3rd Food Structure and Functionality Forum Symposium & 3rd IDF Symposium on Microstructure of Dairy Products, 3 - 6 June 2018, Montréal, Quebec, Canada

Preparation and characterization of oleogels based on whey protein aggregate stabilized o/w emulsions

Verena WIEDENMANN[1], Marina VEMMER[2], Bertrand MATTHÄUS[2], Kathleen OEHLKE[1]

[1]Max Rubner-Institut, Department of Food Technology and Bioprocess Engineering, Karlsruhe, Germany

[2]Max Rubner-Institut, Department of Safety and Quality of Cereals, Detmold, Germany

Hardened fats are responsible for the required texture and mouth feel in various foods but are physiologically unfavorable due to their high content in saturated fatty acids or *trans* fatty. Structured lipids have been developed to replace hardened fats. By oleogelation liquid oils are converted into gel-like structures and gain solid-like behavior. We aimed to produce oleogels by drying and subsequently shearing of o/w emulsions that were stabilized by whey protein aggregates.

Whey protein aggregates were produced by heating 5.6% whey protein in phosphate buffer solution. The size of the aggregates was varied by using pH value of 5.8 or 7.0 (aggregate size approx. 150 nm and 50 nm, respectively). The protein suspensions were used to stabilize 30% canola oil-in-water emulsions at concentrations of 2.0, 4.0 or 6.0% v/v. The emulsions were freeze dried. The dried emulsions were sheared for varying times (30, 40, 50 s) and the samples were characterized regarding their oil holding capacity, firmness and rheological behavior.

Gel-like structures with viscoelastic behavior were obtained by drying and shearing protein-stabilized emulsions containing 4% protein or more at both protein aggregate sizes. The oil holding capacity of the oleogels increased with increasing protein concentration. Increasing shearing times of the dried emulsions increased the sample homogeneities but led to reduced sample firmness. An increase in protein aggregate size resulted in a higher gel firmness.

In this study, we demonstrated that drying and shearing of whey protein aggregate-stabilized emulsions results in the formation of gel like structures and how protein concentration, aggregate size and shearing time affect the later oleogel properties. The produced gels will help in developing alternatives to hardened fats, like e.g. conventional baking fats.