

AFFECTING TEXTURAL PROPERTIES OF PROTEIN FOODS WITH PROTEIN MICRO-STRUCTURES

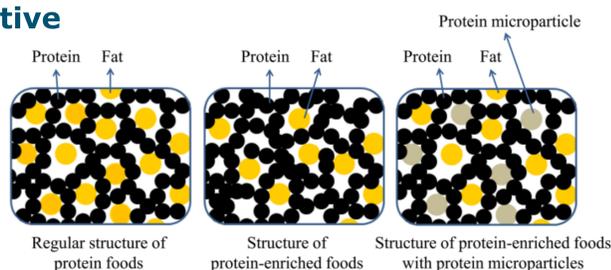
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Background

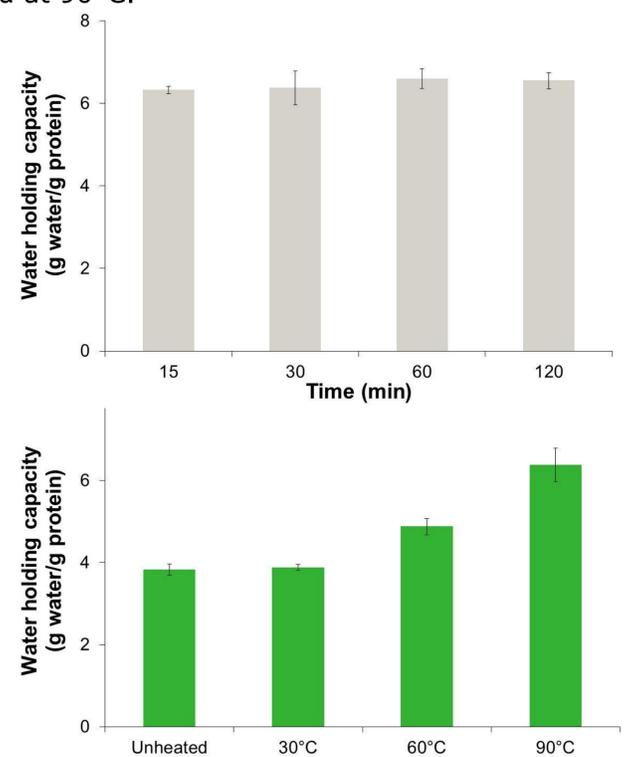
Nowadays, there is a great demand for protein-enriched products. Those products can be beneficial for consumers who want to increase their muscle mass and strength, like elderly and athletes. They can also be used by obese people since protein-enriched foods are giving a longer satiety effect than a carbohydrate-rich diet. In this case, the product may not contain too many calories, so a protein product with an increased water content could be even more advantageous. However, an increase or decrease in the protein content can not be established without affecting its textural properties yet. Therefore, the product properties like the water holding capacity and the mechanical characteristics should be decoupled from the protein concentration. **Changing the internal micro-structure** seems to be a promising method for this.

Objective



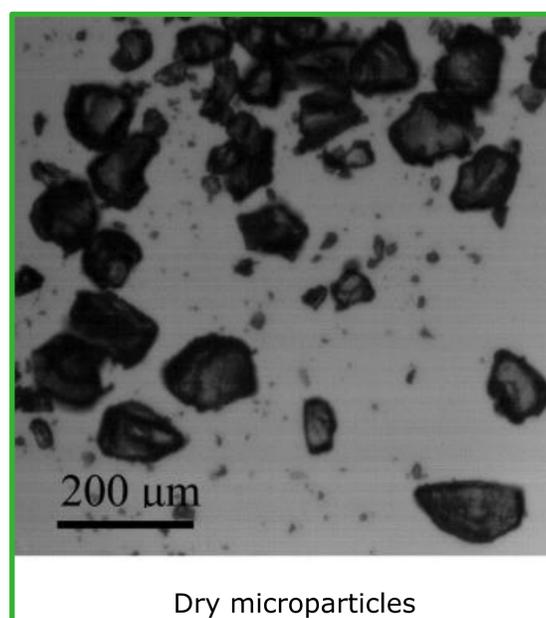
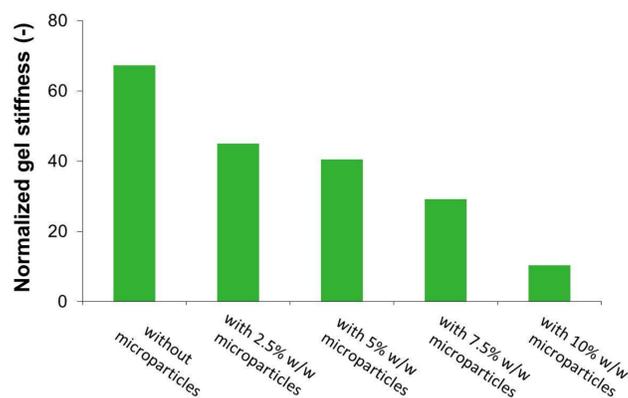
The effect of water on the microparticles

Microparticles are able to absorb water. This amount can be increased by heating the samples, so solubilisation of the particles could also occur. However, the time of heating did not influence the water holding capacity when heated at 90°C.



Results

The effect of microparticles in a model system



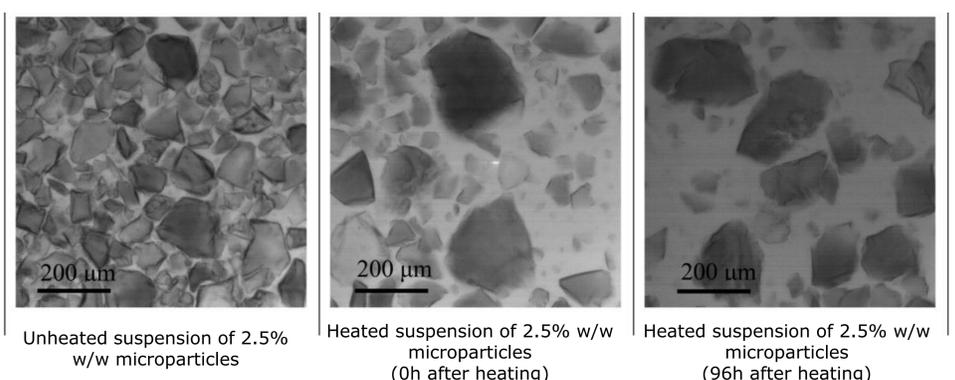
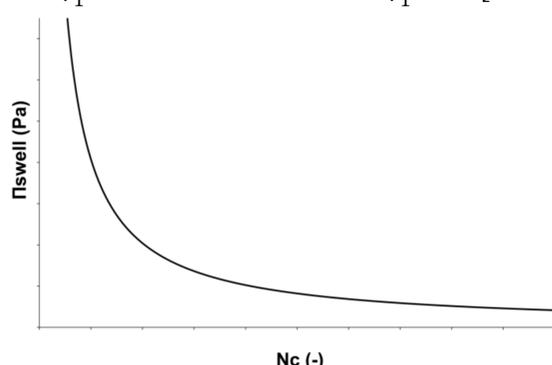
Inclusion of the microparticles decreased the stiffness of the model whey protein system due to:

- a decreased protein content in the continuous phase
- their property to act as an inert structural element
- **water migration**

Modelling swellability

With the Flory-Rehner equation it will be tried to describe the maximal swelling that can be reached by taken into account the polymer-solvent interaction parameter (χ) and the crosslink density (N_c).

$$\Pi_{swell} = -\frac{RT}{V_1} [\ln(1 - \phi) + \phi + \chi\phi^2] - \frac{RT}{V_1} N_c^{-1} \left[\phi^{1/3} \phi_0^{2/3} - \frac{\phi}{2} \right]$$



Conclusions

- **Protein micro-structuring is an interesting tool** to control the textural properties of protein foods.
- Micro-structuring might influence the product stability negatively. It introduces domains with different protein concentrations and hence **a driving force for migration of water** and other components.



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