Towards the development of food delivery systems by making use of microgel stabilized emulsions

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Microgels are intriguing colloidal entities that exhibit properties of both particles and hydrocolloids. In recent years, there has been a growing interest in exploring the potential of microgels to serve as emulsifiers. Furthermore, microgel stabilized emulsions could have great potential as protective systems for valuable nutrients in the dispersed phase of the emulsions and at the same time due to their environment responsiveness to serve as delivery systems for the same compounds. This study focuses on the development of alginate-chitosan microgel stabilized emulsions as food delivery systems. Microgels were formed via shear rupture of macrogels (top to bottom approach), a method which is easy to apply for the food industry. Different chitosan/alginate ratios and different levels of pH were examined. For the emulsions medium fatty acid chain triacylglycerol oils were used as the dispersed phase and vitamin D was added as the bioactive nutrient. The interfacial properties of the systems (determined via dynamic interfacial tension measurements and transient relaxation measurements) were compared with their structural properties determined via confocal laser microscopy (CLSM), and time-domain nuclear magnetic resonance (TD-NMR) as well as with the emulsion stability during storage. The performance of the delivery systems under different pH corresponding to typical food pH and typical pH in the gastrointestinal tract is examined. The potential to use these systems as future delivery systems for targeted nutrition is discussed.

Keywords:
microgels, emulsions, delivery systems

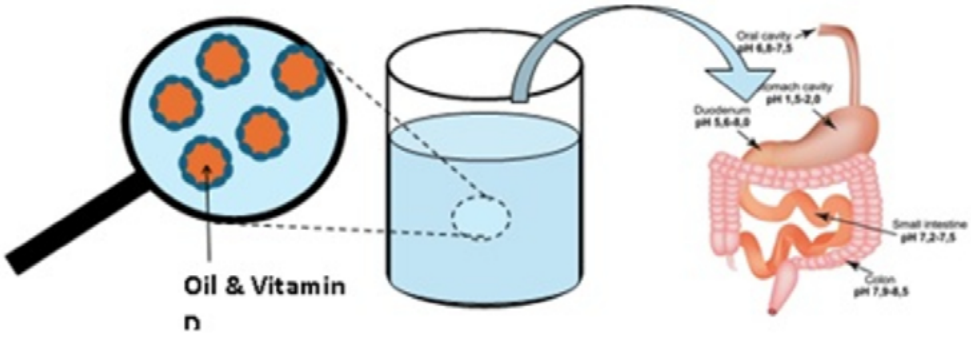

Figure 1. Scheme of the structure and application of the microgel stabilized emulsions.