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Application Perspectives of Plasma Technology for Food Industry

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Atmospheric pressure plasma (APP) technology has been used in a wide spectrum of fields from surface functionalization in semiconductor and display industry to human cancer treatment in medical industry. Along with the recent rapid progresses in plasma medicine, one possible application with high impact can be found in the food area since the APP can provide a comprehensive solution for the challenges in the food industry such as minimal process, organic and environment-friendliness, high quality, highly ensured safety, and long shelf-life. In this presentation, example-based discussions will be made particularly for the food safety, food processing and novel plasma sterilization packaging. Food safety is undoubtedly the most important priority for the food industry as well as consumers. There have been continuous efforts for developing non-thermal pasteurization methods to overcome the drawbacks of the conventional thermal methods. The APP can sterilize food at room temperature, and it can also be a promising cost-effective, convenient, and environment-friendly candidate for ensuring food safety. Several examples of antimicrobial effects of direct and indirect plasma treatments will be given in the presentation to show plasma as an excellent non-thermal sterilization means. In addition, a developed APP package technology is capable of inactivating pathogens in packaged food by using flexible multi-layer packaging film as a plasma source in which reactive oxygen and nitrogen species (RONS) are produced from the ambient air molecules by the plasma discharged on the film surface. Another creative application of APP to be mentioned is the use of APP-treated water as an alternative nitrite source, the most important curing agent for safety and quality of processed meat, along with the direct use of plasma in processed meat manufacturing. In addition to these application examples and experimental results, the requirements and conditions for developing the appropriate plasma sources will be discussed.

Keywords

atmospheric pressure plasma

food safety

plasma treated water

plasma active packaging