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ABSTRACT

Bioplastics in food packaging

Background and potential application

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Packaging for food fulfils important protective functions and helps to reduce food loss if it is adapted to the product and its lifecycle. At the same time, however, packaging can pose an environmental problem. In addition to addressing the reduced use of packaging, the current debate focuses on the recyclability and substitution of plastics and the role of bioplastics. Clear communication and clarification are important in this respect: the term "bioplastics" is often not clearly defined in the way it is used.

FUNCTIONS AND PROPERTIES

For a product packaging system to be successful, the multifaceted functions and properties of the packaging must be carefully selected and coordinated. These functions include storage, which prevents food loss and/or contamination and makes warehousing, transport and distribution possible. Protection against extrinsic and intrinsic influences helps to preserve quality and enhances the shelf life of the products. Convenience is often the decisive factor for the success of a product. Furthermore, the packaging serves the purposes of communication in terms of required, necessary and voluntary information as well as enabling product and brand recognition.

The most important properties of packaging include resistance to physical and mechanical stress and its role as a barrier, e.g. against oxygen, water vapour and light. The possibility of migration from the packaging material to the contents and vice versa and the hygiene of the materials are also important aspects to be tested under application conditions.

SUSTAINABILITY

On the road to sustainable packaging, it is essential that we establish lifecycle thinking and recycling management. In terms of the design, manufacture, transport, use and end of life of packaging, this means it must be effective, i.e. fulfil its functions, and it must be efficient, i.e. minimise resource consumption, waste and emissions throughout the lifecycle. In addition, packaging must be cyclical, i.e. closed loops and maximised recovery are required, and it must be safe, i.e. environmentally friendly and pollutant-free.

BIOPLASTICS

The term describes a large family of materials with different properties. Since a uniform international definition is not yet available, these are usually described as materials that are either bio-based, biodegradable or both. Plastics that contain regenerative, bio-based molecule building blocks and build on them in whole or in part are considered bio-based and non-biodegradable. They are used in established synthesis processes to produce plastics with the same chemical compositions, properties and applications as petrochemical products (e.g. bio PET). These "drop-in solutions" thus make it possible to utilise existing possibilities for production, collection and recycling. Biodegradable plastics, on the other hand, are produced from renewable and petro-based raw materials. It is essential that the chemical composition should permit degradation. Depending on the environmental conditions where this is possible, we speak of "degradable", "biodegradable" or "compostable" plastics. We can thus distinguish between degradability and biodegradability. This is important because not every material that is no longer visible to the naked eye after a few weeks has actually biodegraded. Bio-based plastics are well suited for food packaging. However, it is necessary to recognise that bio-based materials, biodegradable materials and bioplastics in general cannot automatically be equated with sustainability. We need a lifecycle analysis to be able to make well-founded statements.

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