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Section

Food Science and Technology

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Section Editor-in-Chief

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Section Information:

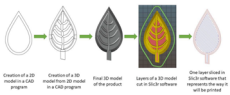
The Section on Food Science and Technology deals with the advancement of food quality; (bio)chemical characterization such as of nutritional composition, flavor compounds (volatiles and non-volatile compounds), bioactive compounds (antioxidants and other phytochemicals), and bioactivity; microbiological issues; and the design and evaluation of new formulated foods. It also includes some other aspects related to food technology, such as the effects of processing, stor-age, and preservation to maintain not only the quality but also the safety of foods. The main focus is on novel techniques for analytical purposes that could lead to increased food quality and safety and the development of new foods and in-gredients. Applied Sciences, in general, and this Section on Food Science and Technology, in particular, offer high-quality peer review followed by rapid publication.

Featured Papers

DOI:10.3390/app11020686

Internet of Nonthermal Food Processing Technologies (IoNTP): Food Industry 4.0 and Sustainability

Authors: Anet Režek Jambrak, Marinela Nutrizio, Ilija Djekić, Sanda Pleslić and Farid Chemat

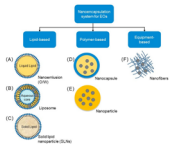


Abstract: With the introduction of Industry 4.0, and smart factories accordingly, there are new opportunities to implement elements of industry 4.0 in nonthermal processing. Moreover, with application of Internet of things (IoT), smart control of the process, big data optimization, as well as sustainable production and monitoring, there is a new era of Internet of nonthermal food processing technologies (IoNTP). Nonthermal technologies include high power ultrasound, pulsed electric fields, high voltage electrical discharge, high pressure processing, UV-LED, pulsed light, e-beam, and advanced thermal food processing techniques include microwave processing, ohmic heating and high-pressure homogenization. The aim of this review was to bring in front necessity to evaluate possibilities of implementing smart sensors, artificial intelligence (AI), big data, additive technologies with nonthermal technologies, with the possibility to create smart factories together with strong emphasis on sustainability. This paper brings an overview on digitalization, IoT, additive technologies (3D printing), cloud data storage and smart sensors including two SWOT analysis associated with IoNTPs and sustainability. It is of high importance to perform life cycle assessment (LCA), to quantify (En)—environmental dimension; (So)—social dimension and (Ec)—economic dimension. SWOT analysis showed: potential for energy saving during food processing; optimized overall environmental performance; lower manufacturing cost; development of eco-friendly products; higher level of health and safety during food processing and better work condition for workers. Nonthermal and advanced thermal technologies can be applied also as sustainable techniques working in line with the sustainable development goals (SDGs) and Agenda 2030 issued by United Nations (UN).

DOI:10.3390/app11135778

Nanoencapsulation of Essential Oils as Natural Food Antimicrobial Agents: An Overview

Authors: Wei Liao, Waisudin Badri, Emilie Dumas, Sami Ghnimi, Abdelhamid Elaissari, Rémi Saurel and Adem Gharsallaoui

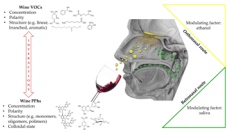


Abstract: The global demand for safe and healthy food with minimal synthetic preservatives is continuously increasing. Natural food antimicrobials and especially essential oils (EOs) possess strong antimicrobial activities that could play a remarkable role as a novel source of food preservatives. Despite the excellent efficacy of EOs, they have not been widely used in the food industry due to some major intrinsic barriers, such as low water solubility, bioavailability, volatility, and stability in food systems. Recent advances in nanotechnology have the potential to address these existing barriers in order to use EOs as preservatives in food systems at low doses. Thus, in this review, we explored the latest advances of using natural actives as antimicrobial agents and the different strategies for nanoencapsulation used for this purpose. The state of the art concerning the antibacterial properties of EOs will be summarized, and the main latest applications of nanoencapsulated antimicrobial agents in food systems will be presented. This review should help researchers to better choose the most suitable encapsulation techniques and materials.

DOI:10.3390/app11031157

Interactions between Polyphenols and Volatile Compounds in Wine: A Literature Review on Physicochemical and Sensory Insights

Authors: Elisabetta Pittari, Luigi Moio and Paola Piombino

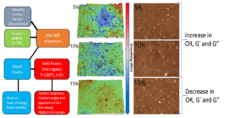


Abstract: Wine polyphenols (PPhs) and volatile organic compounds (VOCs) are responsible for two of the main sensory characteristics in defining the complexity and quality of red wines: astringency and aroma. Wine VOCs' volatility and solubility are strongly influenced by the matrix composition, including the interactions with PPhs. To date, these interactions have not been deeply studied, although the topic is of great interest in oenology. This article reviews the available knowledge on the main physicochemical and sensory effects of polyphenols on the release and perception of wine aromas in orthonasal and retronasal conditions. It describes the molecular insights and the phenomena that can modify VOCs behavior, according to the different chemical classes. It introduces the possible impact of saliva on aroma release and perception through the modulation of polyphenols–aroma compounds interactions. Limitations and possible gaps to overcome are presented together with updated approaches used to investigate those interactions and their effects, as well as future perspectives on the subject.

DOI:10.3390/app11114764

Effect of Sucrose on Physicochemical Properties of High-Protein Meringues Obtained from Whey Protein Isolate

Authors: Maciej Nastaj, Stanisław Mleko, Konrad Terpiłowski and Marta Tomczyńska-Mleko



Abstract: This study reports the possibility of obtaining the WPI-based meringues with the small sucrose content (0–15%). The whey protein isolate (WPI) solution (20%, w/v) was whipped and sucrose was added to foam at the concentrations of 5, 10 and 15%. The surface tension, viscosity, zeta potential of the pre-foam solutions, foam overrun, foam stability and their rheological properties (G′, G″ and tan (δ)) were evaluated. To produce meringues, liquid foams were solidified at 130 °C for 2 h. The surface properties (roughness, contact angles, apparent free surface energy) as well as microstructural ones were determined for the solid foams (meringues). The 15% sugar concentration was detrimental for overrun, stability and rheological properties of liquid foams. The meringue production without sugar was infeasible. The addition of the smallest amount of sucrose (5%) enabled preservation of the aerated structure of the liquid foam during solidification. The 10% sugar concentration increased the stability of liquid foam, its rheology and it was the most effective for air bubbles stabilization during the foam solidification, however, its largest addition (15%) resulted in an increase in the final meringue volume. Larger sucrose concentrations produced a smoothing effect on the meringue surfaces.

Special Issue Books

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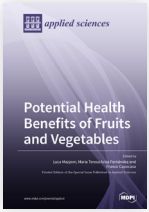
Potential Health Benefits of Fruits and Vegetables



Effects of Plants' Ingredients on Dough and Final Product

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