عنوان مقاله:

Nanotechnology in Food Industries: Application and Safety

محل انتشار:

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خلاصه مقاله:

Nanotechnology, as a scientific knowledge, is clearly defined as manipulation, fabrication, and application of particles with the size of less than 100 nm 1. Although the use of nanotechnology in food has recently emerged, it has dramatically grown 2. Nanoparticles which are generally divided into two categories (organic and inorganic) according to their composition can be used in food and food related-products in several domains, such as producing nano-formulated pesticides, fertilizers, and other agrochemicals; enhancing the safety and shelf life of products; improving tastes, colors, flavors, and bioavailability of vitamins and minerals; and preventing microbial corruption of packaged food 3, 4. Inorganic nanoparticles which consist mainly of metal, especially metal oxides, have been suggested to be effective due to antimicrobial activity and preservation action 5. Inorganic nanoparticles are generally composed of materials such as silver, titanium dioxide, zinc oxide, silicon dioxide, and iron oxide 6. Among them, silver nanoparticles are generally used in food and food packaging materials owing to their antimicrobial effect 7, 8. For instance, it has been claimed that some manufacturers used silver nanoparticles in a particular type of food container 9. Several studies indicated that these nanoparticles can be transmitted to food from the containers; therefore, led to concerns that they could be ingested by human 9- 11. Animal studies have revealed that these nano-silvers can be absorbed and then accumulated in various organs including the liver, small intestine, spleen, stomach, and kidneys 12, 13. At present, there is little information on the toxicity potential of nanoparticles. On the one handsome studies have indicated no toxicity; but on the other hand others have reported noticeable toxicity of nanoparticles 4, 12. For instance, it is reported that silver nanoparticles increase reactive oxygen species (ROS) production and decrease glutathione levels, as a major endogenous antioxidant scavenger, in human liver cells which lead to damage to cellular components and apoptosis 14. Moreover, some studies have indicated that nanoparticles can generate ROS which are toxic in lung epithelial cells and alveolar macrophage cells 15, 16. Furthermore, it is revealed that producing a large number of ROS which is induced by nanoparticles can be effective in the pathogenesis of neurodegenerative diseases, such as Parkinson and Alzheimer diseases 17, 18. Whereas, some animal studies have reported no toxic ... effects of silver nanoparticles 19, 20.Therefore, furt

کلمات کلیدی: