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Opinion

Nanotechnology and Agrofood Processing

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Nanotechnology is a modern technology that contributes to improving the agro-food industry, there are positive impacts for nano application in food manufactories include the development of functional foods, preservation, nano-packaging materials, nanosensors and the dairy sector. There is a growth of using Nanomaterials in the food processing systems particularly in packaging processing, currently, the United States ranking first position in nano food markets which expecting more growth in the current decade, while, Japan ranking the second position and followed by China as the main producer of nano-based food, there are more than 500 nano-based packaging products under commercial use in the food industry, functional foods and nutraceuticals product considered the main Nano-based products, while, the other products could expand in the near future.

There are various applications of nanotechnology in the agro-food industry, particularly in packaging processing, Nano-base materials improve packaging properties such as barrier, strength, flexibility, and stability, also, antibacterial and anti-fungal effects, and oxidative inhibitors properties of nano-based materials are important to increase the effectiveness of packaging, reserve food, and protect it from decomposition, Nano- based materials represent an important tool to increase the quality of various food products, prolong food shelf-life through release antimicrobials, antioxidants, enzymes, flavors, and nutraceuticals to extend shelf life of food products, the nano-packaging materials are uses in various practices like smart packaging, biodegradable packaging, bio-compatible packaging, modified atmosphere packaging, and improved packaging. so, using nano-based materials could play an important role in reserve food, improve quality, and raises food shelf life which increases food safety, also, the modified atmosphere packages increase carbon dioxide and minor oxygen percentages to extend food shelf life, from another side, using nano-based materials such as nano-composites improving the use of edible and biodegradable Nano-based films in the agro-food industry, promising results were obtained in the use of nano-based materials to minimizing food spoilage by inhibit gases release like ethylene and oxygen. In addition, Nano-based packaging could afford different significant functions, like reduce contamination and protection of food, reserve sensory quality, and provide proper information to consumers, furthermore, nano-packaging materials could reduce the wastes and protect the environment through minimizing packaging waste. In dairy processing, nano-based materials were used in the pipeline and as antimicrobial films to extend the shelf life of dairy products. While Nanosensors are another application of nanotechnology in food processing, it could determine the validity of packed foodstuffs, as well as monitoring the percentages of different gases inside packages and determine food validation, also, nano-based materials use as antioxidant solutions to enhancing the quality of perishable commodities and minimally processed of fresh products considered a novel. Of course, more research is required to obtain the various advantage of using nano-based materials in agro-food industry.

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