

# Employing nanoemulsions in food packaging: shelf life enhancement

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## Abstract

Recently, there has been a great deal of interest in implementing new nanotechnology-based approaches to improve the quality of food products. One of the relevant applications in this field is the use of nanoemulsions in the food packaging industry. In this research, the role of nanoemulsions in the food packaging industry and also the recent developments were discussed. Notably, numerous factors, including bacterial growth and oxidation reduce the quality and safety of foods, fruits, and vegetables. In this case, new food packaging systems need to be smart, programmable, and multifunctional. Nanoemulsion can be prepared as a delivery system in the form of an oil-in-water or water-in-oil system under different methods of preparation including low-energy and high-energy techniques. Nanoemulsion-based delivery systems may also contain dyes, flavorings, preservatives, disinfectants, or nutrients, depending on the purpose. This technology can prevent microorganism's growth, changes in food color and appearance, loss of weight, moisture content reduction, undesirable flavor and taste, and also decrease the rate of oxidation and browning compared to the samples with the common packaging. Despite the great potential of nanoemulsions, some specific issues exist which need to be addressed. Using these promising nanotechnologies some food properties such as taste, texture, flavor, color, spoilage, and stability can be controlled. To ensure the commercial use of nanoemulsions, further studies are needed to discover the application of nanoemulsions, their suitable carriers, optimize consumption, and remove obstacles in production and processing.