

Mazda Develops High-Strength Heat-Resistant Bioplastic With Hiroshima Area Partners

Tokyo, Japan, -- Mazda Motor Corporation has announced that an industry-government-academia joint research project in Hiroshima Prefecture, in which it is participating, has achieved an improved exterior surface quality, high-strength, heat-resistant plastic (bioplastic) made of natural materials. It can also be used for vehicle interior parts. An automotive sector first, this new bioplastic is made from natural materials and is carbon neutral because of the reduced amounts of fossil fuels used to make it and the consequent lowered amount of carbon dioxide (CO₂) emissions.

This newly-developed bioplastic features is stronger - it has three times the shock impact resistance along with 25 percent higher heat resistance when compared to contemporary bioplastics used for items such as electrical appliances. In addition, it is made with a fermentation process that includes natural materials such as fermented starches and sugars which, compared with the process to make polypropylene, reduces energy use by 30 percent. In contrast to current petroleum-based polypropylene plastics, the new bioplastic also has comparatively higher rigidity, resulting in thinner molds and fewer materials used. These attributes hold great promise for better productivity in the mass production of vehicle parts, since parts manufacture frequently involves injection-molding equipment. Mazda will continue its research and development in this area for the next several years, with any new advances being employed in Mazda products.

Bioplastic

This newly-developed bioplastic is made of 88 percent corn and 12 percent petroleum. Mainly using corn-based polylactic acids, Nishikawa Rubber Co. Ltd, Hiroshima and Kinki Universities focused their efforts on developing a new nucleating agent for crystallization and a compatibilizer compound to raise the strength and heat resistance of the new plastic, dramatically increasing the amount of applications for automobile manufacturing.

This research was the result of joint industry-academia-government collaboration, promoted under the auspices of the Japanese Ministry of Economy, Trade and Industry's (METI) "Consortium R&D Projects for Regional Revitalization" program, which began in 2004. The joint research conducted under this rubric has the goals of fostering new industry, creating new business and revitalizing regional economies in Japan.

The new bioplastic consortium project partners are Hiroshima University, Nishikawa Rubber Co. Ltd., Western Hiroshima Prefecture Industrial Research Institute, G.P. Daikyo Corporation, Japan Steel Works Ltd., Kinki University School of Engineering, Nishikawa Kasei Co. Ltd., National Research Institute of Brewing, Yasuhara Chemical Co. Ltd., MANAC Incorporated and Mazda Motor Corporation. This is a consortium consisting of two universities, seven companies and two research institutes.

Seita Kanai, senior managing executive officer in charge of Mazda's R&D, said, "Mazda and G.P. Daikyo Corporation are at the center of a world-class accumulation of automotive plastic module parts makers here in the Hiroshima area. Based on our rich tradition of sake brewing in this region, we've been accumulating fermentation biotechnology for a long time and Hiroshima University, Nishikawa Rubber Company and the Western Hiroshima Prefecture Industrial Research Institute - among other organizations - have an extensive history of research into the practical uses of biodegradable plastics than can be broken down by microorganisms. In particular, great results have been achieved through joint international research into lactic acid copolymers. So it's safe to say the Hiroshima area is fertile ground in terms of research achievements. Together with our regional partners over the next few years, Mazda intends to continue its bioplastics research for the purpose of utilizing any advances we achieve to make better products for our customers."

2006 marks the final year of the Mazda Momentum mid-term management plan. Two of the plan's goals were to achieve 100 billion yen in operating profit and a net-debt-to-equity ratio of less than one hundred percent by the end of fiscal year 2006; these were achieved one year earlier than projected. Another key measure of the plan is to strengthen research and development efforts. As a company that values its social contributions now and into the future, Mazda will keep up its proactive technical research on eco-friendly and safe products for its customers.

Mazda will exhibit vehicle interior parts made with the newly-developed bioplastic in its booth at the Automotive Engineering Exposition at the Japan Society of Automotive Engineering (JASE) Annual Congress, to be held at the Pacifico Yokohama complex from May 24-26, 2006.

Notes:

1) Carbon neutral

As an example, carbon neutral can be characterized as CO₂ gases released during plant decomposition or combustion being absorbed during the growth phase of photosynthesis, so any emitted CO₂ gases are offset and end up producing a negligible impact on CO₂ levels in the atmosphere.

2) Nucleating agents for crystallization

An additive to stimulate crystallization

A "stimulus" nucleating agent added to crystal acts as a catalyst and makes it easier to form the crystals. Polylactic acid has properties which make for comparatively slower crystallization when compared to other plastics and this negatively impacts on production efficiency when molding bioplastics for car parts. Given this factor, it is necessary to carry out the crystallization earlier by means of a nucleating agent. When the molecular chain is arranged in a systematic way, the plastic's strength is increased and its heat-resistant properties are improved.

3) Compatibilizer

An additive is needed for a material that has two or more different types of properties, and when distributed uniformly, it improves the physical properties of the material. It is necessary to mix the polylactic acids with a combination of polylactic acid and an added element that is not chemically compatible.

4) Lactic acid copolymers

This is a plastic material derived by partly replacing some of the elements of polylactic acids with other ingredients.

5) International collaboration

-Participating organizations: Hiroshima University (the representative research institute); University of Massachusetts and Tufts University (US); University of Liege (Belgium), Zhejiang University (China).

-Research content: The aforementioned research institutions worked together to conduct research and development into lactic acid copolymers for general use as well as use in medical treatments.

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