

Novel insights on recent advances to enhance the quality of plant-based food O/W emulsions

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Taha Mehany^{1,2}¹Department of Food Technology, Arid Lands Cultivation Research Institute, Egypt²Department of Chemistry, University of La Rioja, Spain

Correspondence: Taha Mehany, Department of Food Technology, Arid Lands Cultivation Research Institute (ALCRI), City of Scientific Research and Technological Applications 21934 Alexandria, Egypt, Department of Chemistry, University of La Rioja, 26006 Logroño, Spain, Email tmehany@srtacity.sci.eg

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Editorial

The global challenges associated to human food sustainability are currently more critical than recently as the severe outcomes of epidemics, conflicts, and climate change. Moreover, human demand are shifting their daily foods to consume more plant-based foods than animal one for natural, sustainability, green, well-being and health foods motives. Plant emulsions are ideal model for delivering bioactive molecules and or nutraceuticals, on the other hands, instability concern limits the emulsions developemnt. Addition stabilizers is an efficient approach to enhance the plant-based food emulsions stability. Hence, the heavy reliance on chemically manufactured surfactants to accomplish long-term stability has become the main practical shortcoming limiting the application of water in oil emulsions in food industry. Therefore, due to safety issues, the natural stabilizers are appealing more attentions in agro-food industries. The natural plant polysaccharides have exceptional thickening and emulsifying properties, thus, they are commonly used as thickeners or stabilizers in emulsions formulation. The utility of plant polysaccharides in enhancing the stability of emulsions has positive findings to improve the technofunctional aspects of the end product.¹

In other study, the application of cellulose nanoparticles as a green, cost-effective and sustainable stabilizers for preparation of plant-based food emulsions was reported. Fibrillar cellulose nanocrystal and/or nanofibril stabilize Pickering models due to their capability to adsorb at O/W interfaces, and making a protective layer. They also form associatory structure in the continuous segment, avoiding flocculation as well increasing the viscoelastic properties of the emulsion. Nanocellulose-based Pickering emulsion has been utilized to obtain edible soft ingredients with numerous functionalities. These results are anticipated to stimulate the application of nanocelluloses as functional constituents to develop a food grade emulsion with improved performance as well novel technofunctional properties.²

Combining surfactants with protein polysaccharide hybrid particles for obtaining high internal phase emulsion in novel plant-based mayonnaise was recently studied. The protein polysaccharide hybrid particles presented high thermal and physical stability than the mayonnaise. *In vitro* digestion fate showed that the digestible fat in protein polysaccharide hybrid particles could reach at a minimal value of 1/11 of that in the mayonnaise as Zein-CFG-Lc particles (ZCLPs) can efficiently inhibit the lipid digestion of protein polysaccharide hybrid particles in the small intestine and therefore, produce a low-calorie product.³ Plant-based protein has capable technofunctional properties that can be utilized for developing an innovative O/W protein emulsions model. Due to world necessities of cost-effective, eco-friendly policies, and green food processing approaches, for example high pressure processing (HPP) and ohmic heating (OH) are of great interest. These emerging methods possess the great potential to alter protein structure and thus, their techno-functions. Furthermore, fundamental investigations about the connection amongst functionality and protein structural alterations of more conventional plant-based proteins is still essential. Besides,

extra studies are required on plant proteins based on less investigated sources, highlighting those demonstrating both quality parameters and techno-functional aspects of interest.⁴

In addition, using plant matrices to produce the plant-based food emulsion has abundant restrictions, such as short shelf life and low stability. Thus, a recent study discussed the emerging food processing approaches, like OH, HPP, ultra-high-pressure homogenization (UHPH), cold atmospheric plasma (CAP), pulsed electric field (PEF), ultrasound (US), ozone (O₃), and ultraviolet C (UVC) to overwhelmed their main challenges. These emerging technologies have a vast potential at the lab scale to improve physicochemical characteristics, increase stability and extend the shelf-life, decrease food additives, increase nutritional and organoleptic qualities of the end product. This study reported that, development of plant emulsion by these novel technologies on a large scale can be expected in the future to formulate innovative and sustainable foods that can offer green alternatives to conventional food processing, furthermore, extra development is still required for broader marketable applications.⁵ In sum, emerging food processing technologies can help guaranteeing the quality and preservation of plant-based food emulsions, and act as efficient apparatuses to develop technofunctional properties of plant proteins guaranteeing health and nutritional characteristics. On the other hands, none of these technologies realized hundred percent efficacy nor were wide-ranging for all plant-based food emulsions. Finally, we recommend more and more studies to address the following opinions:

- Investigations are essential for multidisciplinary academic and industrial alliance relating economics, food engineering, food industry, environmental investigators, application at bulky level, and cost-effective commercialization for sustainable, and “green” food processing procedure.

- b. Searching for novel and less-studied plant-based stabilizers of O/W emulsions.
- c. The emerging approaches must include toxicity and nutritional features, for example, the interaction with other food ingredients, as well the performance in the gastrointestinal tract (GIT) in terms of digestibility and bioavailability.

As an associate editor of MOJ Food Processing & Technology, I tried to narrate recent investigations that highlight the recent innovation and advances are involved to enhance the quality of plant-based food emulsions. Indeed, the importance of this topic in the current time is very crucial for facing the future challenges that our society has. I would like to sincerely thank all the authors for their great contributions either fundamental reports or applied ones published in MOJ Food Processing & Technology. I hope that readers of the MOJ Food Processing & Technology will find it motivating and valued to their own investigation. We sincerely welcome and value all of your research and ideas regarding the topic of emerging technological and recent advances used in novel food processing as well plant-based food emulsions and are sure these will continuously improve MOJ Food Processing & Technology.

Authors contribution

Taha Mehany: Conceptualization, Writing – original draft, Writing – review & editing.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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