

February 18, 2021

New Thin Film Deposition Technology for PET bottles Recognized For Advanced Packaging Technology as a WORLDSTAR WINNER and a Diamond Finalist

- New eco-friendly PET bottle technology prevents degradation of the contents while reducing weight -

TOKYO, Thursday February 18, 2021 - Kirin Holdings Company, Limited (Kirin Holdings), the Packaging Innovation Laboratory ("Packaging Innovation") has developed a new thin film deposition technology for PET bottles using a hot wire CVD technique for an environmentally-friendly package.

In recognition of the results of this development, on January 7, 2021 Kirin Holdings was recognized as one of the [WORLDSTAR WINNERS](#) in the Beverages category of the [WORLDSTAR Packaging Awards 2021](#) organized by the [World Packaging Organization](#) (WPO). The technology was also selected as a [Diamond Finalist](#) presented at the [Dow Packaging Innovation Awards 2020](#), organized by [Dow Chemical Company](#) in the United States on November 11, 2020.

Kirin Holdings' *Institute for Package Innovation* specializes in the development of packaging containers and has led the industry in the development of a range of environmentally-friendly containers, including lighter returnable beer bottles, smaller aluminum can lids and the lightest 2-liter PET bottle in Japan ^{*1}.

*1: As of December 2020

This [New Thin Film Deposition Technology for PET Bottles](#), (the hot wire CVD technique) also won the [44th Kinoshita Award](#) in September 2020. This technology is expected to contribute to resource conservation by forming a colorless, transparent and recyclable gas barrier film on PET bottles, which prevents oxidation and degradation of the content liquid while reducing weight.

The Kirin Group is committed to promoting global CSV^{*2} by creating value across our world of Food & Beverages to Pharmaceuticals. [Kirin Group Environmental Vision 2050](#), a new vision statement on stronger social and corporate resilience established in February 2020 as part of the broader CSV environmental initiative, calls for sustainable recycling of containers and packaging at the macro level. We will continue to promote the development of sustainable containers and packaging by using these and other technologies to save resources, while taking into account the convenience of our customers. In this way, we will try to solve social issues.

*2: Creating Shared Value: combined added value for consumers as well as for society at large.

● **Research title:**

New thin film deposition technology for PET bottles by hot wire CVD system

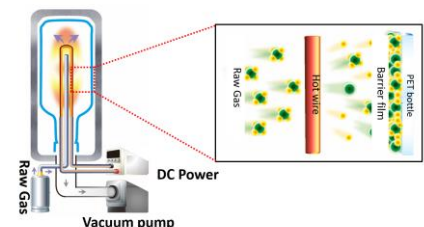
● **Research overview :**

In recent years, environmental concerns have led to the development of technologies to make PET bottles thinner and lighter. However, because thin PET bottles are easily permeable to oxygen, carbon dioxide and water vapor, there is a risk of oxidation and deterioration of the beverage contents, which limits weight reduction. Various gas-barrier technologies have been developed to reduce the permeation of oxygen

and other gases, but these have had problems such as reducing the transparency of the bottle, limiting the range of drinks that can be filled, and making recycling difficult.

● **How does it work?**

This technology uses special ceramic rods to form a thin film on the inner surface of the bottle that prevents the permeation of oxygen and other substances (see the above figure). By devising the type of film material and the conditions under which the film is formed, it has become possible to fill the bottles with a variety of clear and colorless beverages. In addition the bottles are recyclable in accordance with the Voluntary Design Guidelines for Designated PET Bottles issued by the [PET Bottle Recycling Promotion Council](#)^{*3}, thus reducing the environmental impact of the bottles.



● **What is a new thin film deposition using a hot wire CVD system?**

A PET bottle is filled with gas, the raw material for the film, and a ceramic rod (hot wire) is used to raise the temperature so that the decomposed gas is deposited on the inner surface of the PET bottle. The decomposed gas forms a film and prevents permeation.

With these features, this technology is expected to help reduce the weight of PET bottles even more than before, regardless of the liquid content.

*3: The PET Bottle Recycling Association is a voluntary organization established in 1993 by a number of industry groups, including manufacturers of PET bottles and manufacturers that use PET bottles for drinking and other purposes. It carries out awareness-raising, research and surveys on PET bottle recycling, and establishes voluntary

● What the WORLDSTAR WINNERS Are

The WORLDSTAR Packaging Awards 2021 is a contest run by the World Packaging Organization (WPO) with the aim of promoting the world's best packaging and its technology.

Winners of the Japan Packaging Contest, organized by the Japan Packaging Institute, are eligible to enter the WORLDSTAR Packaging Awards, where they compete against entries from around the world to win prizes. In the WORLDSTAR Packaging Awards 2021, 345 entries were received from around the world (the most, 26 came from Japan), and as a result of a rigorous selection process, the WORLDSTAR WINNER was given to Kirin Holdings' *New thin film deposition technology for PET bottles using hot wire CVD equipment*.

● What the “Dow Packaging Innovation Awards” Is

The Dow Packaging Innovation Awards are sponsored by The Dow Chemical Company, the world's leading chemical company. The Dow Packaging Innovation Awards, formerly known as the DuPont Awards, are now in their 32nd year and have a global history.

In this year's Dow Packaging Innovation Awards, "New thin film deposition technology for PET bottles using hot wire CVD system" was selected as one of the four finalists for the Diamond Award out of 175 companies from around the world.

Overview:

1. Research title:

New Thin Film Deposition Technology for PET Bottles Using Hot-wire CVD Device

2. Related paper:

[Impact of hot wire and material gas species on the Cat-CVD coating of gas barrier SiOC thin films onto PET bottles Surface and Coatings Technology](#), Volume 344, 25 June 2018, Pages 21-29

3. Name of awards:

- 1) WORLDSTAR Packaging Awards 2021/WORLDSTAR WINNERS
- 2) Dow Packaging Innovation Awards 2020/Diamond Finalists

4. Announcement date:

- 1) January 7, 2021
- 2) November 11, 2020

5. Winner:

- 1) Kirin Holdings Company, Limited, Mitsubishi Chemical Corporation
- 2) Kirin Holdings Company, Limited

###