

Nanopack: A Nanotechnology-Based Antimicrobial Packaging Solution for Extension of Shelf Life and Food Safety

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Abstract : Microbial spoilage of food products is of great concern in the food industry due to the direct impact on the shelf life of foods and the risk of foodborne illness. Therefore, food packaging may serve as a crucial contribution to keep the food fresh and suitable for consumption. Active packaging solutions that have the ability to inhibit the development of microorganism in food products attract a lot of interest, and many efforts have been made to engineer and assimilate such solutions on various food products. NanoPack is an EU-funded international project aiming to develop state-of-the-art antimicrobial packaging systems for perishable foods. The project is based on natural essential oils which possess significant antimicrobial activity against many bacteria, yeasts and molds. The essential oils are encapsulated in natural aluminosilicate clays, halloysite nanotubes (HNT's), that serves as a carrier for the volatile essential oils and enable their incorporation into polymer films. During the course of the project, several polyethylene films with diverse essential oils combinations were designed based on the characteristics of their target food products. The antimicrobial activity of the produced films was examined in vitro on a broad spectrum of microorganisms including gram-positive and gram-negative bacteria, aerobic and anaerobic bacteria, yeasts and molds. The films that showed promising in vitro results were successfully assimilated on in vivo active packaging of several food products such as cheese, bread, fruits and raw meat. The results of the in vivo analyses showed significant inhibition of the microbial spoilage, indicating the strong contribution of the NanoPack packaging solutions on the extension of shelf life and reduction of food waste caused by early spoilage throughout the supply chain.

Keywords : food safety, food packaging, essential oils, nanotechnology

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