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EDITORIAL

Development and evolution of natural antioxidant active packaging

Desarrollo y evolución de envases activos antioxidantes de origen natural

Since 1930s, production of synthetic plastics from non-renewable resources (mainly from petroleum) has been growing with applications in different fields. The use of plastics in packaging began after World War II. Polyethylene films introduced transparent and resealable bags, being the bread bags the first application of contact with food. Nowadays, packaging is the largest single market for plastics (about a quarter of the total production) with a high proportion used for direct contact with foods (1). Polymers and low molecular weight additives compose the plastics, where the latter are necessary to maintain the plastic properties (2). During the late-1970s and early-1980s there was a number of publications reporting that small molecules diffused through the polymer chains in the plastic and moved to the contained food by means of a process called migration (3, 4). This kind of interaction between plastic packaging and food opened a new research field, and many materials were analysed for migration. Also, the identity and quantification of the diffusion rate of the migrants were reported, and legislation was established in order to protect the health of consumers who were not aware about the plastic components contaminating their food (5). The beginning of the 21 Century brought new analytical technologies that helped to quantify migration levels that were not able to be detected with the 20 Century technologies. The researchers working in that field concluded at some point that the interaction between plastic and food exist in all the cases, and could be limited but not completely avoided.

Then, the question was ¿why not to use non-toxic additives in plastics?; going further, why not to use the plastic packaging as a source of additives for food, in a system in which the additives can be delivered at known and controlled rate, according to the needs of the food. This was the born of the development of a type of active packaging based on the release of food additives, where antioxidant active packaging and antimicrobial active packaging are the main examples. As a common trend, during the 1990s most of the research groups, initially working in the topic of migration, started this new field of research (6, 7). Since then, hundreds of scientific papers and patents have been published in the topic of antioxidant active packaging. Few of them are commercially produced.

Undoubtedly, plastic packaging offers advantages related to the transport, protection and preservation of food, when compared to glass, metal or paper packaging. However, one of the main disadvantages is that the accumulation of non-biodegradable residues affects the planet. Moreover, the petrochemical-based plastics depend on the price of petroleum oil, whose reserves will eventually end up. Therefore, the alternative is to use renewable raw materials that can come from sub-products generated by the agriculture or food industry. In fact, several research groups are working with the aim of using the same food components as raw materials for food packaging (proteins, carbohydrates and fats). These bio-based materials also need additives in order to maintain or improve their properties. Furthermore, they can also be used as vehicles for delivering additives necessary for the food preservation. This kind of packaging is called bio-based active packaging, comprising two types: antioxidant and antimicrobial. Nowadays, the research is focused on the generation of enough data to develop novel technologies to commercially produce this kind of packaging. The development of protein films added with α-tocopherol is an example of this, and an article is included in the present number of this journal (8). In the past, several publications have reported the use of α-tocopherol as an active additive in conventional packaging with positive results for whole milk powder, vegetable oils and red meats (9-11).

The use of whey protein added with α-tocopherol to produce films for food packaging is an innovative development based on biomaterials, and takes advantage of the interactions between the components of the packaging and the food. This material will not depend on non-renewable resources to be produced; instead of that, it will help to use a sub-product of the dairy industry that could be a contaminant of the environment if it is not properly disposed. The article reports the fabrication process and characterization of the material. It leave us with curiosity, looking forward future publications to learn how is the performance of the interaction between the α-tocopherol with the whey protein and the food in contact with, as a real bio-based antioxidant active packaging system (8).

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