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Extraction of value-added components from food industry based and agro-forest biowastes by deep eutectic solvents

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Highlights

- The food sector is a major area in which there are potential opportunities for the development of new technologies
- A variety of extraction by deep eutectic solvents and naturally deep eutectic solvents can be applied to recover the target compounds and products from the different type of biomass, food and agro-forest waste.
- Green extraction by using deep eutectic solvents could be renewed and reinforced the interest for recovery new products, additives and functional ingredients used in the industrial food sector and to enhance food quality.

Abstract

The scientific community, experts in technology and marketing have been seeking cost-competitive and green solvents with good dissolving capacity for the valorisation of biomass and biowaste. Along with traditional solvents and techniques, deep eutectic solvents (DESs) and their bio-analogues, natural deep eutectic solvents (NADESs) are currently emerging as a new class of promising liquid media. In this review, a comprehensive summary of recent contribution of DESs to the processing and valorisation of various kinds of plant and animal based biomass and biowaste is provided. In the field of food industry based and agro-forest waste valorisation, through treatment of the waste, by-products, and natural materials by DESs, several types of compounds, such as flavonoids and other plant phenolics, phenolic acids, stilbenes, tannins, lignans, and lignin were obtained. Extraction of algae by DESs led to isolation mainly of proteins, carbohydrates, lipids and nucleic acids. Vegetable oils, spent oils, residues and by-products of their processing are a rich source of phenolic compounds such as phenolic acids and phenolic alcohols, secoiridoid derivatives (aglycone and ligstroside), lignans (pino and acetoxypinoresinol), flavones (luteolin and apigenin), tocopherols and tocotrienols. Dietary fibre serves as a source of lignin, pectic substances, gums, resistant starch, inulin, as well as non-carbohydrate components, e.g., polyphenols, waxes, saponins, cutin, phytates, resistant proteins. Valorisation of wastes originated from animal processing by DESs means obtaining high-value chemicals including amino acids, proteins, bioactive peptides, collagen peptides, albumin etc. Through the valorisation of the mentioned waste types value-added products with potential applications in the pharmaceutical, food and cosmetic industries are produced. The paper gathered data on the used DESs, treated substances and obtained products, together with treatment conditions and the products yields. The evaluation of the state-of-the-art in the field of biowaste valorisation using DESs and NADESs led to conclusions and indication of future prospects and predicted development in this field.

Key words: deep eutectic solvents, biowaste, biomass, valorisation, added value, extraction, fractionations, food industry

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