

Versatile barrier layer for innovative packaging solutions in the food and beverage sector

Bio-based and biodegradable coating system for heat-resistant, water- and gas-impermeable coating of food and food packaging.

- Universally applicable for common packaging materials based on plant fibers
- compostable according to DIN EN 13432
- Heat resistant up to 110 °C
- Barrier against water vapor
- Barrier against O₂
- food safe and edible
- direct application to substrate by common methods such as glazing, laminating and spraying on
- Can be processed into films or granules

Fields of application

The barrier layers described can be used in a variety of ways for food packaging in which the exchange of water vapor and oxygen between the packaging contents and the packaging or the environment is to be prevented. The method is particularly suitable for bio-based, compostable packaging that is to be equipped with additional barrier functions (e.g. for packaging fresh meat). Furthermore, there is great potential in the convenience and catering sector as heat-stable disposable tableware.

Example tray made of paper, bagasse, bamboo and similar natural fiber-based materials:

By applying the oleogel layer, additional impermeability to the entry or exit of

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Service

Technologie-Lizenz-Büro GmbH has been entrusted with the exploitation of this technology and assists companies in obtaining licenses.

water vapor and/or oxygen can be achieved. In this way, softening of the packaging by products with a high water content or high water activity is prevented. In addition, a protective gas can be introduced into the package that does not escape or prevents oxygen from entering the package, thereby extending the shelf life of the food product. Furthermore, since the packaging is heat-stable in humid and dry environments, it can be used directly as a serving aid/plate/tray.

Other application ideas:

- Convenience food packaging where the package contents are to be heated in a moist environment and consumed immediately afterwards from the package, such as ready-to-eat meals and instant soups, stews, etc.
- Sustainable, compostable disposable packaging for festivals, street food markets, etc., for serving freshly prepared, moist food (such as sauces, stews, goulash). In addition, the packaging itself can be designed to be completely consumable and thus marketed as part of the product.
- Straws made of paper, cardboard, etc., which are protected from soaking by an internal coating.
- Ice cream cup

Background

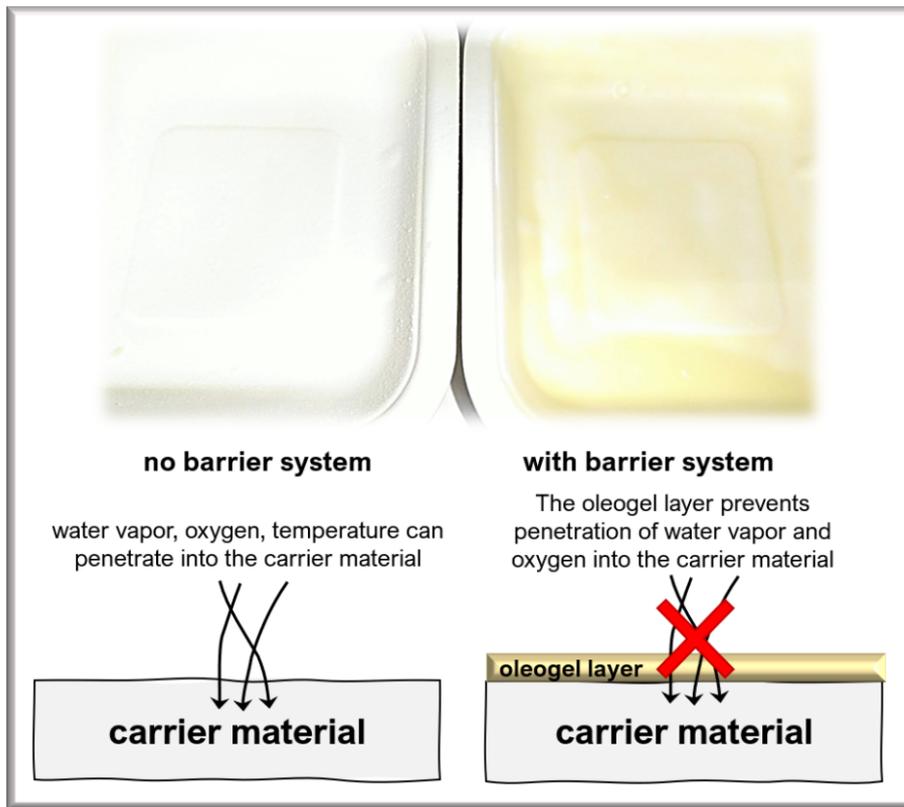
For some time now, the food packaging industry has been looking for a packaging system that fulfills the four main tasks (protective function against light, moisture, atmospheric oxygen and mechanical impact; storage function; transport function; advertising/sales function) and at the same time meets the increased requirements for sustainability. Sustainable packaging solutions usually consist of vegetable (waste or residual) materials whose fibrous components are reprocessed and pressed into the appropriate shape. In particular, the residues from wood, sugar cane, bamboo, hemp and cocoa processing are used to produce packaging, containers, cutlery and the like.

Problem

Bio-based and biodegradable packaging generally cannot prevent the transfer of moisture or water vapor and oxygen to a sufficient extent. Accordingly, the applicability of sustainable packaging solutions is more limited than compared to conventional but less sustainable plastic packaging. Accordingly, there are various solutions to compensate for these disadvantages, such as paper packaging with plastic coatings, but these are then again not recyclable.

Solution

A new innovative and universally applicable barrier coating for use in packaging has been developed at the University of Hohenheim. The newly developed, food-safe coating system promises to treat bio-based carrier materials to obtain a water- and gas-barrier packaging. According to the invention, this is achieved by oleogels. These are fats that are structured by certain gelling agents. Oleogels are easy to produce with standard equipment (oven with agitator or scraper heat exchanger) and can be bonded to a carrier material by softening at about 160 °C. The gels can also be produced by other methods. This can be done, for example, by common processes such as glazing, laminating and spraying. On the one hand, the coating can be applied directly after production, or it can be prepared as film or granules for further processing. Subsequent sealing of the packaging is also possible by selective heating and melting of the coating with conventional sealing tools and suitable material combinations. The protective function is not lost here, since the layer, even after softening, is in the form of a gel and does not liquefy, which could result in imperfections due to run-off. In addition, the oleogel layers can withstand high heat and mechanical stress. By changing the composition or adding additives, the oleogel layer can be optimally adapted to the particular application. The composition of the oleogel is purely vegetable due to the use of (refined) vegetable oils (such as rapeseed, sunflower or olive oil) and ethyl cellulose, which is why these barrier layers are ideal for sustainable packaging solutions that are fully compostable according to DIN EN 13432.



Demonstrator object: Bagasse shell without coating (left) and with oleogel coating (right). The coating provides a diffusion barrier for water vapor and gases or oxygen. In addition, the coating is heat-stable and mechanically resilient. (Image sources: University of Hohenheim)