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Editorial

Special Issue: Application of Proteomics and Enzyme Technologies in Foods

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This Special Issue entitled "Application of Proteomics and Enzyme Technologies in Foods" explores the latest progress and perspectives on the development and application of enzyme technologies, proteomics, and bioprocessing in the context of food science. The collection of research papers included in this Special Issue encompasses various aspects, including the optimization of texture modification processes, the development of natural antioxidants, the production of antimicrobial compounds, the extraction of bioactive proteins, the purification of valuable enzymes, and the enhancement of wine quality.

One study focused on the microstructure and cross-linking of casein proteins through ultrasound-assisted transglutaminase catalysis, demonstrating improved polymerization using a combination of transglutaminase and ultrasound treatment. Another investigation optimized the texture modification process of yellowfin sole to enhance its suitability for consumption by the elderly; the result was a soft flesh texture with desirable microbial, physicochemical, and sensory qualities. The potential of bioactive peptides derived from egg whites and fish as natural antioxidants and enzyme inhibitors was also explored, offering safe alternatives to synthetic compounds. Furthermore, the production of phenyllactic acid through lactic acid bacterial fermentation of *Porphyra* residues showcased a cascading biorefinery approach for obtaining a potent antimicrobial compound. Another study highlighted the enzyme-assisted extraction of phycobiliproteins from *Porphyra*, demonstrating their bioactivity and potential applications. Lastly, the secretion, purification, and characterization of fructan sucrase as well as the enhancement of wine quality using a *Saccharomyces cerevisiae* mutant were investigated, which provided novel approaches for industrial applications. These studies collectively contribute to advancing the field of food science and provide valuable insights into enzyme technologies and bioprocessing techniques for improving food quality, functionality, and sustainability.

Seven high-quality papers have been published in this Special Issue. The accepted publications, all of which are available online at https://www.mdpi.com/journal/processes/special_issues/Proteomics_Enzyme_Foods (accessed on 28 February 2022), cover a range of protein, enzyme, and bioprocessing technologies in the food sector. The accepted papers showcase novel approaches, validate the methods employed, and provide motivation for further investigation. Below are the cited papers, accompanied by a brief explanation of their main topics and contributions.

(1) C. C. Chen et al. Ultrasound-Assisted Transglutaminase Catalysis of the Cross-Linking and Microstructure of αs-Casein, β-Casein and κ-Casein [1].

This paper investigated the effects of ultrasound-assisted transglutaminase catalysis on the microstructure and cross-linking of caseins. Although transglutaminase was used to cross-link αs-casein, β-casein, and κ-casein, which resulted in the formation of highmolecular weight polymers, the combination of transglutaminase and ultrasound treatment significantly increased the rate of polymerization compared to transglutaminase alone. Transmission electron microscopy confirmed the formation of network structures

Citation: Hsieh, J.-F. Special Issue: Application of Proteomics and Enzyme Technologies in Foods. *Processes* **2023**, *11*, 1817. https://doi.org/10.3390/pr11061817

Received: 4 June 2023
Accepted: 14 June 2023
Published: 15 June 2023

from the cross-linked caseins. Overall, the results indicate that ultrasound treatment enhances transglutaminase-polymerized reactions, leading to the improved polymerization of caseins. The combination of transglutaminase and ultrasound treatment demonstrated superiority as a method for polymerizing caseins.

(2) W. H. Cho et al. Optimization of Texture-Modified Yellowfin Sole (*Pleuronectes aspera*) by Enzymatic Treatment and Superheated Steam Treating to Improve Quality Characteristics [2].

This paper focused on optimizing the texture modification process of yellowfin sole (*Pleuronectes aspera*) to enhance its quality characteristics for improved consumption by the elderly. For the optimized enzymatic treatment, a protease concentration of 1.00% (*w*/*v*) and an immersion time of 3.16 h were utilized. The texture modification process led to a decrease in hardness and an increase in overall acceptance values when compared to products processed without enzymes. The texture-modified yellowfin sole exhibited a soft flesh texture that is well-suited for consumption by the elderly. It also possessed desirable microbial, physicochemical, and sensory qualities, presenting a suitable and safe food option, especially for elderly individuals with dysphagia.

(3) A. Thaha et al. Food-Derived Bioactive Peptides with Antioxidative Capacity, Xanthine Oxidase and Tyrosinase Inhibitory Activity [3].

This paper investigated the potential of 11 bioactive peptides derived from egg whites and fish proteins as natural antioxidants. Among the bioactive peptides, VWWW (VW4, derived from mackerel meat) exhibited the highest antioxidant activity. Additionally, VW4, IW3 (derived from egg white) and VS14 (derived from tuna backbone protein) demonstrated competitive inhibition against xanthine oxidase and tyrosinase. These peptides demonstrate promising potential as natural inhibitors of xanthine oxidase and as antioxidants for the prevention of milk fat oxidation and the inhibition of tyrosinase oxidation caused by food. In general, these peptides exhibit great potential as safe and natural agents for antioxidants, anti-enzymatic browning, and inhibiting xanthine oxidase activity.

(4) C. H. Huang et al. Production of Phenyllactic Acid from *Porphyra* Residues by Lactic Acid Bacterial Fermentation [4].

Utilizing a cascading biorefinery approach, this paper explores the production of phenyllactic acid (PhLA, a potent antimicrobial compound) through the lactic acid bacterial fermentation of *Porphyra* residues. The fermentation process involved inoculating *Porphyra* residues, ultrafiltration eluate, phenylalanine, and yeast extract with LAB strain KP3, resulting in PhLA content equal to 1.86 mg. In order to optimize the process, commercial cellulase replaced the ultrafiltration eluate, leading to the acquisition of 4.58 mg of PhLA, which was 2.5 times higher than for MRS broth cultivation. This paper demonstrates the feasibility of lactic acid bacterial fermentation as an algae biorefinery method for obtaining PhLA from *Porphyra* residues.

(5) C. H. Huang et al. Enzyme-Assisted Method for Phycobiliproteins Extraction from *Porphyra* and Evaluation of Their Bioactivity [5].

The focus of this paper was to develop an enzyme-assisted method for the extraction of phycobiliproteins from *Porphyra* while assessing their bioactivity. Two marine strains (MAEF108 and MA103) were cultured with *Porphyra* powder to induce enzyme production, resulting in increased enzyme activity in the culture supernatant. The extraction of phycocyanin and phycoerythrin involved incubating *Porphyra* in the crude enzyme solution, followed by homogenization, ultrasonication, and ultrafiltration. The resulting fractions, identified as R-phycoerythrin, R-phycocyanin, and small molecular phycoerythrin, exhibited varying degrees of free radical scavenging, antioxidant activity, and concentration-dependent angiotensin-converting enzyme inhibitory activity. The enzyme-assisted extraction process proved to be a feasible method for obtaining highly pure and bioactive phycobiliproteins from *Porphyra* without compromising functionality.

(6) J. Wang et al. A Fructan Sucrase Secreted Extra-cellular and Purified in One-Step by Gram-Positive Enhancer Matrix Particles [6].

This paper focused on the secretion and purification of fructan sucrase. The fructan sucrase gene from *Bacillus subtilis* was cloned and transformed into *Escherichia coli* BL21, resulting in three clones: BS-FF, BSO, and BS. Optimal conditions for enzyme expression were determined, including an IPTG concentration of 0.5 mM for BS-FF and 1.0 mM for BSO, with an incubation temperature of 28 °C for 8 h. The purification rates of recombinant fructan sucrase including BSO and BS-FF were 84.99% and 97.70%, respectively. Characterization of the bioactivity of the purified enzyme revealed that the optimal pH conditions and temperature were 5.6 and 50 °C, respectively. This paper provides a novel method for the production and purification of fructan sucrase, offering the potential for large-scale enzymatic fructan production and industrial applications.

(7) P. F. H. Lai et al. Improved Phenolic Compositions and Sensory Attributes of Red Wines by *Saccharomyces cerevisiae* Mutant CM8 Overproducing Cell-Wall Mannoproteins [7].

This paper aimed to enhance the quality attributes of red wines by using the *Saccharomyces cerevisiae* mutant CM8, which overproduces high-mannose mannoproteins. The mannoproteins isolated from the CM8 mutant exhibited significantly higher mannose content in the polysaccharide fraction compared to the parent strain. Compared to wines produced using the parent strain (SC-WIN), red wines produced using CM8 and winter grapes (CM8-WIN) exhibited substantially higher levels of total anthocyanins, flavonols, and tannins as well as superior color, consumer preference, and flavor compared to wines produced using the parent strain (SC-WIN). Overall, the utilization of the CM8 mutant as a starter during fermentation improved the quality attributes of red wine through interactions between high-mannose mannoproteins and wine compounds.

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

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