

Nanoencapsulation: A Game-Changer in Functional Food Development and Delivery Systems

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Introduction

In the field of food innovation, a novel technique called Nanoencapsulation is completely changing our perception of functional foods. This innovative method holds the key to improving the creation, distribution, and effectiveness of functional foods, indicating a future in which our everyday meals are not only scrumptious but also bursting with health advantages. Encasing probiotics, antioxidants, and other beneficial substances inside nanoparticles is known as nanoencapsulation. The encapsulated substances are protected from oxidation, degradation, and other environmental effects by these particles, which serve as protective shells. This technique allows for regulated release while maintaining the strength of these bioactives, resulting in optimal absorption and effectiveness within the body. By being nanoencapsulated, functional food additives can be added to meals and drinks more effectively. This can also help to increase shelf life and compatibility during the production, storage, transportation, and use of food products. It can also help to improve the bioavailability of the ingredients by demonstrating good functionalities, mask undesirable flavors and tastes to lessen their negative effects on mouthfeel, and regulate release rate or a particular delivery environment for optimal performance on their functionalities (Zhu & Huang, 2019).

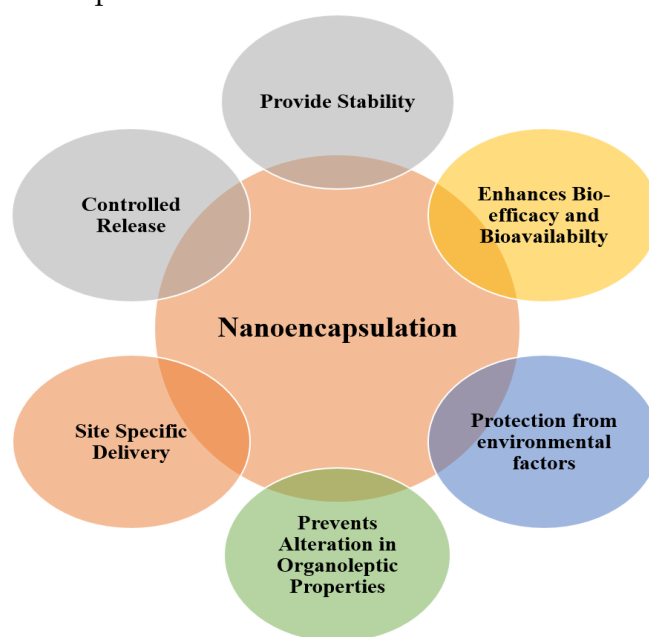
Enhancing Food Stability and Shelf Life

Maintaining the stability and shelf life of products, particularly those containing sensitive bioactive chemicals, is one of the fundamental issues in the food development process. By shielding these components from deterioration brought on by elements like heat, light, oxygen, and moisture, nanoencapsulation provides a remedy. Manufacturers are able to prolong the shelf life of their products without sacrificing their nutritional value or sensory appeal by encasing antioxidants, vitamins, and flavoring chemicals.

Targeted Delivery for Maximum Impact

Nanoencapsulation also enables targeted delivery of bioactive compounds to specific sites

within the body. By designing encapsulation systems with specific properties, such as pH sensitivity or surface modifications, researchers can ensure that these compounds are released at the desired location, whether it be the stomach, intestines, or bloodstream. This precision delivery enhances the bioavailability and efficacy of functional ingredients, maximizing their impact on health and wellness.



(Tiwari *et al.*, 2020)

Innovating Functional Food Formulations

Functional foods, which offer additional health benefits beyond basic nutrition, are gaining popularity among health-conscious consumers. Nanoencapsulation is driving innovation in this space by enabling the development of novel formulations with enhanced functionality. From fortified beverages and snacks to dietary supplements and personalized nutrition products, nanoencapsulation is unlocking new possibilities for delivering bioactive compounds in convenient and appealing formats.

Meeting Consumer Demands for Health and Convenience

In today's fast-paced world, consumers are increasingly seeking foods that not only taste good but also support their health and well-being. Nanoencapsulation addresses this demand by

allowing manufacturers to fortify a wide range of food and beverage products with bioactive compounds, without compromising on taste or texture. Whether it's adding vitamins to fruit juices, probiotics to yogurt, or omega-3 fatty acids to snacks, nanoencapsulation makes it possible to create functional foods that are both delicious and nutritious.

The Future of Functional Food

As research and development in nanoencapsulation continue to advance, the future of functional food looks brighter than ever. With the ability to enhance stability, target delivery, and innovate formulations, nanoencapsulation is poised to revolutionize the way we eat and think about food. From promoting overall health and wellness to addressing specific nutritional needs, this game-changing technology is paving the way for a new era of functional food development and delivery systems.

In conclusion, nanoencapsulation represents a paradigm shift in the food industry, offering limitless possibilities for creating functional foods that are not only delicious and convenient but also packed with health benefits. As consumers become increasingly conscious of the link between diet and health, nanoencapsulation stands ready to meet their demands for innovative, science-backed solutions that support their journey towards a healthier lifestyle.

Reference

- Zhu, J., & Huang, Q. (2019). Nanoencapsulation of functional food ingredients. *Advances in food and nutrition research*, 88, 129-165.
- Tiwari, S., Singh, B. K., & Dubey, N. K. (2020). Encapsulation of essential oils-a booster to enhance their bio-efficacy as botanical preservatives. *Journal of scientific research*, 64(1), 175-178.

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