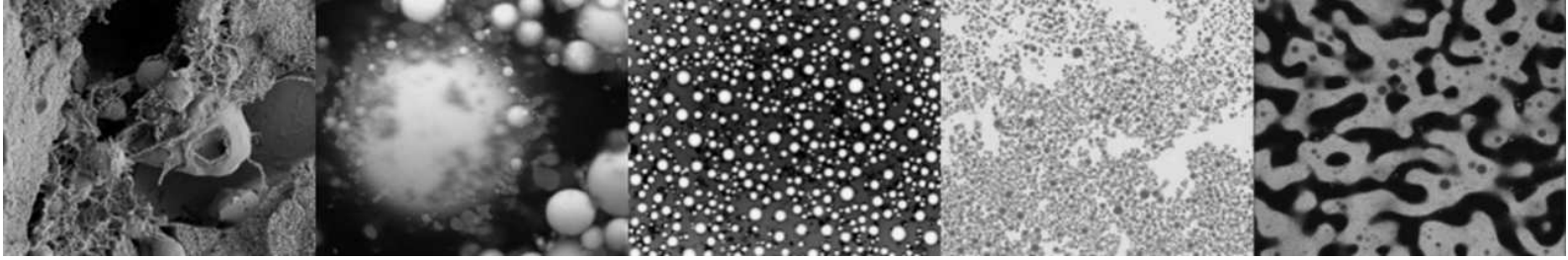

RSP-63

Incorporation of solid lipid nanoparticles in β-lactoglobulin gels and their impact on the network structure

Verena Wiedenmann [1,2], Kathleen Oehlke [1], Heike Petra Karbstein [2], Ulrike van der Schaaf [2]

[1]Max Rubner-Institut, Department of Food Technology and Bioprocess Engineering, Karlsruhe, Germany
[2]Karlsruhe Institute of Technology, Institute of Process Engineering in Life Sciences, Food Process Engineering, Germany

Nanoparticles show great potential as carriers of active substances enhancing the functionality of foods. Besides, they also modify food structure related properties such as firmness or syneresis of gels. In this contribution, the impact of solid lipid nanoparticles (SLN) on β-lactoglobulin (BLG) based gels was investigated. By using SLN, we aimed to improve gel properties like syneresis and gel strength.

SLN were prepared by ultrasound assisted hot emulsification and stabilized by sucrose palmitate, soy lecithin and Tween 20. Tween 20 was exchanged by BLG to modify possible interactions between SLN and the protein. SLN stabilized by BLG (B-SLN) or Tween 20 (T-SLN) were added to the BLG-solution before or after the heat denaturation of the protein at varying concentrations (0.25 to 2.5 wt.-%). Gelling of the protein was initiated by decreasing the pH value. The characterization of the gels included syneresis, network structure and mechanical properties.

All gels showed fine stranded network morphology. The addition of B-SLN increased the Young's modulus of the gels compared to the control. B-SLN caused many ramifications within the gel and no particles were detected in the syneresis water. T-SLN, incorporated before heat treatment, did not affect the Young's modulus. By contrast, T-SLN added after heat denaturation, decreased the gel strength. They led to structural defects and disrupted lamellae. Furthermore, in all samples containing T-SLN, particles were washed out and found in the syneresis water.

The results indicate the integration of B-SLN in the protein gel network and their function as bound particles. T-SLN did not participate in the gel network and hence act as unbound particles.
It could be shown, that both types of SLN influence the gel network properties. By a proper choice of emulsifier, SLN can be used to modify gel properties in a targeted way.

17th Food Colloids Conference 2018 : Application of Soft Matter Concepts, 8th-11th April 2018, Leeds, UK