohol production.

* Energy-recycling within a continuous flow system

Utilizing the heat and energy from within a highly efficient system as a key to reduce production costs. For example, heat from one of four operations, can be used to support another operation.

* Bio-refinery

A different concept from an oil-refinery, representing plants or technologies for the production of bio-fuels and resins from biomass.