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Editorial

Special Issue "Novel Developments in the Bioproduction of Biochemicals and Biomaterials"

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Bioprocesses with new environmentally friendly approaches, along with new perspectives that favor a transformation from conventional production routes to sustainable alternatives, as envisioned in the UN 2030 Agenda for Sustainable Development, will play an important role in the near future. The shift towards sustainable processes is focused on the development of biorefineries, producing valuable compounds from biomass, as well as on the use of new technologies based on renewable resources (from both marine and specific terrestrial ecosystems), agricultural wastes, and industrial byproducts. The sustainable bioconversion of such feedstocks or raw materials into a wide range of high-value products, including chemicals, reagents, or therapeutic agents, and the improvement of such bioprocesses, will result in a valorization of sub-products, having a positive impact on both the environment and the economy. This Special Issue on *Novel Developments in the Bioproduction of Biochemicals and Biomaterials* in *Applied Sciences* aims to bring together some of the latest research in this field. Its scope includes potentially sustainable processes that comprise the use of byproducts or waste materials originating biochemical building blocks, biochemicals, biopolymers, and/or high-end value bioproducts for the pharmaceutical, cosmetic, and nutritional/food industries. A total of five papers (two original research papers and three specialized reviews) focusing on the biological production of commercially important biomolecules were published in this issue.

Carrot pomace, the main waste obtained from carrot juice extraction, accumulates phenolic compounds in response to stress conditions. Sánchez-Rangel et al. (2021) present new results showing that carrot pomace treated with UVC radiation has an increased concentration of phenolic compounds, which are important in the food industry to produce nutraceutical compounds with antioxidant activity. The authors suggest the use of low-investment technologies to induce abiotic stress on carrot pomace and other vegetable by-products, originating a raw material rich in bioactive compounds to be further used at a large scale in the food industry in a cost-effective way [1].

Lignocellulosic agro and industrial wastes are important sources of carbon. Araújo et al. (2021) compared hydrolysates from banana peels, brewer's spent grains (BSG), corncobs, grape pomace, grape stalks, and sawdust as feedstocks for xylitol production at the shake-flask scale by the yeast *Komagataella pastoris*. The authors analyzed the different raw materials (regarding moisture, ash, cellulose, hemicellulose, lignin, arabinans, xylans, and protein) and the different hydrolysates produced (sugar composition and inhibitors). For xylitol production, the highest concentrations were obtained from BSG hydrolysate, and both *K. pastoris* growth and xylitol production were increased after the detoxification of the hydrolysate [2]. The manuscript highlights the potential of *K. pastoris* to convert lignocellulosic hydrolysates into high-value sugar alcohols, namely, xylitol and arabitol.

Silva et al. (2021) presented a state-of-the-art review on the microbial synthesis of lactones. Lactones can be produced through the microbial biotransformation of fatty acids,

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a superior alternative to chemical synthesis. However, the authors emphasize that the biosynthetic process needs further improvement, namely regarding the sustainability of the substrate. This review covers topics from the variety and importance of lactones and their biosynthetic routes to opportunities and challenges towards using a more sustainable industrial approach [3].

The carbohydrate-rich fraction that results from the hydrolysis of lignocellulosic materials comprises several simple sugars (e.g., glucose, xylose, arabinose, and mannose) that can be bioconverted into valuable molecules. Domingues et al. (2021) reviewed the current knowledge on xylose transport and conversion routes in bacteria, envisaging the production of two commercially interesting intermediates of the xylose metabolism in bacteria—xylitol and xylonic acid. From the published research on xylitol and xylonic acid production at shake-flask and bench-scale reactors, the authors conclude that thorough knowledge and optimization of the cultivation parameters (dissolved oxygen concentration, xylose initial concentration, and pH) is paramount to achieve the high productivities needed for large scale industrial production [4].

Gordalina et al. (2021) provided a current perspective on macroalgae as alternative protein sources in the context of a biorefinery approach. The major challenges facing protein extraction and purification relate to the complex nature of algal cell walls; however, the species to be used, harvesting season, location, and growth conditions should all be considered for the optimization of the process. The review focuses on macroalgae composition, protein extraction, enrichment, and characterization methods, and also on the potential bioactivities of macroalgae-derived proteins and peptides [5]. The authors include recently published research and newly available methodologies that will hopefully lead to the production of high-value protein concentrates from algae extract.

Overall, the main themes of the papers published in this Special Issue cover important achievements leading to sustainable bioproduction, particularly pertinent to addressing the environmental challenges of an increasingly industrialized world. We hope that this Special Issue will inspire researchers in the field, paving the way to new sustainable solutions to industrial challenges.

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