

UC Davis

UC Davis Previously Published Works

Title

Editorial: Novel delivery systems of flavors and essential oils: exploring potential health applications in foods

Permalink

<https://escholarship.org/uc/item/7t6149s5>

Journal

Frontiers in Nutrition, 10

ISSN

2296-861X

Authors

Gravelle, Andrew J
Saffarionpour, Shima
Wright, Amanda Joyce

Publication Date

2023

DOI

10.3389/fnut.2023.1183878

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at <https://creativecommons.org/licenses/by/4.0/>

Peer reviewed



OPEN ACCESS

EDITED AND REVIEWED BY
Alejandro Cifuentes,
Spanish National Research Council, Spain

*CORRESPONDENCE

Andrew J. Gravelle
✉ agravelle@ucdavis.edu
Shima Saffarionpour
✉ ssaffarion@gmail.com
Amanda Joyce Wright
✉ ajwright@uoguelph.ca

SPECIALTY SECTION

This article was submitted to
Nutrition and Food Science Technology,
a section of the journal
Frontiers in Nutrition

RECEIVED 10 March 2023

ACCEPTED 29 March 2023

PUBLISHED 18 April 2023

CITATION

Gravelle AJ, Saffarionpour S and Wright AJ
(2023) Editorial: Novel delivery systems of
flavors and essential oils: exploring potential
health applications in foods.
Front. Nutr. 10:1183878.
doi: 10.3389/fnut.2023.1183878

COPYRIGHT

© 2023 Gravelle, Saffarionpour and Wright.
This is an open-access article distributed under
the terms of the [Creative Commons Attribution
License \(CC BY\)](#). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that the
original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with these
terms.

Editorial: Novel delivery systems of flavors and essential oils: exploring potential health applications in foods

Andrew J. Gravelle^{1*}, Shima Saffarionpour^{2*} and
Amanda Joyce Wright^{3*}

¹Department of Food Science and Technology, College of Agricultural and Environmental Sciences, University of California, Davis, Davis, CA, United States, ²Department of Chemical Engineering & Applied Chemistry, Faculty of Applied Science & Engineering, University of Toronto, Toronto, ON, Canada, ³Department of Human Health and Nutritional Sciences, College of Biological Science, University of Guelph, Guelph, ON, Canada

KEYWORDS

encapsulation, flavors, essential oils, foods, delivery

Editorial on the Research Topic

Novel delivery systems of flavors and essential oils: exploring potential health applications in foods

Encapsulation serves to protect and promote the delivery of volatile and otherwise labile compounds for a myriad of applications. It is applied extensively across a wide range of fields, including the pharmaceutical, cosmetics, and food industries. Food applications include the delivery of bioactive nutraceuticals (e.g., vitamins, minerals, pre- and probiotics), as ingredients for food fortification, to enhance or control the release of encapsulated molecules, and to carry flavor and aroma compounds. As carriers of flavors and essential oils, encapsulated systems can contribute to the sensory attributes and palatability of foods and food ingredients, as well as to the biological activities of the encapsulated compounds. As such, interest in exploring novel encapsulation strategies for these applications remains high. This Research Topic aims to highlight recent developments in this area.

The review by Lazar et al. focuses attention on the relevance of encapsulation to gut microbiota and its modulation by essential oils and nanoparticles. It contributes to an enhanced understanding of how nanomaterials, essential oils, and active terpene molecules in encapsulated systems can influence and modulate the human gut microbiota. It discusses the impacts on improving lipolysis, suppressing body weight, reducing systemic inflammation, and potential anti-pathogenic activity in the gut. Due to the complexity of the gut microbiome, the impacts of both encapsulated and encapsulant materials are areas requiring further investigation. Indeed, there is significant potential to leverage a better understanding of encapsulation technologies on bioactive delivery, and ultimately health consequences, as mediated through the gut microbiota.

The review by English et al. sheds light on the application of different approaches and techniques for encapsulating flavor compounds. It highlights the influence of preparation technique on particle size and morphology of the produced nano- or micro-particles as encapsulants or colloidal emulsion systems. As key factors influencing the stability of encapsulated flavors, the impact of wall material selection and the interaction of flavors

with the encapsulant are discussed. In conclusion, they elaborate on the application of encapsulated flavors in functional foods and ultimately emphasize the need to further explore the influence of encapsulation technique on binding, oxidative stability, and controlled release of flavors.

In their original research contribution, [Chen et al.](#) report on the value-added proposition of extracting essential oil from litchi tree flowers which are pruned as a standard cultivation practice for increasing litchi fruit yields. This work highlights the effects of the essential oil on energy intake, metabolic rate, and lipid metabolism under different feeding conditions using nematodes (*Caenorhabditis elegans*) as a biological model. The authors provide evidence that litchi flower essential oil could alleviate lipid accumulation and identified the relevant signaling pathways responsible for this outcome. The work sheds light on the biological mechanism responsible for possible lipid-lowering effects of litchi flower essential oil. It justifies further investigation to extrapolate these findings to other animal models, and ultimately human populations.

Lastly, [Tang et al.](#) report on an *in-situ* complex coacervation spray drying process to protect limonene from citrus peel oil in alginate-gelatin microparticles. The researchers included a food-grade latex polymer (ethylcellulose), aiming to improve volatile retention, and characterized the moisture and oxygen barrier properties of the microparticles with the embedded latex excipient. The reported experiments elucidate the influence of latex on microcapsule size and retention of limonene during spray drying. In addition, the impact of storage conditions and relative humidity on the shelf-life and retention of the volatile flavor were explored. Ultimately, limonene encapsulated by complex coacervation with latex ethylcellulose accelerated volatile losses, generating important insights about the nuances of controlled release.

The contributions in this Research Topic showcase that research on delivery systems for flavors and essential oils, and the biological role of both the encapsulants and encapsulated compounds, continue to be an active and exciting area. Encapsulation technologies are central to realizing the potential health benefits of many bioactive molecules. Continued progress will yield further insights, enabling the design of novel and effective delivery strategies that are tailored for a broad range of applications.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.