

Recent Advances on the Effect of Cold Plasma Treatment on Carotenoids

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Abstract

Cold plasma (CP) technology is gaining recognition as a promising approach in the food industry for preserving the stability and bioactivity of carotenoids. These pigments, abundant in plants and microorganisms, are essential for human health due to their potent antioxidant properties but cannot be synthesized by the human body. CP treatment produces reactive gases by generating plasma at low temperatures, which can inactivate microorganisms and modify enzymatic activity in food systems. The effects of CP on carotenoids are influenced by key parameters such as voltage, treatment duration, type of gas used, and the specific food matrix. CP has the potential to enhance carotenoid content by facilitating their release from cellular structures. However, it may also trigger oxidative reactions that degrade carotenoids under certain conditions. For example, CP treatment has been shown to improve the brightness and redness of carrot juice but reduce its carotenoid content. Conversely, in fruits such as mango, CP can enhance the preservation of carotenoid content during storage. Similarly, in tomatoes, CP treatment has been reported to either increase or decrease lycopene content, depending on the processing conditions. The advantages of CP include its ability to extend the shelf life of carotenoids, its energy efficiency, and its low environmental footprint. Despite these benefits, challenges persist in scaling up CP technology for industrial applications and optimizing its processing parameters. Future research should focus on elucidating the effects of CP on carotenoid stability across diverse food matrices and unlocking the full potential of this innovative technology in the food industry.

Key Words:

