

News Release

2023.5.30

Toray, Mitsui Chemicals and Kumagai Put People and the Planet First by Jointly Developing Revolutionary Mono-Material Film Packaging Material and Technology

Tokyo, Japan, May 30, 2023 – Toray Industries, Inc., Mitsui Chemicals, Inc., and Kumagai Co., Ltd., announced today that they have jointly developed a revolutionary mono-material film packaging material and manufacturing process that are free of volatile organic compounds (VOCs; see note). Carbon dioxide emissions are 80% lower than from conventional counterparts with this new material, which is also recyclable.

The lightness, transparency, and processing ease of these materials should make them popular choices for refillable pouch applications, including for foods, shampoos, and detergents. The market for these materials should keep growing more than 3% annually (see note 2) as the global population rises.

Regular film packaging material manufacturing uses petroleum solvents inks to print text, images, and other information on plastic films and in adhesives to laminate plastic films. These solvents release VOCs. The equipment required to heat, dry, and incinerate petroleum solvents in inks and adhesives consumes a lot of electricity. The lamination of plastic films with different materials to achieve various functions makes them hard to recycle, leading to their frequent incineration as waste.

VOC emissions from petroleum solvents in film packaging materials production have raised concerns about their impact on work environments. Another issue is the global warming impact of carbon dioxide emissions from their electricity consumption in production processes and from incineration during disposal.

These considerations prompted Toray, Mitsui Chemicals, and Kumagai to develop a mono-material film packaging material and manufacturing technology that is free of petroleum solvents for ink and adhesives and is recyclable.

Toray demonstrated printing for the new material's manufacturing process by employing its Toray proprietary IMPRIMA (see note 3) offset printing plate. The plate uses electron beam-cured printing inks that consume less electricity and need no thermal drying. Mitsui Chemicals verified the lamination process with adhesives that do not incorporate petroleum solvents. The manufacturing process is thus VOC-free because it does not use petroleum solvents for inks or adhesives.

Incorporating Kumagai's package manufacturing and processing technologies resulted in a mono-material film packaging material. This breakthrough makes the material far easier to recycle than regular counterparts.

Under this collaboration, Toray is leading the way with its printing technology. Mitsui Chemicals is providing total coordination for the new setup with its materials technology. Kumagai is leveraging its industry-leading package manufacturing technology. The three look to commercialize the new film packaging material for food and other daily necessities.

They will offer the material to distributors and brand owners to help alleviate the environmental impact of the film packaging industry and contribute to a sustainable economy.



Mono-material packaging film

	Printing process	Lamination	Film packaging materials
Conventional Offerings	<p>[VOC combustion treatment equipment]</p> <p>Ink (containing solvents) → Gravure plate → Printing → Petroleum solvents → Heating and drying</p> <p>Film (Material A)</p>	<p>[VOC combustion treatment equipment]</p> <p>Adhesive (containing solvents) → Coating → Petroleum solvents → Heating and drying → Film (Material B) → Laminate</p>	<p>Film made from different materials (hard to recycle)</p>
New Offerings	<p>Ink (solvent-free) → IMPRIMA plate → Printing → Electron beam curing</p> <p>Film (Material A)</p>	<p>Adhesive (solvent-free) → Coating → Film (Material A) → Laminate</p>	<p>Mono-material film (easily recycled)</p>

Regular and mono-material packaging film comparisons

Profile of Toray Industries, Inc.

Principal businesses: Manufacturing, processing, and selling fibers, plastics, and other basic materials

Headquarters: 1-1, Nihonbashi-Muromachi 2-chome, Chuo-ku, Tokyo

Establishment: January 1926

Representative: Akihiro Nikkaku, President and Representative Director

Profile of Mitsui Chemicals, Inc.

Principal businesses: Manufacturing and selling life & healthcare solutions, mobility solutions, ICT solutions, and basic & green materials

Headquarters: Tokyo Midtown Yaesu, Yaesu Central Tower, 2-1, Yaesu 2-chome, Chuo-ku, Tokyo

Establishment: October 1997

Representative: Osamu Hashimoto, President & CEO

Profile of Kumagai Co., Ltd.

Principal businesses: Manufacturing, processing, and selling plastic packaging materials

Headquarters: 3-10, Higashiodori 2-chome, Chuo-ku, Niigata, Niigata Prefecture

Establishment: January 1960

Representative: Masami Kumagai, President & CEO

Notes

1. Volatile organic compounds include toluene, xylene, and ethyl acetate, and are in organic solvent-based paints. VOC-free in this news release means zero emissions from these compounds in the drying process.
2. Source: The future of global flexible packaging to 2025, published by Smithers
3. IMPRIMA is the brand name for a Toray waterless printing plate that is free of dampening water containing volatile organic solvents during printing process and does not discharge alkaline processing liquid waste during plate making.

<https://www.toray.com/global/news/details/20211012134842.html>

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