

# Longer Shelf-Life, Less Waste

## *Barrier Materials Protect Food and Make Packaging more Sustainable*

Vast quantities of food are thrown away every year. Modern plastic packaging keeps food fresh and preserves its flavor for longer, so it reduces the amount of valuable produce that is wasted. At the same time, politicians are calling for more environmentally friendly packaging. Kuraray provides key barrier materials for this, including biodegradable polymers that are impermeable to gas.

Laminated with biodegradable film or paper, barrier polymer layers are suitable for use in packaging for dry goods such as coffee, snacks, sweets and animal feedstuffs (© Kuraray)



**D**emand for food is rising fast. According to the Federal Ministry for Food and Agriculture in Germany, agricultural yields need to be increased by up to two-thirds in the next 30 years in order to meet global demand. Food is a valuable commodity. Yet the United Nations estimates that 1.3 billion t of food are thrown away every year. Packaging keeps food fresh and safe for longer. Specialty chemicals company Kuraray markets high-performance polymers for packaging applications. Its water-soluble ethylene vinyl alcohol copolymer Exceval, its barrier copolymer Eval, and its biopolymer Plantic

preserve flavor and protect food from atmospheric oxygen and pollutants. The properties of these barrier materials help reduce food waste. At the same time, they make a contribution to cutting packaging waste and meeting the European Union's targets for sustainable packaging.

### *Protection against Oxidation*

Contact with oxygen causes oxidation of many foods, which affects their color, consistency and taste. In addition, an acid rich environment promotes the proliferation of microorganisms. As a result, food goes off

faster. Barrier plastics protect food from gases such as atmospheric oxygen, so it stays fresh for longer. They can be used in various types of packaging and packaging processes, from coating of films to retort packaging.

The barrier copolymer Eval is one of these materials. This polymer is suitable for use in co-extrusion processes and co-injection processes and as a monolayer for lamination. Eval keeps out oxygen so food retains its flavor. A layer as little as four micrometers of this polymer also protects packaged food from impurities such as mineral oils from recycled cartons (Fig. 1).



**Fig. 1.** A layer of only four micrometers of Eval barrier copolymer prevents impurities such as mineral oil from recycled cartons contaminating food (© Kuraray)

### Environment-Friendly Printable Barrier Layers

Another barrier material marketed by Kuraray is the ethylene vinyl alcohol copolymer Exceval, an aqueous solution that is used to coat packaging materials. That makes them impermeable to grease and oil and acts as an effective gas barrier (Table 1). This polymer does not contain chlorine or solvents and is biodegradable in water. Among other things, it meets the strict requirements of the US Food and Drug Administration and the criteria set by Germany's Federal Institute for Risk Assessment.

Oxygen transmission rate $\text{cm}^3 \cdot \text{m}^{-2} \cdot \text{day}^{-1} \cdot \text{atm}^{-1}$	Initial	After 20 cycles Gelbo Flex Testing
Towards $\text{O}_2$ -side	< 0.1	< 0.1
Toward $\text{N}_2$ -side	< 0.1	< 0.1

**Table 1.** Oxygen permeability of a PE film coated with Exceval and metallized, analyzed at 23°C and 65% relative humidity in 100% oxygen. The barrier layer shows good properties even after 20-fold torsion of the film (source: Kuraray)

By 2030, all packaging used in the European Union should be reusable or recyclable. Exceval can be used in combination with recyclable paper to produce environmentally friendly and sustainable alternatives to conventional packaging. It increases the functionality of paper. Moreover, coated paper containing up to 5% Exceval can be disposed of simply via the paper recycling process. In Europe,

more than 70% of waste paper is currently recycled, compared with less than a third of plastic waste. One reason is that recycling paper waste is far easier, so economically it often makes more sense than recycling plastics. Paper packaging with a barrier coating looks set to become increasingly important in the future, especially in the food industry.

### Biodegradable Packaging with a Gas Barrier

Biopolymers are one way of reducing packaging waste. Plantic is a recyclable and biodegradable biopolymer with high gas barrier properties that is certified for both industrial composting (Vinçotte: OK Compost) and domestic composting (Vinçotte: OK Compost Home). This biopolymer is based on the starch molecule amylose. It does not contain any artificial plasticizers and is around 80% starch. It is a very good barrier to atmospheric oxygen. Laminated to other biodegradable foil or paper, the new Plantic Compostable Film (CF) barrier seal produces biodegradable or, in the case of paper, recyclable barrier packaging. It is therefore suitable for packaging dry goods such as coffee, snacks, sweets and animal feed. Production of Plantic does not compete with food production. In addition, Plantic Technologies Limited only uses raw materials that are not genetically modified.

The South Korean packaging manufacturer Softpack uses a Plantic barrier layer in its new pouches for coffee beans (Fig. 2). The company has been presented with the Green Packaging Award by the



**Fig. 2.** Softpack's coffee packaging is biodegradable and impermeable to gas. The biodegradable barrier polymer Plantic is used in this packaging to keep out oxygen and make sure the coffee (© Softpack)

South Korean Ministry for the Environment for this product. Only biodegradable materials are used in these pouches, making them a sustainable, environment-friendly alternative to conventional packaging types that use aluminum foil or similar materials as a barrier layer. ■

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## Company Profile

Kuraray Co., Ltd. is a global specialty chemicals producer headquartered in Tokyo, Japan. Kuraray Europe GmbH is based in Hattersheim, Germany, and is a wholly owned subsidiary of the Japanese company.

## Service

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