

Accepted Manuscript

Innovative food processing technologies on the transglutaminase functionality in protein-based food products: Trends, opportunities and drawbacks

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PII: S0924-2244(17)30778-1

DOI: [10.1016/j.tifs.2018.03.014](https://doi.org/10.1016/j.tifs.2018.03.014)

Reference: TIFS 2193

To appear in: *Trends in Food Science & Technology*

Received Date: 11 December 2017

Revised Date: 13 March 2018

Accepted Date: 14 March 2018

Please cite this article as: Gharibzahedi, S.M.T., Roohinejad, S., George, S., Barba, F.J., Greiner, R., Barbosa-Cánovas, G.V., Mallikarjunan, K., Innovative food processing technologies on the transglutaminase functionality in protein-based food products: Trends, opportunities and drawbacks, *Trends in Food Science & Technology* (2018), doi: 10.1016/j.tifs.2018.03.014.

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Abstract

Background: Consumption of protein-based food products has a key role in the improvement of human health. The crosslinking agent microbial transglutaminase (mTGase) is an effective and promising tool to modify animal proteins used in the food industry. Improvement in the gelation process, physicochemical and textural quality, and consumer's demand of protein-based food products could be attained by combining mTGase and some non-conventional food processing technologies. *Scope and approach:* New perspectives and key areas for future research in the development of high-quality food proteins and protein-based products as a function of interaction effect of mTGase and some new processing techniques (e.g. high pressure processing (HPP), ultrasound, microwave (MW) and ultraviolet (UV) irradiation) are reviewed. The effect of conventional thermal and emerging processing methods on the mTGase crosslinking activity and protein gel functionality are also compared. *Key findings and conclusions:* The crosslinking density and functional properties of protein gels can be strongly promoted by the synergistic action of mTGase and innovative processing methods. Compared to the conventional heating, HPP with further increase of mTGase affinity to proteins can result in products with better physicochemical quality and more complex and firmer gel structure. The yield, water holding capacity, surface hydrophobicity, strength, and viscoelastic characteristics of mTGase-catalyzed protein gels can be significantly increased by ultrasonication treatments. mTGase-crosslinked hydrogels subjected to high-intensity ultrasonic pretreatment have potential to be used as delivery vehicles for a wide spectrum of bioactive compounds. The application of MW and UV light can substantially improve the surface, textural and structural features of gels generated by mTGase-technology.

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