

Preface

We dedicate this book to our parents

Nano: a small prefix makes a big difference

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Original concepts in food and agriculture have recently emerged following the discovery of the new properties of nanomaterials. For instance, the hydrophobic sheathing of leaves has been mimicked to coat food and agricultural materials at the nanoscale. Research in nanoscience has produced materials with unique properties such as nanotubes, nanofillers, nanoparticles, nanocomposites, nanoemulsions, nanoliposomes, nanoclusters and self-assembled nanoparticles. Nanoencapsulation of functional molecules in food matrices is a new formulation technique that enhances food quality and security. The hurdles previously observed during the fabrication of encapsulating nanostructures have been addressed. Research is actually aiming at developing novel nanodelivery vehicles, and evaluating their risks. In particular, localized delivery and controlled release of nutrients is a current topic (Figure 1). Nanofertilizers and nanopesticides has the potential to enhance agricultural productivity. However, the transfert of engineered nanoparticles in the food chain may induce a toxic risk. This book reviews the formation, synthesis, functionality, applications, regulation, safety and socio-economical aspects of nanoparticles in food and agriculture.

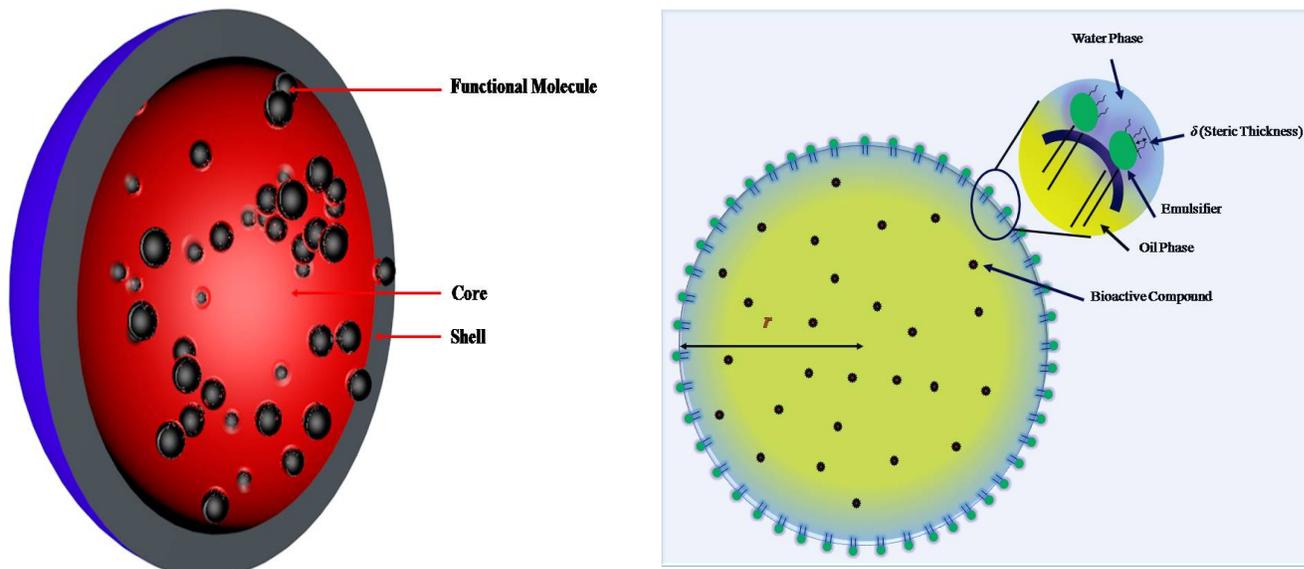


Figure 1: left: shell-core model of an encapsulation matrix used for the protection of functional molecules in food and agriculture. Copyright: H. Lohith, NIT Rourkela. Right: scheme of an oil droplet dispersed in water, stabilized by an amphiphilic emulsifier. The bioactive compound entrapped inside the oil droplet is a lipophilic molecule, which possess health benefits and disease prevention properties (Sarkar et al., chapter 4)

The first chapter by Yata et al. reviews patents and research trends. Sodano then explains the actual issues of nanotechnologies in light of the social, economical and political aspects of the food chain, in chapter 2. The principles and applications of nanosensors are presented by Srivastava et al. in chapter 3. In chapter 4 Kumar and Sarkar describe nanoemulsions for better nutrient delivery. Arora and Jaglan detail a specific application of nanocarriers for therapeutic resveratrol in chapter 5. Milk proteins can be used to encapsulation of active food ingredients, as explained by Poonia in chapter 6. In chapter 7 Dev et al. review the uptake and toxicity of nanomaterials in plants. Nanoparticle toxicity and regulatory frameworks are discussed in chapters 8 and 9 by Kaphle et al. and Kaundal et al. The concept of nanofertilizers is explained in chapter 10 by Sanivada et al. The impact of nanomaterials on the aquatic food chain is presented by Gupta et al in chapter 11. Finally, nanoremediation is presented by El-Ramady et al in chapter 12.

Thanks for reading

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