

The Nanocomposites, The Plastics and the Food Packaging Industry

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Submitted: 16 Aug 2019; Accepted: 21 Aug 2019; Published: 29 Aug 2019

Plastic is one of the most used materials in the food packaging industry and is essential to food processing [1]. Its global use is mainly because of its versatility, lightness, high mechanical strength, low cost, and consumer-friendliness. Moreover, plastic accomplishes the primary purpose of food packaging which is, maintaining the safety from hazards and quality of food [2]. But plastic waste is one of the biggest environmental problems today and one of the largest contributors comes from the food packaging industry [3]. To solve these problems or at least reduce them requires the cooperation of government, society, industry, and science. The government must create the strategic plans and the financial incentives, the scientific community, with the funds, will develop the alternative products which are then mass-produced by the industry towards the society that will use the alternative products. Without one of these sectors, the whole problem will not be tackled efficiently. Strategic plans for this problem already exist, such as the European strategy for plastics reduction and the scientific community over the last few years has presented several alternatives to replace plastics [4]. The plastic industry, nowadays, is keen on changing their production of plastic to renewable and biodegradable polymers from natural resources thanks to the incentives from the government, and society is more aware of the problem than ever in history and is trying to make some real change, after all, we don't have a planet B.

So, what are the solutions? Is there a perfect material for food packaging? Well there is no perfect material but there are a lot of promising alternatives, but today I will talk about one, nanotechnology. Nano composites are a trend in the food packaging industry because of some solutions that it offers such as increasing significantly the food shelf-life and it's completely changing the perception of packaging which is changing from a passive protective role into an active one, being used to preserve quality and stability of the food [5, 6]. To produce these materials there are generally two approaches, top-down and bottom-up. In the first approach, nanometric structures are obtained by size reduction of bulk materials while the second is the complete opposite and is produced from individual atoms capable of self-assembling through chemical reactions. These nano composites come in different chemical compositions, being the composition chose depending on the properties that we pretend from the packages. There is a wide range of main specific properties that nano composites might have such as the increased tensile strength, gas permeability, bioavailability, water resistance, flame resistance and antimicrobial activity [7].

Every day, new studies are being made for new nanocomposites applications in food packaging [7]. One of the new projects of our research group is exactly that, produce a new nanocomposite for frozen food, using nanocomposites with natural fibers; polylactic acid (PLA) and ZnO in order to enhance the hydrophobicity, mechanical strength, antibacterial, antimicrobial and barrier properties.

The advantages of these materials are undeniable but there are still some challenges that need to be considered. The toxicity of the nanomaterials to the human health and environment needs to be better understood before being put in the market or we will just be solving a problem creating a new one. Nevertheless, nanocomposites have the potential to have a very bright future in a wide range of applications in food packaging, from frozen food to fresh dairy products.

References

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