



Abstract

Encapsulation: A Promising Technology for Future Food Applications, but What Policies Are Countries Following Today? [†]

Emel Hasan Yusuf 

Department of Fruit, Vegetable and Nutraceutical Plant Technology, The Wrocław University of Environmental and Life Sciences, 51-630 Wrocław, Poland; emel.hasan.yusuf@upwr.edu.pl

[†] Presented at the 2nd International Electronic Conference on Foods—Future Foods and Food Technologies for a Sustainable World, 15–30 October 2021; Available online: <https://foods2021.sciforum.net/>.

Abstract: The simple definition of encapsulation is “enclosing something in a capsule”. Encapsulation is applied as micro- and nanotechnology in pharmaceutical and food sciences for varied materials. Moreover, we will see more implementations in the forthcoming years because of the promising nature of this technology. However, the adverse effects of encapsulated tiny materials are unknown, and the health authorities of countries do not follow specific legislations on micro- and nano-encapsulated foods. Indeed, applications of micro- and nanotechnology are observed with different regulations in different countries. For instance, in the USA, there are no regulations for encapsulation studies required by the FDA. Standard food tests are applied for micro and nano food products as well. In the European Union, no strict rules are required by the EFSA for approval requests from authorized institutions regarding the safety of food products utilizing micro- and nanotechnologies [1]. Furthermore, there are no regulations in Argentina, Canada, China, and the Republic of Korea for nanomaterials used in foods. Encapsulated food products are tiny, and the extent of accumulation of materials in the human body is unknown [2]. More importantly, encapsulated foods might create some unpredictable changes in the human body and produce harmful byproducts for the environment as well [3].

Keywords: micro-encapsulation; nano-encapsulation; food regulations; health authorities; side effects



Citation: Yusuf, E.H. Encapsulation: A Promising Technology for Future Food Applications, but What Policies Are Countries Following Today? *Biol. Life Sci. Forum* **2021**, *6*, 83. <https://doi.org/10.3390/Foods2021-11061>

Academic Editor: Diego Moreno-Fernandez

Published: 14 October 2021

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2021 by the author. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/Foods2021-11061/s1>.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data available in a publicly accessible repository.

Conflicts of Interest: The author declares no conflict of interest.

References

1. Maksimović, M.; Omanović-Miklićanin, E.; Badnjević, A.; Maksimović, M.; Omanović-Miklićanin, E.; Badnjević, A. Is Nanofood Safe? In *Nanofood and Internet of Nano Things*; Springer International Publishing: Cham, Switzerland, 2019; pp. 87–137. [\[CrossRef\]](#)
2. Rahman, U.U.; Sahar, A.; Ishaq, A.; Khalil, A.A. Design of nanoparticles for future beverage industry. In *Nanoengineering in the Beverage Industry: Volume 20: The Science of Beverages*; Elsevier: Amsterdam, The Netherlands, 2019; pp. 105–136. [\[CrossRef\]](#)
3. McClements, D.J.; Xiao, H. Is nano safe in foods? Establishing the factors impacting the gastrointestinal fate and toxicity of organic and inorganic food-grade nanoparticles. *Npj Sci. Food* **2017**, *1*, 6. [\[CrossRef\]](#) [\[PubMed\]](#)