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Incorporation of solid lipid nanoparticles (SLN) in protein gels: Impact on water holding capacity and rheological properties

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Filling gels with emulsions or suspensions may change their network structure. It is known that gel characteristics are altered compared to non-filled gels¹. Droplet- or particle-sizes as well as the concentration of filler materials affect the properties of these gels². In the present study, we investigate the impact of the incorporation of solid lipid nanoparticles (SLN) on the characteristics of cold set β -lactoglobulin gels. In this contribution we present experimental results for different SLN concentration (0 %, 1.5 %, 2.5 %, 4.7 % w/v) and time of SLN addition (before or after protein denaturation). After thermal denaturation, the formation of the network was induced by reducing the pH-value. The gels were characterized with respect to their water holding capacity, rheological properties and gel strength.

Both in the presence and absence of SLN, the gels showed viscoelastic properties and thixotropic behavior. The water holding capacity and the gel strength increased with increasing SLN concentration. The time at which the SLN were added to the protein solution had a smaller impact on the gel characteristics than the nanoparticle concentration. No differences in storage modulus and water holding capacities between gels containing SLN that were incorporated before or after heat denaturation of the protein were found.

SLN in β -lactoglobulin gels act as active filler and influence the characteristics of the gel. This study will help in understanding better the behavior of nanoparticles during network formation and their influence in complex food structures, the latter being a prerequisite for prospective applications.

1. Oliver, L.; Scholten, E.; van Aken, G. A. *Food Hydrocolloids* **2015**, 43, (0), 299-310.
2. Gravelle, A. J.; Barbut, S.; Marangoni, A. G. *RSC Advances* **2015**, 5, (75), 60723-60735.