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Editorial

Introduction to the Special Issue "Extraction and Fractionation Processes of Functional Components in Food Engineering"

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Diet plays an unquestionable role in the growth, development, and maintenance of all body functions. Foods are a source of a multitude of compounds, such as proteins, lipids, carbohydrates, peptides, oligosaccharides, and antioxidants, among others, that go beyond basic nutrition. Harnessing the full potential of the diversity of the nutrients in food becomes essential to enable its use as prophylactic therapy, with the potential to minimize the incidence of several metabolic disorders affecting humans. Food processing is evolving from a traditional approach, with the technical aspects as the main focus, toward a bio-guided strategy, which strives to maintain or improve the original biological and functional properties of food compounds. The development of a holistic approach with cost-competitive yet bio-guided food processing strategies is needed to deliver healthy and nutritious food for everyone.

This Special Issue of Journal Processes includes seven outstanding papers describing novel advances in the development and application of innovative processing strategies, in order to extract, isolate, and modify food compounds to produce ingredients and foods with improved nutritional, functional, and biological properties.

In the review of Franca-Oliveira et al. [1], the existing evidence of suitable, cost-effective, and environmentally friendly technologies to extract high concentrations of valuable proteins from traditional and alternative natural sources is summarized. Novel and eco-sustainable approaches are compared with conventional methods, describing their advantages and current limitations. Moreover, in this article, the combination of these methods with enzymatic hydrolysis is described as a successful strategy to release bioactive peptides at high yield and concentration, which could enable their incorporation into food products and supplements to prevent/treat chronic diseases of high incidence and mortality in our society. One of these eco-friendly extraction technologies is the aqueous extraction process, which relies on the use of upstream mechanical treatments to disrupt the matrix and facilitate the release of intracellular compounds into water. This sustainable approach is used by Dias et al. [2] to concurrently extract oil and protein from almond flour. The proof of concept of this process was demonstrated at a 7 L scale with respect to oil and protein extractability and their distribution amongst the fractions that were generated. Moreover, the impact of enzymatic and chemical demulsification approaches was evaluated on the physicochemical properties and stability of the emulsion proteins and final oil recovery. Aqueous extraction, followed by chemical or enzymatic demulsification, produced a final oil with a similar fatty acid composition to hexane extracted lipids.

In addition to soybean oil, there has been an increasing interest in the use of techniques with a reduced environmental and economic impact to produce plant-based oils such as coconut, flaxseed, and hemp seed as a source of added-value oils. Although expeller

Citation: Hernández-Ledesma, B.; da Silva, R.C.; De Moura Bell, J.M.L.N. Introduction to the Special Issue "Extraction and Fractionation Processes of Functional Components in Food Engineering". *Processes* **2022**, *10*, 1425. https://doi.org/10.3390/pr10071425

Received: 30 June 2022
Accepted: 10 July 2022
Published: 21 July 2022

pressing and flammable solvent extractions are common methods that are used for oil extraction in the food industry, the low yield for expeller pressing and the environmental impact resulting from the use of organic solvents remain the main concerns limiting the current application of both traditional methodologies, highlighting the importance of alternative green alternatives such as supercritical CO_2 and enzyme-assisted extractions. In the review of Lavenburg et al. [3], the advantages and disadvantages of conventional and novel eco-friendly approaches applied to extract oil from seed by-products are summarized from economic, environmental, and practical perspectives.

Similarly, other food wastes can be a source of bioactive compounds for subsequent recovery and industrial/nutraceutical applications. In the review of Risner et al. [4], the potential of untreated whey permeate as a growth medium for recombinant *Escherichia coli* is described as an affordable approach to microbially produce pinene, a secondary plant metabolite with functional properties as a flavor additive and cognitive health benefits. This process would allow valorizing a dairy by-product by converting it into a valuable co-product, while reducing the detrimental environmental impact that is associated with its disposal. Seeking the development of circular processes, the research of Truong et al. [5] aimed at isolating acid-soluble collagen from snakehead fish (*Channa striata*) by-products, including skin and skin–scale mixtures. The functional and rheological properties of extracted collagen are evaluated, showing that proteins that are obtained from marine sources have the potential to be used as a promising alternative to mammalian collagens.

In the study of Handa et al. [6], the angiotensin-converting enzyme (ACE) inhibitory potential of fermented and non-fermented soy products and isolated 7S and 11S protein fractions is evaluated after their digestion under simulated gastrointestinal conditions. The results of this research provide evidence supporting the important biological role of these products as new functional foods or ingredients to prevent and/or control hypertension and associated diseases.

In addition to extraction methods, in this Special Issue, techniques that are applied for the characterization of the extract compounds are included. The study of Félix-Palomares and Donis-González [7] focuses on the application of Response Surface Methodology (RSM), a multivariate statistic technique, in combination with a Box–Behnken experimental design to optimize and validate the Rancimat operational parameters such as sample weight, temperature, and airflow. The optimized approach allows the identification of standard operational parameters for a more precise, accurate, and efficient determination of walnut oil induction time (resistance of lipids to be oxidized) estimations.

Author Contributions: Writing—original draft preparation, B.H.-L.; writing—review and editing, B.H.-L., R.C.d.S. and J.M.L.N.D.M.B. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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