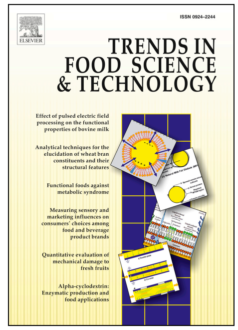
Accepted Manuscript



Techno-functional and biological properties of food protein nanofibrils formed by heating at acidic condition

Mehdi Mohammadian, Ashkan Madadlou

PII: S0924-2244(17)30451-X

DOI: 10.1016/j.tifs.2018.03.013

Reference: TIFS 2192

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

Received Date: 8 July 2017

Revised Date: 7 March 2018

Accepted Date: 11 March 2018

Please cite this article as: Mohammadian, M., Madadlou, A., Techno-functional and biological properties of food protein nanofibrils formed by heating at acidic condition, *Trends in Food Science & Technology* (2018), doi: 10.1016/j.tifs.2018.03.013.

Abstract

Background: Nanofibrillation of proteins by heating at extremely acidic condition for long durations (several hours to days) is studied enthusiastically in food science. The process progresses by the unidirectional self-assembly of peptides as building units of the fibrils.

Scope and approach: This communication provides a review on the underlying mechanism of protein fibrillation, and various technological properties of the fibrils, followed by discussing their biological and cellular effects.

Key findings and conclusions: Fibrillation of proteins and addition of the fibrils into liquid foods causes a significant increase of apparent viscosity. Nevertheless, certain post-fibrillation processes such as freeze-drying may result in viscosity reduction. Fibrils form cohesive viscoelastic interfaces, bringing about high foam and emulsion stability. The presence of non-fibrillated peptides and low molecular weight surfactants influence the foaming and emulsification properties of fibrillated protein solutions. Fibrillated protein can yield cold-set gels at extremely low concentrations, which is attributed to formation of space filling networks. Reinforcing polymeric films, conferring hydrophilic character to graphene, developing drug and nutraceutical delivery vehicles such as microcapsules, microgels and fibrillosome and utilization (mostly as scaffolds) in fabrication of biosensors and bio-sorbents are the other applications of protein fibrils. Fibrillation may increase the antioxidant activity of proteins. It can also influence protein digestibility. Fibrils do not exert any major toxicity towards human cell lines and can be exploited as biomimetic cell culture platforms and cellular transport shuttles.