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Perspective

Food chemistry and preservation technologies

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DESCRIPTION

To solve global food safety and preservation concerns, new and sustainable food processing platforms are urgently needed. The use of non-thermal plasma discharges created within food packaging, often known as in-package plasma, is a very promising method. The in-package plasma technology is highly successful for bacterial and sporal sterilization, with minimal heat and deleterious impacts on food quality, low energy inputs, and no additional potentially dangerous food preservatives.

In package plasma based food preservation in a variety of processing combinations and packaging gas chemistries. The existing and emerging state-of-the-art in-package plasma-based food applications, as well as the prevalent microbial inactivation processes, are studied critically. The possible implications of diverse food items' shelf life on various nutritional, qualitative qualities, and chemical safety are examined. Microbial safety, nutritional quality, and cross-contamination of food goods may all be ensured with in-package plasma technology. While protecting the quality of fresh and minimally processed goods during shelf life, the in-package plasma efficiently inactivates harmful germs and prevents their proliferation. The use of oxygen-reduced atmospheres in conjunction with enhanced biopolymer materials for plasma packaging is expected to overcome the common constraints of present in-package plasma technologies originating from lipid oxidation and possible packaging material alteration by reactive species. Finally, to address the scientific and engineering problems of this potential food preservation method, recommendations and ideas for future investigations and applications are presented. Aroma and flavor are important food components that increase the organoleptic properties of food and make it more appealing to customers. The industry's microbiological source is used in commercial synthesis of aromatic and flavoring chemicals, although the principle has been underlying human behaviors from time immemorial. Microbial flavor compounds have piqued interest in recent decades due to their long-term viability as a source of natural additives for the food processing industry. Microbial bioprocess products also provide a variety of health advantages, ranging from antibiotics to fermented functional meals. Food thickening agents are commonly used to change the rheological and textural aspects of foods as well as to improve their quality. The main roles of food thickeners are to improve moisture binding capacity, structural modification, and change flow behavior features. Modified starches, proteins (alone or in conjunction with exudates and seed gums), seaweed extracts, and, most recently, microbial polysaccharides have all been found to improve product mouth feel, handling qualities, and stability. Temperature, shear, pH, ionic strength, and other factors affect the functioning of these thickening agents, therefore food processors must carefully optimize them during formulation. Moreover, the type of thickener used affects the product's functioning. The inclusion of a protein-based thickener improves the nutritional and rheological qualities by increasing the amino acid content (arginine, cysteine, histidine, lysine, proline, and aminobutyric acid). Realigning the polymer chains, on the other hand, lessens the contact between nearby molecules, resulting in a drop in viscosity. The generation of stable emulsions might be aided by steric stabilization or network building by bacterial cellulose fibrils. Nano cellulose is an endless substance that has promise in a variety of industries, including food, medicines, healthcare, packaging, personal care, and so on. By using suitable modification procedures on Nano cellulose, a variety of distinct functional nanomaterials with amazing characteristics may be created. The negative charge induced on the surface of the Nano cellulose during acid hydrolysis can form stable colloidal Nano suspensions, which improve its dispersibility and, as a result, its application in nano-related applications such as protein immobilization, drug delivery, inorganic reaction models, and so on. Nano cellulose may be used in a variety of food applications due to its high aspect

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ratio, hydrophilicity, high surface area, nontoxicity, rheological characteristic, biodegradability, and biocompatibility. Nano cellulose offers a lot of potential uses in the food business, such as stabilizing agents in food emulsions, functional additives in food (like dietary fiber and calorie reduction), food packaging materials, and so on. However, in order to respond to the safety and regulatory difficulties, permitted ethics to represent the created nanostructure, enumerate its properties, and estimate its toxicity are still required to achieve the usage of Nano cellulose as a commercial product in the food business. Principles of Green Chemistry and Green Analytical Chemistry have aided in the development of ecologically friendly procedures in order to build a more sustainable society. The tight link between sustainable development goals, green chemistry, and food bio economy has given this boost to sustainability. Green Analytical Chemistry based analytical methodologies, in particular, have aided in the assessment of food safety and quality, as well as food bioactivity.

Metabolomics has emerged as a critical methodological technique in the field of food research over the last decade. It combines advanced data analysis, such as multivariate statistics, with analytical chemistry technologies used in food safety, such as liquid chromatography and gas chromatography linked to mass spectrometry. This combination has a wide range of applications in the study of pollutants and metabolites in food, and these methods have been widely applied to a variety of problems such as food safety and food fraud.